5th National Conference and Webinar on Doubling Farmers Income for Sustainable &Harmonious Agriculture 'DISHA-2022'

11th & 12th, June 2022

ABSTRACTS PROCEEDINGS BOOK
(Volume-5)

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ABSTRACTS PROCEEDINGS BOOK

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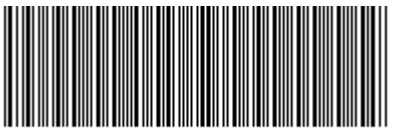

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PREFACE

Hon'ble Prime Minister of India, Shri Narendra Modi Ji, has called for Doubling Farmers income by 2022. The Organizing Team of DISHA conferences have been in forefront from the year 2017 onwards when the first DISHA conference was launched at the very lord's place at Tirupati. This generated massive students, young researchers, scientists, farmers level awareness regarding various programs , schemes of Govt of India . To create awareness with very limited and with our own resources , organizers of DISHA have highlighted through their delegates papers, manuscripts , documents several innovations happening very fast in agriculture and allied sciences and their noteworthy achievements made by Indian farmers in last 7 decades since Independence. The small and marginal farmers are as good as medium and large farmers in adopting the improved agricultural technology for raising production but what they lack is resources and capital in hand. The idea to organize DISHA 2021 was again to generate the awareness on new knowledge/ technologies driven approach. When the rules of the farming have changed and more and more innovations led farming fastly changing the scenario at farm levels in India and abroad, it is here that a lesson or two learning will lead to uprising among the farmers. It is in this context, DISHA 2022. is conceptualized with the hope that deliberations by eminent, abroad and galaxy of speakers may provide a vibrant approach so as to tability of the small and marginal farmers to raise the productivity. This particular, DISHA-2022, this time, will attract several experts deliberations either electronically or through physical presence from abroad and particular emphasis will be on to bring out several books, books chapters, documents and manuscripts related to doubling farmers income through science led farming practices.

This conference is about survival, adaptation, new opportunities to enable traditional agriculture cope up with the challenges of sustainable agricultural production in this Information Age. This conference is more of being up-to-date with current knowledge and technology-driven farming methods with the purpose of sustainably improving land productivity. This sharing of practical experiences and exchange of scientific knowledge motivates, prepares and equips our younger generation for the challenges ahead.**President, life members, and staff of GREEN AGRI PROFESSIONAL SOCIETY", DHANBAD, JHARKHAND,** India,,PRAGATISHEEL KRISHAK VIKAS SEWA SANSTHAN, PATNA , Bihar,FARMERS YOUTH FORUM, BARH, PATNA,Bihar deserves, a lot of thanks for their persevereence and hard work , who whole heartedly worked for organizing the conference. Editors are thankful to all the contributors of the book. Efforts have been taken to proof read the book before printing. As this is the major conference of the society, some errors will sleep in for which we place our advance apologies. Help rendered by N Suresh Babu in timely printing is duly acknowledged. Authors acknowledge one and all who helped in organizing this conference.

June,2022

Dr. Alok Kumar Singh
Chief Editor

ABSTRACTS

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DOUBLING FARMERS INCOME THROUGH PROCESSING OF UNDERUTILISED HORTICULTURAL FRUIT-POMELO

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ABSTRACT

Manipur is biodiversity hotspot, having many underutilized fruits and considered as one of the hotspot of global significance. More than 60% of the geographical area is covered under forest. Pomelo is one of underutilised fruit, which remain wasted every season. Pomelo, popularly known as 'nobab' is the largest citrus fruit from the family Rutaceae having high nutritional and medicinal value. The fruit is also consumed as a raw fruit and also used for festive occasion food item which help to slow down the aging process, reduce cancer cell growth and also to balance the cholesterol levels. Pomelo fruit is a juicy fruit with predominantly white or pink colour succulent pulp/flesh having high nutritional and medicinal value. It is a natural fruit which contains high quality vitamin C, natural fibre, carbohydrate, potassium, magnesium and zero cholesterol. Pomelo fruit is used for the formulation of indigenous herbal medicines which are used for boosting immune system and also to fight body resistance to infectious diseases. Pomelo fruit is one of the underutilised fruit which is wildly available in plenty in every hillock of Chandel district, Manipur during October to January. It is highly perishable. Due to lack of storage and knowledge for processing, preservation and value addition, a huge amount of fruits go wasted every year. To tackle such problem, KVK, Chandel took initiative for the promotion of processing and value addition of such underutilized fruits in the form of squash, RTS, jam, chutney, marmalade and candy. The BC ratio of the products are very high 1:3 and this enterprise could double the income of some farmwomen and could sustain livelihood through this enterprise and also enhance the socio economic status which help to empower many farmwomen of Manipur.

Key words: Biodiversity, Pomelo, underutilized fruit, medicinal value, value addition,

LINSEED FOR FARMERS' PROSPERITY AND SUSTAINABLE DEVELOPMENT

***Shanti Bhushan[1], Sunil Kumar[1], Sanjay Kumar[2], S. R. P. Singh[1], Akhilesh Kumar Singh[1] Pankaj Kumar Sinha[3], Shivnath Das[4] and Anuj Kumar Choudhary[5]**

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ABSTRACT

Linseed *(Linum usitatissimum* L.) is among one of the oldest crop plants cultivated for the purpose of oil and fibre. It is basically a cool season crop, mainly grown under input starved and moisture stress situation in India. Areas where there is less or no irrigation facility, linseed can be a better option thus bringing sustainability. Based on use, linseed is basically classified into three types viz.; varieties grown only for seed/oil are known as seed type linseed, whereas, varieties yielding only fibre are known as flax whereas varieties grown for getting both seed and fibre are called dual purpose linseed. Production of dual purpose linseed will certainly be helpful in changing the production status of linseed, which will not only increase the income of farmers but also help in employment generation for rural and urban masses along with smart earnings of foreign currency to improve agro socio-economy. Advances in medical research have found linseed as best herbal source of Omega-3 and Omega-6 fatty acids with immense nutritional/medicinal effect on human body system. Essential Omega-3 fatty acid (ALA) plays an important role in lowering cholesterol, reducing inflammatory disorder like rheumatoids arthritis and providing immunity and cardiovascular benefits. Linseed is one of the richest sources of lignin (800 times more than any other plant seed except sesame seeds 47 times more) which provides protection against certain form of cancer due to estrogenic and anti-estrogenic activity in the body.

Key words: Farmers, Sustainable ALA, Linseed

ROLE OF ICT IN DOUBLING FARMERS INCOME

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ABSTRACT

Keywords: Indian economy, ICT, agriculture extension.

Agriculture in India is the core sector for food security, nutritional security, sustainable development & for poverty alleviation. It contributes approximately 16% of GDP. Even today, nearly half Indian population adopts agriculture sector as their primary occupation and source of income. In spite of major role of agriculture in Indian economy, agriculture is lagging behind in many aspects such as poor connectivity and disintegration of market, unreliable and delayed information to farmers and less adoption of recent technologies by farmers. Information and Communication Technologies (ICTs) can be used as key enablers for accelerating agricultural development for updating farmers with recent information about agriculture, more efficient and integrated production and widening the market horizons of farmers. ICTs may include devices, networks, services and applications, including internet-based technologies and tools like telephones, mobiles, televisions, radio and satellites. Central, state and private organization have taken ICT measures for agriculture extension which include e-choupal, e-krishi, Agrisnet, Digital mandi, Kisan call centres (KCCs), e-sagu, IKSL (IFFCO Kisan Sanchar LTD), Agmarket, aAQUA (Almost All Questions Answered), Kisan SMS portal, etc. ICT has empowered the rural communities, improving networking and social connectivity between the farmers. It has modernized the aspects of farm management and has given agriculture in India a new face. Various start-ups with innovative ICT application have entered the agriculture sector in past few years though sustenance is low due to lesser adoption of technology. Government should look into the matter and should promote ICT adoption by creating awareness among farming community.

DOUBLING OF FARMERS INCOME THROUGH PROCESSING OF FISH

***Dr. Y. Jamuna Devi and Dr,Y.Prabhabati Devi**
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KVK, Chandel, ICAR, Manipur Centre

ABSTRACT

Fish is one of the main food item of the majority of the people . Fish is an excellent and cheapest source of high quality animal protein consumed by the people since the days of our forefathers. It is also an excellent source of high quality protein which contains essential amino acid, lipid, long chain n-3 unsaturated fatty acid, which is very important for the normal functioning of nervous system and blood clotting of human body. If carefully exploited, the freshwater fish as a renewable natural resource can be utilized to meet of protein requirement. Fish is highly perishable commodity having shorter shelf life. Spoilage of fish commences immediately after harvesting. Processing and value addition.in the form of drying, smoking and fermentation of fish are considered as Manipur-specific technologies for preservation and value addition of fish. It can increase the shelf life and can makes the product more attractive to the buyers and also increase the taste, texture and color of the finished product. and can also made the product available throughout the year. Promotion of value added product is essential to minimize post harvest loses and also to obtain optimum profit.. Establishment of enterprise on preservation and value addition of fish helps to generate more profit which indirectly helps for increasing and betterment of the livelihood of women and also to increase employment opportunities of women folk and empowerment of women in the family as well as in the society. The enterprise on processing of fish can double the income of farm women as the benefit cost ratio is very high. The demand of the fish product is very due to its high nutritional content.

Key words: Enterprise, fish, shelf life, preservation and value addition

DIGITALIZATION OF AGRICULTURE TO EMPOWER THE FARMERS: DIGITAL TRANSFORMATION AND IT REVOLUTION TO UPSURGE PROFITABILITY

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ABSTRACT

India is primarily an agrarian economy, so modernization in agriculture and allied sectors are very important to empower farmers and improve their life-style. By using age-old methods to uplift farmers' life take quantum time, that's why adoption of new technology and internet based tools are crucial in this digital era. According to recent research, the global drone market within agriculture would grow at 35.9% CAGR and reach $5.7 billion by 2025. Considering this Government of Haryana planned to train drone pilots, the state come up with a new plan to establish an institute named 'Drone Imaging and Information Service of Haryana Limited' (DRIISHYA). Similarly, the Government of Kerala holds the distinction of establishing the first-ever IT park in the country and has opened nation's first Digital University aka Kerala University of Digital Sciences Innovation and Technology which has ongoing collaborations with the Indian Space Research Organisation (ISRO), Indian Institute of Space Science and Technology (IIST) etc. On other hand 5G calls are successfully tested at IIT-Madras which (5G network) is entirely is designed in India. ICTs are most natural allies to facilitate the outreach of Agricultural Extension system in the country. Not only in Agriculture but also in other allied sector like community science is indulge in internet based methods. In March-April 2022, Group of 10 students of Extension Education of Community science batch 2018-2022 got training at NIIT, Patna in the course of HTML 5, CSS, and JAVA Script. By the help of this course they are now able to create new website, animated photo gallery and so on; which may help to boost the agribusiness and awareness of rural youth.

Keywords: Agricultural Digitalization, Digital University, Drone Institute, IT revolution,

PRECISION FARMING: AN OPPORTUNITY FOR INDIAN FARMERS

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ABSTRACT

In India, conventional agronomic techniques follow a blanket prescription for a broad area, regardless of the variety that exists within and among farms. Native nutrient status varies not just from field to field, but also geographically and temporally within a field. Precision agriculture is a farming management approach that involves observing, measuring, and responding to inter and intra field variability in crops and animal rearing. The benefits will mostly come from greater yields and increased production profitability for the farmer. Better working conditions, enhanced animal welfare, and the possibility to improve different elements of environmental stewardship are among the other advantages. Precision agriculture thus contributes to the larger goal of agricultural production sustainability. Precision agriculture is now possible because to the advent of sensor technologies and techniques for linking mapping variables to appropriate farming practises such tillage, seeding, fertilisation, herbicide and pesticide application, harvesting, and animal husbandry. Precision agriculture is characterised by positioning technologies, particularly Global Navigation Satellite Systems, which are a primary facilitator of 'precision.' Precision agriculture is most advanced among arable farmers, particularly those with vast farms and field sizes in India's main grain growing regions, and where maximising profitability is the primary motivation. The most effective uses on arable land are controlled traffic farming and auto guiding systems, which show clear benefits in practically all circumstances. The success of Variable Rate Application strategies, such as tailoring fertiliser or pesticide use to areas of need, varies substantially depending on the application's individual parameters. Machine vision approaches have benefited products that are often of high value and where quality is crucial to earning a premium price, such as fruit and vegetables and vineyards. Irrigation is also being scrutinised for such crops and arable areas, as water shortages are becoming more common, and supply on intensive agricultural areas need precision management. To maximise water use efficiency, precision agriculture methods that use reliable indicators of water stress are used. Precision livestock farming, which uses automatic monitoring of individual animals to produce meat, milk, and eggs, as well as monitor animal behaviour, welfare, and productivity, as well as their physical environment, is used.

DOUBLING OF FARMERS INCOME THROUGH PROCESSING OF FISH

***Dr. Y. Jamuna Devi and Dr,Y.Prabhabati Devi**
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ABSTRACT

Fish is one of the main food item of the majority of the people . Fish is an excellent and cheapest source of high quality animal protein consumed by the people since the days of our forefathers. It is also an excellent source of high quality protein which contains essential amino acid, lipid, long chain n-3 unsaturated fatty acid, which is very important for the normal functioning of nervous system and blood clotting of human body. If carefully exploited, the freshwater fish as a renewable natural resource can be utilized to meet of protein requirement. Fish is highly perishable commodity having shorter shelf life. Spoilage of fish commences immediately after harvesting. Processing and value addition.in the form of drying, smoking and fermentation of fish are considered as Manipur-specific technologies for preservation and value addition of fish. It can increase the shelf life and can makes the product more attractive to the buyers and also increase the taste, texture and color of the finished product. and can also made the product available throughout the year. Promotion of value added product is essential to minimize post harvest loses and also to obtain optimum profit.. Establishment of enterprise on preservation and value addition of fish helps to generate more profit which indirectly helps for increasing and betterment of the livelihood of women and also to increase employment opportunities of women folk and empowerment of women in the family as well as in the society. The enterprise on processing of fish can double the income of farm women as the benefit cost ratio is very high. The demand of the fish product is very due to its high nutritional content.
Key words: Enterprise, fish, shelf life, preservation and value addition

AQUACULTURE INTERVENTIONS VIS-A-VIS FOSTERING FARMER'S INCOME.

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ABSTRACT

India is blessed with abundant and diverse natural resources. India has 10,360 rivers, 195,210 km rivers and canals, 2.41 million hectare ponds and tanks, 0.812 million hectare flood plain lakes, 3.15 million hectare reservoir, and 3.9 million hectare estuarine, as well as 7516.6 km coastline, 193,834 km2 territorial sea (up to 12 nautical miles), and 2,305,143 km2 Exclusive Economic Zone (EEZ) area. India ranks third in fisheries production and second in aquaculture. In India, the agricultural community is quite diverse in terms of land ownership (from major progressive farmers with enormous holdings to small/marginal farmers with small holdings) and farming activity (crop cultivation, horticulture, floriculture, dairy, poultry, fisheries and many other allied activities). Due to several socio-economic issues and changing environment, operating small land holdings for long-term economic gains is becoming unviable. Income flow is insufficient to support farm households for resource-poor small/marginal farmers. Due to the uncertainty of input/output pricing and markets, as well as the negative impact of policy action and climate change, farmer productivity and farm income are dropping, and the farmer community is sliding into poverty, indebtedness, and suffering. Mr. Narendra Modi, India's Prime Minister, took the initiative on February 28, 2016, to quadruple farmers' income by 2022. Farm productivity must be increased through technological interventions, market access must be improved, and the industrial and service sectors must be developed to support various farmer activities in terms of marketing and processing their produce, as well as other requirements in terms of self-employment/employment in the farming sector.

Three ways to enhance income of farmers:-

1. Increasing the gross income: High production/ productivity, High market price, Diversification and Reducing post-harvest losses(value addition).
2. Reducing the production costs: Integrated farming models involving complementary farming systems and Reduced input cost.
3. Stabilizing the income: Insurance/risk management and Expansion of irrigation area.

Keywords- Aquaculture, Farming, small/marginal farmers, productivity.

FARMER'S PROFITABILITY OF BANANA CULTIVATION AT KUSHINAGAR DISTRICT OF EASTERN UTTAR PRADESH

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ABSTRACT

Bananas are one of the most popular fruits in the world. They are the fourth most important food crop after wheat, rice, and maize in terms of production and are the world's favorite fruit in terms of consumption quantity. The study was conducted to analyse production of banana in Kushinagar district of Uttar Pradesh. The district was selected purposively. 50 farmers were selected by simple random sampling method. There are 17 marginal, 11 small, 16 medium, 6 large farmers. large farmers from five selected villages of the one block of the district. The farm level data and required information of banana growing farmers pertaining to crop year 2019-2020. The average cost of banana cultivation was Rs. 272342.41 per hectare. The over cost A_1 accounted 65.67 per cent of total cost (cost C_3). Cost A_1 and cost A_2 were found to be same as there was no land was taken on lease. Cost B_1, Cost B_2, cost C_1 and C_2 was found to be 68.81, 88.84, 70.88 and 90.00 per cent of cost C_3, respectively. The cost C_3 which take into account the marginal function performed by farmers was Rs. 299576.65. The average gross income, net income per hectare comes to Rs. 644803.75, Rs. 372461.32. The B: C which indicated the profitability of investment was observed to be 2.36 at the overall level.. Non availability of high yielding variety of banana was considered as the most important problems major faced by the banana grower with 62.24 average score in garret ranking. Non availability of seed/Suckers in time was considered as major problems faced by banana growers with 57.84 average score in garret ranking.

Keywords: Cost of Production, Banana, Cost concepts, Farm income measures, Benefit-cost ratio

AN ECONOMICS ANALYSIS OF SUPER COMPOST PRODUCTION AND MARKETING UNDER GODHAN NYAY YOJNA OF CHHATTISGARH PLAINS

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ABSTRACT

The General objective of this study is to find out the cost and returns and marketing of super compost production of Gothan under Godhan Nyay Scheme. The Study was based under primary data; conducted in three districts of Chhattisgarh plains viz. Bilaspur, Raigarh and Janjgir-Champa. From each district four Gothans and from each Gothan one self help groups were selected randomly. Thus, a total number of 120 respondents were selected. Criteria of Gothan selection is as follows; Model Gothan, Non-Model Gothan, Village Gothan and City Gothan. The study revealed that Total cost of production of super compost in Model Gothan was lowest 4.24 Rs./Kg and Net Return from super compost production was highest 1.77 Rs./Kg followed by City Gothan, Non-Model Gothan and Village Gothan. Largest consumer of Supercompost was Farmers followed by Nursery and Agriculture department.

Keywords: Super compost, self help group, Godhan Nyay scheme, cost and returns.

DOUBLING FARMERS INCOME: WOMEN PROSPECTIVE

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ABSTRACT

Agriculture is the backbone of our country. The livelihood of more than 60% of India's total population is dependent on agriculture and its allied sectors. Rural women account for 47% percent of agricultural laborers. Indian women and especially the rural women, have traditionally achieved more with less.They play a pivotal role in producing staple crops, livestock, goat-rearing, forestry, fisheries, dairy, pig- farming, mushroom production etc. In recent year, a large no. of women is making fortune and getting recognized for their work in the field of agriculture. But altogether, low level of farmers' income and the erratic weather is a serious matter of concern for all of us. To secure the future of our country and to improve the livelihood of more than 60% of our agrarian fellows we have to focus on increasing their income. For that there are several farmer-cum-business women are there in our society who all are busy in doing their business tirelessly. A farmer-cum-business women namely Vinita kumari has developed her business of spawn production and other product of mushroom.Milk Lady Savita Devi has remarkably improved the lives of others by her venture in the field of dairy. Beside boosting allied sectors, such as animal husbandry, dairying and fisheries many farmer friendly equipment's like bhindi plucker, sugarcane bud chipper, maize dehusker-cum-sheller has been developed to make farmers especially women farmers to do their work more efficiently without much drudgery, hence conserving energy and saving time at the same time doubling the farmers income.

***Key Words*:** Farmer, agriculture, income, profit-making, women

DOUBLING FARMERS INCOME BY SCIENTIFIC SWEET POTATO (IPOMOEA BATATAS L.) CULTIVATION

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ABSTRACT

An experiment was conducted to find out most suitable weed management practice in sweet potato cultivation during 2015-16 and 2016-17 at Agricultural Research Farm, Dholi of Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar) under sandy loam soil so that farmers income can be doubled as per our prime minister's call to double farmers income by 2022. It was found that the herbicide Quizalofop-p-ethyl alone or in combination with other herbicides performed better than all other herbicides tested. It may due to its better efficacy towards controlling narrow leaved weeds particularly against the most dominant weed of the field *Sorghum halepanse*. The most effective combination of herbicides was pendimethalin followed by quizalofop-p-ethyl (T_7) which may be due to weed control right from the early stage up to about a month by the application of pendimethalin and thereafter control of most dominating and vigorous weed *Sorghum halepanse* by the application of quizalofop-p-ethyl. Although lowest weed population and weed dry matter at 30 and 60 days after planting were recorded under T_{10} (Hand weeding twice at 20 & 40 days after sowing) and was significantly superior than all other treatments, it could not achieve highest net return and B : C ratio even after realizing highest tuber yield (20.3 t ha^{-1}). Best weed index (9.36 %) was recorded by the treatment combination of pendimethalin followed by quizalofop-p-ethyl (T_7) and it was equally good with hand weeding twice (T_{10}) with respect to tuber yield. Significant highest net return (Rs.115226 ha^{-1}) was recorded by T_7 than all other treatments but was found at par with T_{10} (Rs.111826 ha^{-1}). B : C ratio recorded by T_7 (3.60) was significantly superior than the other treatments. Highest weed population, weed dry matter, weed index and lowest tuber yield, net return and B : C ratio were recorded under control treatment.

Keywords : Sweet potato, weed management, herbicides, tuber yield, net return and B:C ratio.

SUCCESS STORY OF AN IFS FARMER

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ABSTRACT

A. Lingaraju belongs to farm family, surviving at tribal areas of Vizianagaram district of Andhra Pradesh. Hehas Agricultural crops, orchards, livestock and lot of importance given to them for ensuring the sufficient manure as input to our natural farming system. Apart from year round availability of flowering noticed in his village and induced thought for establishment of HoneyBee Production.

He got the information about Krishi Vigyan Kendra (Rastakuntubai) located in Vizianagaram District, Kurupam mandal which is close to his village. In the year 2018, along with his family attended a training programme organized by KVK Rastakuntubai on Bee Keeping techniques, following the programme, he started to rear few boxes in the farm. Since he got good backup support from KVK Rastakuntubai he has taken this activity as an enterprise and expanded the area in other parts of the district.

Healso got very good support from his wife and she encouraged to expand the enterprise. By seeing the interest of him, from last 2 years KVK Rastakuntubai engaged him as resource person in their training programme organized every month in the centre. His enterprise has 3 different approaches as given below

The economics of Bee Keeping unit:
Expenditure:

1	4 Bee boxes (Rs.7,500/box)	:	Rs.30,000-00 (Given by KVK)
2	30 Kgs. Sugar	:	Rs.1,200-00
3	Packing and transport	:	Rs.400-00
4	Honey Extractor	:	Rs.6,000-00 (Given by KVK)

Total expenditure: Rs. 37,600-00
Actual expenditure by farmer: 37,600-36,000=1600

Income

1	18 Kgs from 1 box (Colony), year , 72 kgs for 4 boxes (Colony), year	:	72 Kgs of honey
2	1 kg honey @ Rs.300 for 72 kgs	:	Rs.21,600-00
3	Net income	:	Rs.20,000-00

Crop / Enterprises	Area or trees	Income per annum (Rs/-)
Paddy	5 acres	1,25,000
Mango orchard	10 trees	20,000
Cashew orchard	3 acres	75,000
Poultry	Country birds	5000
Bee keeping	4 boxes	20,000
	Total:-	Rs 2,45,000/-

DOUBLING FARMERS INCOME :A PROMISE TO BE FULFILLED BY 2022

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ABSTRACT

Key words – organic farming, post-harvest, productivity, diversification, cropping intensity, e-NAM, APMC mandis.

Past strategy for development of the agriculture sector in India has focused primarily on raising agricultural output and improving food security. The strategy did not explicitly recognise the need to raise farmers' income resulting in low income of farmers. Farmers' income also remained low in relation to income of those working in the non-farm sector. **Pradhan Mantri kisan Samman Nidhi Yojana –** provide a payment of Rs.6000/- per year in three quarterly instalment of Rs.2000/- to the farmers families. **Pradhan Mantri Man dhan Yojana**- a minimum fixed pension of Rs.3000/- will be provided to small and marginal farmers on attaining an age of 60 years. **Per Drop more Crop-** encourage drip/sprinkler irrigation for optimal utilization of water and recusing cost and increasing productivity **, and Prampragat Krishi Vikas Yojana**- for promoting organic farming . **Pradhan Mantri Fasal Bima Yojana**- To provide insurance cover for all the stages of crop cycle including post-harvest risks in specified instances with low premium contribution by farmers. **Pradhan Mantri Kisan Sampada Yojana**- to promote food processing in a holistic manner **Soil health card scheme-** distribution of soil health card to farmers so that the use of fertilizers can be rationalized .**Operation Green** – to address price volatility of perishable commodities like Tomato, Onion, Potato(TOP).**Initiating e-NAM**- a pan india electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities. There are seven recommendations given by Dalwai committee which are improvement in crop productivity, improvement in livestock productivity,resource use efficiency or savings in the cost of production , increase in the cropping intensity,diversification towards high value crops ,improvement in real prices received by farmers, shift from farm to non-farm occupations.

Conclusion

The low level of farmers' income and year to year fluctuations in it are a major source of agrarian distress. To secure future of agriculture and to improve livelihood of half of India's population,adequate attention needs to be given to improve the welfare of farmers and raise agricultural income.

DOUBLING FARMERS INCOME THROUGH DIVERSIFICATION AND VALUE CHAIN MANAGEMENT STRATEGIES IN BIHAR: AN OPTION AND STRATEGY

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ABSTRACT

The paper examine the various options and Strategies for enhancement of farmers income in the state of Bihar. At present in the state of Bihar more than 90 percent people are engaged in Agricultural practice but the per capita income particular in farming community is very low after taking several steps by academicians, civil society organization, policy makers, politicians, and many other concerned stake holders. But still the farming and farmers are not sounds in economic front. In the state agriculture is still subsistence type and more than 85 percent of the total cropped area occupied by foodgrains only. The crop diversification and value Chain system is not so effective for improving farmers income in the state. In this context, the present paper try to focus on some options and Strategies for enhancement of farmers income in the state. In the phase of globalization and continuous changes in taste, preference, and quality level of the consumers both at domestic and international level it is comell to all stake holders who engaged in Agricultural practice towards diversification and addition in value Chain on continuous basis. As per several experts opinions adoption of diversification and value Chain addition act as catalyst in improving farmers income. Due to unplanned strategy of Agricultural production farmers were getting very low income and their economic and social condition gradually declining trends. It was also observed that in the state poor marketing facility, technology, inputs level, etc. also responsible for reduction of farmers income in the state. It is the fact that more than 90 percent of the farmers and 70 percent of the workforce are very small landholder and face several constraints in their transition towards commercialization of farms. In this context, diversification and value Chain addition are act as important tools for facilitate farmers entry into remunerative market and able to fight against growing challenge emerging after the globalization, poverty eradication from economically poor states. Thus, the study finds and suggests that promotion for crop diversification by suitable technology options with proper value Chain Management. The strategies must be helpful in income enhancement as well as reduction in disasterous effect in the climatic changing conditions. The study has suggested several other measures for enhancement of farmers income in the state of Bihar and has suggested that the state government should take proper steps on the management of existing institutional and policies drawbacks. It is also suggested that the role of public private partnership will be must effective for doubling farmers income in the state of Bihar.

Key Words: Crop diversification, value Chain, farmers income, strategies, Bihar

INTEGRATED FARMING SYSTEMS FOR DOUBLING FARMER'S INCOME, SUSTAINABLE PRODUCTIVITY, AND NATURAL RESOURCE MANAGEMENT

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ABSTRACT

India's agricultural genetic plant and animal diversity, watershed and rural landscape location specific farmers, community organisations, public sector organizations play very important role in conservation agrobiodiversity through various farming systems throughout the vast country. The country has distinct agro-ecosystems, climatic, soil, geological, and other natural features under 20 broad agro-ecological zones. Also, the Indian region is one of the world's eight centres of diversified crop plant and livestock origins. Hence, under the present globalized economic environment, doubling farmers' income should be possible through adoption of sustainable – location specific multiple farm enterprises based integrated farming system (IFS)practices. The innovative farmer led multiple farm enterprises based IFS adoption supports doubling farmer's income, sustainable productivity and ensuring natural resource management through energy recycling process with ecosystem specificity. Under this context a survey study was conducted among the 332 numbers of ICAR-IARI innovative farmers through telephonic interview, online survey tools and social media based interactions across the country.

In that, 173(52.10%) farmers were adopted location specific multiple enterprise based integrated farming system practices. They also reported that 74.33% of farmers' income had increased from 22% to 156%. It also acts as aclimate smart farming practice and 61.76% of farmers' attitude was highly favoured towards climate smart sustainable farming practices. The study reported that the livestock, poultry and fisheries component were majorly supported to enhance the income of farm families in a short period. It also reported that 42.07% of farmers had high level of knowledge with improved educational status, farming experiences, eeconomic motivation, scientific orientation with better extension agency for sustainable productivity and natural resource management to conserve the agro ecology, socio cultural conditions with enhanced income.

Key words: Integrated farming system, Doubling farmers' income and location specific multiple enterprises

AZOLLA CULTIVATION: A VIABLE OPTION FOR DOUBLING FARMER'S INCOME

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ABSTRACT

Women and young girls in India often spend a great deal of time followed by drudgery of collecting the fodder for the animals. Existing feed sources such as farm wastes and fodder obtained from farm lack adequate amount of nutrition and calorific values results in low milk production. Chemical and concentrated feed sources available in urban markets are expensive for poor farmers to procure. Azolla is a water fern produces abundant biomass, and has 5-7% protein that can be grown both at farmstead and homestead by resource poor farmers to feed cattle, helps to cut down the cost involved in purchase of chemical and concentrated feeds. In addition to that it can secure the maximum economic returns and also saves time and reduce drudgery faced by women farmers regarding collection of fodder. Hence, the azolla cultivation is an innovative practice to empower farmers through improving their livelihood and socio-economic situation. In this case study, Dipali Sutradhar from the village Raserkuthi of Coochbehar (West Bengal) had taken the initiative of cultivating azolla for livestock feeding purpose in her 5 katha homestead land after being trained and motivated by Krishi Vigyan Kendra Coochbehar. She prepared one pit (9x6x1) $m^3$for one milch cow and she harvested azolla 20 days after incorporation of mother culture. Results showed that she has to spend Rs.55/- on cow feed with azolla per day for two cows as compared to Rs.70/- on cow feed without azolla per day for the same. So after using azolla as cattle feed she made a profit of Rs.15/- per day. Similarly, milk production increases up to 25% and she earned a profit of Rs.975/- per month by using azolla as cattle feed.

Key words: Azolla, fodder, milch cattle, women farmers

VISAKHA MILLETS FARMERS PRODUCER ORGANISATION- A SUCCESS STORY OF AN FPO, PAVES THE WAY FOR DOUBLING FARMERS INCOME.

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ABSTRACT

Millets are important crops for dry land farmers; they are highly nutritious and are climate-compliant crops. In order to revive the demand of millets in India, various efforts are being done by the central and state governments in India. ICAR-IIMR coordinates and facilitates millets cultivations, Processing and value addition technologies and supply chain networks through small farmers and Farmers Producer Organization (FPOs). ICAR-IIMR created six FPOs under the guidance of SFAC in different parts of Andhra Pradesh, Telangana, Karnataka and Madhya Pradesh. Amongst six FPOs Visaka Millets FPO/FPC is working extensively not only in promotion of millets but also providing service to farming community. It was incorporated under Companies Act 2013 (18 of 2013) rule 18 of the 2014, on 15thNovember, 2019 with an objective of doubling the farmers income in coming years through aggregation and segregation of produce. It has covered nine blocks of district, 38 FIGs and 753 share-holder members. FPO is in service of providing millets to retail stores and home delivery and developing various recipes of Ready to Eat and Ready to Cook products with milletsto include in the daily diet.

ROLE OF GOVERNMENT SCHEMES IN DOUBLING FARMERS INCOME IN INDIA

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ABSTRACT

Agriculture-Pandit Jawaharlal Nehru said "Everything else can wait but not for Agriculture" Worldwide - is a vital determinant of the livelihoods of small holder farmers and rural communities. Sustainable growth in Agriculture sector is the "need of the hour" for the Country as a whole. Economy of India continues to be predominantly agrarian. In view of this Government of India taken very keen role in implementing various schemes like PMFBY, PMKSY,PKVY, PM kisan scheme, National agriculture market (e NAM), NMSA. PM Kisan scheme -wherein 120 million small and marginal farmers of India with less than two hectares of landholding will get up to Rs. 6,000 per year as a minimum income support. Kisan credit card scheme - provides farmers with timely access to credit, PMKSY - focuses on creating sources for assured irrigation, also creating protective irrigation by harnessing rain water at micro level through 'Jal Sanchay' & 'Jal Sinchan'. E-NAM, an e-marketing platform at the national level. This new market process is revolutionizing agriculture markets by guaranteeing better price discovery and also brings in transparency & competition to enable cultivators to get improved remuneration for their produce moving towards 'One Nation One Market'. RADP is another scheme - to improve quality of life of farmers' especially, small & marginal farmers by giving a complete package of activities to maximize farm returns. It also helps in increasing agricultural productivity of rainfed areas in a sustainable way by adopting suitable farming system based approaches. Certain states like A.P, Telangana, Karnataka are also giving assurance to the farmers with various capital incentive schemes like YSR Rythu Bharosa, Rythu Bandhu, Rythu Siri and Krishi Bhagya respectively. Majority of the states operating DBT in agriculture (direct beneficiary transfer). Government of Uttar Pradesh has taken initiation in doubling the farmers income by launching scheme Kisan Kalyan Mission. Solar water pumps scheme for farmers in Maharashtra is launched by state government of Maharashtra aims to provide solar water pump on subsidy basis for agriculture in Maharashtra state.

Keywords:e NAM, PMKSY, Rythu Bharosa, Rythu Bandhu etc**.**

DOUBLING OF FARMERS INCOME THROUGH VALUE ADDED FLORICULTURE

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ABSTRACT

Value added floriculture is a process of increasing the economic value and consumer appeal of any floriculture commodity through changes in genetics, processing and packaging diversification with this profitability of a commodity is increased. Value addition helps in avoidance of post harvest losses, industrialization, employment generation, export, extended availability of produce, foreign exchange earnings and product diversification, easy marketing etc. Floriculture has emerged as a major diversification option in the agri-business in recent years. The product-wise groupings under floriculture are cut-flowers, loose flowers, live potted plants and foliage plants. Types of value added products in loose flowers include garlands, venis, floral decorations and floral jewellery. Value addition in cut flowers include flower arrangements, bouquets, button-holes, flower baskets, corsages, floral wreaths etc., A very huge opportunity of enhancing the farmer's and rural women's income is by dry flower cultivation and their value addition, as these flowers are everlasting in nature they have very high market demand and their various products like dry flower baskets, bouquets, pot-pourri, wall hangings, button holes and greeting cards. Preparation of these value added products can add value up to 5-10 times from flowers and green foliages. Not much scientific technology is needed for preparation of these products except some training and economic support. Just some extra time & effort is needed to earn some extra income. . The value-added products from floricultural crops like essential oil of rose, tube rose, jasmine, marigold etc. and plants extracts used in medicines and pharmaceutical industry are unique. Besides these there is a huge demand for pharmaceutical compounds like catharanthin, Vincristine and nutraceutical pigments like carotenoids such as lutein esters that are effective in preventing free radical generation, oxidation damage associated with cancer, coronary heart disease and age-related macular degeneration.

HORTICULTURAL INTERVENTIONS FOR DOUBLING OF FARMERS INCOME

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ABSTRACT

Double farmers' income have emerged as the focus of the entire agricultural policy decision due to the increase in the number of suicides among farmers and the low and fluctuating incomes of farmers, the high cost of planting crops, the increase of old and field crops, unplanned purchases are a big bottleneck. Organic farming practices and the system of farming system should encourage the reduction of import costs and ultimately increase revenue. In addition, the regeneration of old and unfruitful fruits, advanced processing technology, advanced marketing and implementation of effective land use planning, various farming systems, land use management, and livestock management, climate resilient agriculture, dry land farming, conservation agriculture, conservation management strategies children progress in horticultural production, efficient use of resources, increased planting vigour and the diversity of high value plants.

Keywords: Horticulture crops, new techniques and Farmers income

LIVESTOCK RESOURCES IMPROVEMENT STRATEGIES OF INDIA: A FUTURE PROSPECTS

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ABSTRACT

The livestock animal product demand is increasing over the years due to human population growth, increasing of income and public nutritional health consciousness. Although, India has rich domestic animal biodiversity, but the productivity of animal is low. The genetically production improvement can be done through the process of selection and breeding. But, the production of livestock animals can not be increased beyond the animal's genetic potential limits even after providing the better feeding and management, and its vice-versa too. But due to limitation of animal production potency and increased susceptibility to adverse climatic condition increases the reproductive & metabolic problems which lead to affect production and its cost. In this situation, the one way may be to continuous use of some selected animal for breeding as that is going on for last three to four decades. The other way may be also to improve the productivity of the less productive and non-descript animals through designing the sustainable breeding policy. This can be achieved with designing the region specific production system and fixing the breeding goal based on traits of interest and its percentage. These could be done through proper identify and recording the animal performance record, identification and selection of animals based on their phenotype, pedigree/ family to be the parent of next generation, then maximize to use the selected animals to produce replacement stocks and finally assess the genetic gain and retain the genetic diversity to control the inbreeding in the population. Ultimately, whether use of novel or traditional method to evaluate and improve the animal is also a big challenge. The genetic changes through traditional selection are in range of 1-3 percent while genomic is able to at double the rate of genetic gain. Therefore, it is much more need to understand the match between livestock population, breeds and genes with the physical, biological and economical land scale (FAO, 2007).

DOUBLING FARMERS INCOME THROUGH SESAME CULTIVATION

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ABSTRACT

Sesame (*Sesamum indicum* L.) is one of the most important oilseed crops and is also the oldest crop known to humanity. It is a short duration crop grown throughout the year. The seeds of the sesame plant produce edible oil. Due to the high presence of antioxidants, sesame seeds are known as “the seed of immortality”. Sesame oil is healthiest cooking oil because of rich source of oleic acid (40-50%) and linoleic acid (35-45%). It is a good source of micronutrients Copper, calcium and magnesium. It has high medicinal value, which is effective in reducing bad cholesterol level, beneficial for Alzheimer patient and for good for moisturizing dry skin. Sesame oil is a natural stable oil because of the presence of antioxidants. This crop is usually grown in rain fed and unfertile land condition. The area for sesame cultivation in Bihar is 1.14 (000ha), production 1000 q and yield 874 kg/ha in the year 2020-21, whereas, country yield is 474 kg/ha. It shows that yield of Bihar is almost double to that of the national yield. Therefore, it is high time to increase the area for sesame cultivation as well as emphasizing on research for development of high yielding, non-dehiscent capsule, and determinate plant. Sesamum has the highest MSP in Kharif at Rs 7307 provided by the Government of India, coupled with short term crop as it requires less investment will benefit the farmers greatly.. This will help farmers in their acceptance towards cultivation of sesame in different cropping rotation like early paddy- potato-summer sesame and wheat-summer sesame. It is short duration crop with high remunerative price. Two distinct types of seed are recognized, the white and the black. There are also intermediate-coloured varieties varying from red to rose or from brown or grey. The crop production can be considered poor, mainly attributed to low yield of the cultivars with an indeterminate growth.

Key words: sesame, linoleic, determinate, non-dehiscent

PROFITABILITY IN AN INCREASINGLY CHALLENGING AND UNCERTAIN ENVIRONMENT

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ABSTRACT

The agriculture sector contributes over a fifth of India's GDP, and nearly 60% of the country's 1.4 billion people depend on agriculture for their livelihood, either directly or indirectly. India is the world's largest producer of milk, pulses, and jute and ranks as the second-largest producer of rice, wheat, groundnut, vegetables, fruits, cotton, and sugarcane. After independence, Indian agriculture achieved an incredibly huge improvement in crop production and productivity. Foodgrain production increased from 50.82 million tonnes (mt) to 307.31 million tonnes (mt) between 1950–51 and 2020–21, while oilseed production increased from 5.16 mt to 35.95 mt. Similar growth has also been achieved in cotton, jute, mesta, tea, sugarcane, vegetables, and other crops (Ministry of Agriculture and Farmers Welfare, Govt. of India). Farmers aim to increase labour, minimize costs, and maximize income in order to earn as much profit as possible. Apart from directly increasing rates, farmers can use different techniques to maximize profits while retaining product quality, such as nutrient management, use of natural by-products of animal digestion, improving soil health and weed management practices, monitoring market fluctuations, resource use efficiency, reducing the cost of cultivation, increasing cropping intensity, boosting livestock performance, etc. Farmers must have a deep understanding of their profit drivers and tactical management plans in place to improve profitability in an increasingly challenging and uncertain environment. Many farmers believe that price has the highest impact on profit, but small changes made across the farm are often more profitable.

Key-words: Different techniques, foodgrain, minimize input cost and maximize income, nutrient management, production and profitability.

DOUBLING FARMERS INCOME THROUGH VARIOUS GOVERNMENT SCHEMES

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ABSTRACT

Union cabinet recently approved the country first agriculture export policy with an aim to double farmer income the government has set a target of doubling farmer income by the year 2022 past strategy for development of the agriculture sector in india has focused primarily on raising agriculture out put and improving food security the strategy did not explicitly recognise the need to raise farmer income resulting in low income of farmer farmers income also remained low in relation to income of those working in the non farm sector the low farm income is forcing more and more cultivators particulary younger age group to leave farming this can have a an adverse effect on the future of agriculture in the country leading to food insecurity productivity area agriculture output has be increased through access to irrigation and technological advancement increasing in cropping intensity the ratio of net area sown to the total cropped area by raising short duration crop after the main kharif and after the main rabi season so that agricultural land does not remain unused for half of the production period two word high value crop like fruit vegetable fiber condiment spices and sugarcane toword other allied interprises like forestry dairing rather than depending primarily on crop cultivation shifting cultivation from farm to non farm sector provide time ,more productive employment than agriculture sector in rural area , Pardhan mantri krishi sinachi yojana soil health card prampragat kirshi vikas yojana aiming to raise output and reduce cost pardhan mantri fasal bima yojana to provide insurance against crop and income loss and to encourage investment in farming operation green to address price volatility of perishable commoditions like tomato onion and potato (top) pm kisan sampada yojana to promote food processing in a holistic manner technology mission on cotton which aims to increase the income of the cotton growers by reducing the cost of cultivation as well as by increasing the yield per hectars through proper transfer of technology to the grower the country need to increase use of quality seed fertiliser and power supply to agriculture area under irrigation has to be expanded by 2 million hectars and area under double cropping should be increase by 3 millon hectar every year beside area under fruit and vegetable is required to increase by 5 percent each year

OPPORTUNITY OF BROCCOLI CULTIVATION IN NALANDA DISTRICT UNDER ORGANIC CORRIDOR SCHEME OF BIHAR

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ABSTRACT

Broccoli (***Brassica oleracea* L. var. *italica***) belongs to the family **Cruciferae**. Commercial cultivation of broccoli was started around 1923. It is grown as a Rabi crop in India and requires **12-18^{o}C** optimum temperature for proper head development. Broccoli is an important vegetable crop and has high nutritional and good commercial value. It is low in sodium food, fat free and calories, high in vitamin C and a good source of vitamin A, vitamin B2 and calcium. It is also a rich source of **Sulforaphane,** a compound associated with reducing the risk of cancer.

Generally, excessive amounts of inorganic fertilizers are applied to vegetables in order to achieve a higher yield and maximum value of growth. This ultimately affects the health of soil as well as humans and the environment. Due to excess use of chemical fertilizers a decline pattern is observed in soil fertility, therefore organic nutrient management is an important demand of the present era. Organic manure plays a direct role in plant growth as a source of all necessary macro and micronutrient in available forms during mineralization and improving physical and chemical properties of soils .The judicious combination and sources of organic nutrient will maintain long term soil fertility and sustain higher levels of productivity.

Therefore, utilization of locally produced manures by vegetable production operations may increase crop yield of broccali. In recent times, consumers are demanding higher quality and safe food vegetables. Also, farm business income from organic agriculture is greater than that from conventional agriculture in the vegetable cultivation with improvement of soil properties. Hence, it is imperative to integrate various sources of organic nutrients through application of FYM, vermicompost and poultry manure to enhance quantitative and qualitative characters of Broccoli. Also, Nalanda district is selected for organic corridor for vegetable growing by the Goverment of Bihar out of 13 selected distric. This provides better opportunity for farmers of Nalanda district to grow broccoli organically. The details of organic corridor scheme mentioned in the figures and photograps.

GENERATING OPPORTUNITY FOR AUGMENTING FARM INCOME

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ABSTRACT

Agriculture and related industries provide a living for over 58 percent of India's people, but nearly a fifth of our country's farmers live below the official poverty line. In the past, India's agricultural development plan focused primarily on increasing agricultural output and enhancing food security, and did not expressly identify the need to increase farmers' income or include any direct measures to boost farmers' welfare. The net result has been that farmers income remained low, which is evident from the incidence of poverty among farm households. Low level of absolute income as well as large and deteriorating disparity between income of a farmer and non-agricultural worker constitute an important reason for the farmers' suicides during 1995 to 2004, and is also forcing more and more cultivators, particularly younger age group, to leave farming. This can cause serious adverse effect on the future of agriculture in the country. To provide a solution for all these, in February 2016, Prime Minister Narendra Modi announced a scheme. For decision makers, scientists, and policymakers, doubling farmers' income in such a short period of time is a daunting job. Increased overall output and improved market price realisation, lower production costs, product diversification, efficient post-harvest management, value addition, and export, among other things, can double farmers' income. It will be difficult to double farmers' income by 2022, but it is necessary and feasible. To double farmers' income, a three-pronged strategy centred on I development activities, (ii) technology, and (iii) policy reforms is required.

Keywords: Export, Farmer income, opportunity, Value addition.

DOUBLING FARMERS INCOME THROUGH ANIMAL HUSBANDARY

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ABSTRACT

Animal husbandry is an important in agriculture that deal with the rearing of animal for abtaining useful product from then product that are commercially useful of the human society animal that are reared maintained and taken care of in animal like cows buffaloes sheep cattle pig goat etc scientific management principle have to be stricty followed in animal husdandry to maintain high standard of good quality farm production enhanced production of animal product that bring economics value to man is the main concern behind this farming practice cattle animal like cow buffaloes and sheep are together kept in farm area where they are fed raised taken care of and also breed by proper breeding technology the domestication of such farm animals is referred to as livestock farm ancient times animal were domesticated in village for abtaining a range of product from then such as milk wool chicken meat production eggs honey fishes etc all these product proved to be usefull to man both commercial as well as an earing means for his livehood as civilization evoled and become technology sound new methodologies inloving scientific researches and practices came into force carrying the old practices and modifying them suitably meat increasing demand of the economy proper dispasal of water from area is also a major area of concern and should be properly addressed

Cattle farming involve two type of animal rearing firstly the one that are involed in food production the first category involve animal like cows buffaloes goat etc for production of milk some of the well known brands of cow in india are red sindhi and gir forengn brand like jersy and holestein friesion are known to produce high yield and are very popular internationally supplying food that is rich in protain and making provision for fresh drinking water keep the cattle healthy poultry farming is another type of animal husbandry practice which involves the raising of fowls for production of egg ,meat chicken etc broiler are mainly used for chicken and meat supplies while fowl supply egg in poultry farming such occurrences of cross breeding are commen in that they provide new varietics with new desirable trait the ministry of fisheries is responsible for governing and setting up quideline for aqua culture production this is one field which has grown to be commercial viable making marketable for fish farmer to expand their fishing activities livestock reasing and poultry farming together with dairy farming provide apportunities for small scale farmar as well as medium level worker in rural background the department of animal husbandry is a government body overlooking matter in policy making and execution of livestock farming creating awareness through health programs for vaccinating livestock are provided at reduced rate for the benefit of farm worker

ROLE OF DAIRY FARMING TO DOUBLE THE FARMER'S INCOME: SPECIAL REFERENCE TO SULTANPUR DISTRICT

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ABSTRACT:

India has been a major producer and consumer of dairy products across the world since 1998 with continuous increase in the availability of milk and milk products. Dairy activities are an essential part of the rural Indian economy, serving as an important source of employment and income. India also has the largest bovine population in the world. However, milk production per animal is quite low as compared to other major dairy producers. In addition, almost all dairy products in India are consumed domestically, most of which are sold as liquid milk. Due to this, the Indian dairy industry has immense potential for value addition and overall growth. The high genetic resources in India provide great opportunities for employment and income. Small dairy farmers are the backbone of India's milk production and play an important role in the highest milk production. Dairy farming in India is an important way for farmers to increase their income and obtain more nutritious food for their families. Organic dairy farming and integrated farming systems complement all other interventions in increasing profits to the farmers.

Keywords: Dairy, farmer, income, employment, organic dairy farming etc.

CLIMATE-SMART INTEGRATED FARMING SYSTEM FOR SUSTAINABLE INCOME AND LIVELIHOOD IMPROVEMENT

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Climate change has direct and indirect effects on crops, soils, livestock, and pests, all of which can have an impact on agriculture. Indian agriculture has made great progress in recent years, it is today facing numerous challenges. The major challenges facing Indian agriculture are stagnation of net sown area, plateauing yield level, deterioration of soil quality, decline in per capita land availability, and the detrimental effects of climate change. Climate change will have a significant impact on food and nutritional security, particularly in developing countries in the semi-arid tropics, where increasing and maintaining food production is critical. Abiotic stress factors such as drought, salinity, high temperature, and soil pollutants reduce crop development and production significantly. Climate resilient integrated farming systems (CIFS) have the great potential to address some of these challenges. At ICAR-NIASM, Malegaon, Baramati (India) started working on development of climate smart integrated farming system (CIFS) for abiotic stressed regions. CIFS has one hectare land for the different agriculture enterprises. This includes seasonal cropping pattern (6250 sq.m), fruit crops (3000 sq.m), Cattle shed; goat shed and farm shed, Farm Pond (400 sq.m) and trees on boundaries. In this CIFS model abiotic stress tolerant crops (varieties) and cropping systems, livestock species, horticulture & agroforestry components and fisheries are integrated to achieve diversified outputs. Optimization of the size of individual components require careful considerations such as fulfilling the nutritional requirement of farm family for food, fodder, fuel, fruit, oil, pulse for human being and livestock and surplus for selling in market for meeting other expenses such as children education, medicines, clothes etc. Further, the size of CIFS components need modification depending upon the climatic conditions, soil type, irrigation facility, market demand and increasing the sustainable agriculture income of the farm household. Climate smart technologies are used such as micro-irrigation; use of organic fertilizers and bio-pesticides, solar operated pump and loose housing system etc. Diversification Index of CIFS components was worked out. The Crop Diversification Index was 0.99, Horticulture Diversification Index was 0.84 and Animal diversity (Simpson's Diversity Index) was 0.46. Diversification of components and within the components will help in minimizing the risk. Recycling of wastes will help in reducing the production costs will increase the net profit to the farmers. The preliminary results of the first-year study shows that the overall cost of cultivation of different components of CIFS was Rs. 161315, gross income was Rs. 191491 and the B:C ratio was 1.18.

Keywords: Abiotic stress, Climate change, Diversification, Recycling.

TECHNOLOGICAL OPTIONS - IT ACHIEVES HIGHER PRODUCTIVITY BY DOUBLING THE FARMERS' INCOME (DFI)

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ABSTRACT

Income is the most relevant measure to assess the farmers' welfare and agriculture transformation. Even today, the highest returns on investment on per unit basis are from agriculture. What is lacking is the scale unlike corporate investment. Certainly, returns from cultivation alone will not help to achieve the set target of DFI. It has to be supplemented, in fact to a larger extent by livestock and other non-farm activities supported with policy intervention at all levels (Chand, 2017). India's cropped area has been stagnant around 141 m ha for over a decade now, whereas net irrigated area is currently 65.3 m ha and the gross cropped area is 195 m ha with cropping intensity of 135%. Of this, almost 55% is still rainfed. Since there is no scope for horizontal expansion any more, vertical expansion through increased productivity is the only way forward, for which considerable scope exists. In this context, has suggested a clear strategy was suggested for productivity enhancement state-wise/ crop-wise projecting an increase of 80 mt of food grains (Hooda Committee Report, 2010). Some States have productivity less than National average, whereas some can achieve yet higher productivity in view of rich resources and availability of technological options.

AGRICULTURAL DIVERSIFICATION" - NEW OPTIONS OF DOUBLING THE FARMERS' INCOME (DFI)

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ABSTRACT

It must be understood well that unless smallholder farmers adopt diversified agriculture in a farming systems' mode, including both secondary and specialty agriculture, the expected doubling of their income will not be possible. Fortunately, India has made great strides in sectors like horticulture (now second largest producer in the world in fruit and vegetable production of more than 304.5 mt), livestock (White Revolution by achieving the highest milk production in the world of 155 mt), and fisheries (Blue Revolution by achieving 11.0 mt of total fish production). All these sectors have shown much faster growth (>5.0 - 7.0%) compared to food grains over the last two decades. Also, considerable scope exists to increase the income of farmers by adopting agroforestry, rural based low cost primary processing for value addition, cool chain and by adopting secondary and specialty agriculture such as: protected cultivation, mushroom production, bee keeping, sericulture, growing low volume high value crops like nuts, spices, medicinal plants, nutri-crops, etc., seed production of vegetable hybrids, nursery raising to provide disease free saplings, fish seed production, growing of flowers, vegetable seedlings to promote peri-urban agriculture, use of plastic culture, post-harvest processing, rural based low cost value addition, cool chain, etc. These new options would certainly provide opportunities to enhance farmers income substantially, and shall attract youth (including women) to agriculture provided right knowledge is disseminated, competent human resource is built and enabling policy support and incentives are provided. Youth can also play an important role as technology provider, input supplier, besides being a rural entrepreneur. For increasing income, farmers would also need a change in their attitude/perception towards adoption of diversified agriculture to make a difference.

REPERCUSSIONS EFFECTS OF CLIMATE CHANGE IN INDIA'S DIVISION

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ABSTRAC

Since the 1950s, there has been a decrease in monsoon rainfall. The number of strong rainstorms has also increased. The summer monsoon in India will become exceedingly unpredictable if global average temperatures increase by 2°C.An extraordinarily rainy monsoon, which now has a chance of occurring only once every 100 years, is expected to occur every 10 years by the end of the century if global temperatures rise by 4°C.An unexpected change in the monsoon might spark a catastrophic crisis, resulting in more frequent droughts and flooding across most of India. Rainfall could be above average throughout India's northwest coast and south eastern coastal region. Improvements in hydro-meteorological systems for weather forecasting and the installation of flood warning systems can help people move out of harm's way before a weather-related disaster strikes. Rain-fed agriculture accounts for more than 60% of India's agriculture, making the country extremely reliant on groundwater. Even without climate change, India's groundwater supplies are overexploited to the tune of 15%.Although it is difficult to estimate future ground water levels, declining water tables are likely to worsen as a result of rising water demand from a growing population, more affluent lifestyles, as well as the services sector and industry. It will be necessary to incentivize the efficient use of groundwater resources. Research indicates that portions of South Asia have been drier, with an increase in the number of droughts, since the 1970s. Droughts have significant ramifications. Droughts impacted more than half of India's crop area in 1987 and 2002-2003, resulting in a massive drop in crop production. Droughts are projected to become more common in north-western India, particularly in Jharkhand, Orissa and Chhattisgarh. The drought-resistant crops developed via research and development can help mitigate some of the harmful effects.

GOVERNMENT OF INDIA SCHEMES AND STRATEGIES FOR DOUBLING FARMERS' INCOME.

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अर्थव्यवस्था में किसान का निचले पायदान पर रहना,कृषि का उतार चढ़ाव ,किसानों की प्रतिवर्ष की आय मात्र 20000 रुपए रह जाना इस बात का संकेत देता है की हमारी आधी से अधिक आबादी आर्थिक संकट में है।

स्वतंत्रता के बाद से ही सरकारी योजनाओं का मुख्य उद्देश्य कृषि उत्पादन और खाद्य सुरक्षा को बढ़ाना था। उच्च गुणवत्ता वाले बीजों,उर्वरकों,और सिंचाई सुविधाओं से लागत को कम करना तथा सब्सिडी के जरिए प्रोत्साहन देकर कृषि उत्पादन बढ़ाने पर जोर दिया गया था। इस नीति ने 60 के दशक में आए गंभीर खाद्य संकट से निकालने में देश को सहायता दी और कृषि अर्थव्वस्था को सुधारने में महत्वपूर्ण योगदान दिया।

हरित क्रांति के बाद जहां जनसंख्या ढाई गुना बढ़ी वहीं कृषि उत्पादन में 3.7 % की वृद्धि हुई । फलस्वरूप भारत न केवल खाद्यान्न उत्पादन में आत्मनिर्भर बन गया बल्कि खाद्यान्न निर्यातक देश भी बन गया।

लेकिन इस नीति की सबसे बड़ी कमजोरी ये थी इसने न तो किसानों की आय को बढ़ाने पर जोर दिया न ही किसानों के कल्याण को बढ़ाने वाले किसी योजना को लागू किया। यह नीति केवल और केवल उत्पादन बढ़ाने पर ही जोर देती रही परिणाम स्वरूप किसानों की हालत दयनीय ही बनी रही।

किसानों की इस स्थिति को देखते हुए केंद्र सरकार ने 2015 में कृषि संबंधी सुधारो के लिए एक समिति बनाई।इसके प्रतिवेदन के आधार पर प्रधानमंत्री नरेंद्र मोदी जी द्वारा वर्ष 2022 23तक किसानों की आय को दुगना करने का लक्ष्य निर्धारित किया गया है।

यह लक्ष्य किसानों की आय को बढ़ावा देने, कृषि संकट को कम करने में महत्वपूर्ण भूमिका निभाएगा। किसानों की आय को बढ़ाने का अर्थ GDP मे कृषि की हिस्सेदारी को बढ़ाना नहीं है और ना है इसका लक्ष्य कुल कृषि उत्पादन को दोगुना करने का है। यहाँ आय बढ़ाने का अर्थ स्थिर कीमतों पर किसानों की क्रय शक्ति को बढ़ाने का है। इसके लिए ज़रूरी है की सरकार कृषि क्षेत्र में 12.7% की प्रति वर्ष की दर से वृद्धि करे। इसके लिए ज़रूरी है की सरकार कृषि भूमि मे किए जा रहे संस्थागत परिवर्तनों के अलावा इन 3 उपायों पर भी ध्यान दे।

पहला उपाय यह है की खेती मे अपनाए जा रहे साधनों तथा इनपुट को सस्ता करना। सब्सिडी का पैसा सीधा किसानों तक समय से पहुँचाया जाए, बिजली पानी इत्यादि की सुविधाएं बढ़ाई जाए। किसानों को सस्ती ब्याज़ दरों पर समय से ऋण उपलब्ध कराया जाए।

दूसरा उपाय यह है की किसानों को उनके उत्पादन का सही मूल्य प्राप्त हो सके।

और तीसरा उपाय यह है की वैकल्पिक उपायों से किसानों की आय को बढ़ाया जाए जैसे पशु पालन, मत्स्य पालन, डेयरी उद्योग आदि। NSSO के सर्वे के अनुसार 64% परिवार कृषि कार्य में लगा हुआ है जिनका कुल उत्पादन मात्र 39% है। अतः छिपी बेरोजगारी कृषि क्षेत्र में मौजूद है इसलिए जरूरी है की इन्हें कृषि क्षेत्र से हटाकर गैर कृषि व सहायक कार्यों में लगाया जाए।

के कार्यक्रम योजनाओं और नीतियों के माध्यम से किसानों की आय को दोगुना करने की रणनीति (मृदा स्वास्थय कार्ड योजना के विशेष सन्दर्भ में)

शोध सार

दीपिका शुक्ला
शोध छात्रा,अर्थशास्त्र विभाग
कमला नेहरु इंस्टिट्यूट ऑफ़ सोशल साइंसेज
सुल्तानपुर उ० प्र०

भारत में ग्रामीण परिवेश पर अपने विचार रखते हुए गांधी जी ने कहा था भारत की स्वतंत्रता का अर्थ पूरे भारत की स्वतंत्रता होनी चाहिए और इस स्वतंत्रता की शुरुआत भारत के ग्रामीण परिवेश से होनी चाहिए। जिससे प्रत्येक गांव को आत्मनिर्भर और सक्षम बनाया जा सके जिसके कारण वह राष्ट्र की मुख्य धारा में शामिल हो सकें। भारत देश के गाँव आज विकास के प्रतिमान स्थापित कर रहे हैं, आगे बढ़ रहे हैं। खाद्यान्न उत्पादन में आत्मनिर्भरता इसी का उदाहरण है। गाँवों को स्थापित करने का श्रेय वहां पर रह रहे ग्रामीण मानव संसाधन के रूप में उन सभी कृषको को जाता है, जो लघु मध्यम और बड़े किसान हैं साथ ही साथ भारत सरकार द्वारा चलाई गई विभिन्न योजनाएं, कार्यक्रम एवं एवं रणनीतियां भी शामिल हैं जिससे कृषकों के जीवन में सुधार हुआ है।

जनगणना 2011 के अनुसार भारत में गाँवों की कुल संख्या 6,49,481 है इसमें से अधिकांश ग्राम सफल विकसित और सक्षम है वहीं दूसरी ओर ऐसा ग्रामीण परिवेश भी है जो बहुत पिछड़ा हुआ है। अतः इन्हीं सभी समस्याओं को हल करने के प्रयास में भारत सरकार विभिन्न पंचवर्षीय योजनाओं, नीति आयोग के नीतियों और कृषि एवं ग्रामीण विकास मंत्रालय द्वारा संचालित विभिन्न कार्यक्रमों को संचालित करता है। जिसमें से प्रमुख नीतियां और कार्यक्रम हरित क्रांति, नवीन हरित क्रांति, सामाजिक योजनाएं- (मनरेगा जैसे कार्यक्रम ग्रामीण विकास हेतु प्रभावशाली रहे है। राष्ट्रीय कृषि विकास योजना (2007), बागवानी मिशन के साथ ही साथ वर्तमान समय में बहुत सारी योजनाओं का क्रियान्वयन शामिल हुआ है जैसे प्रधानमंत्री फसल बीमा योजना, किसान मित्र योजना, किसान क्रेडिट कार्ड योजना, मृदा स्वास्थ्य कार्ड योजना।

मृदा स्वास्थ्य कार्ड योजना की शुरुआत 1 फरवरी 2015 से हुई जिसके माध्यम से किसानों को अपनी भूमि की उपजाऊ क्षमता के बारे में पता चलता है एवं मिट्टी की जांच के साथ वह अपनी कृषि उत्पादकता में कैसे वृद्धि करते हैं यह शोध सार इसी पर आधारित है। मिट्टी की गुणवत्ता किसानों की आय को दोगुना करने में सक्षम हुई है और अन्य राज्यों की कृषि उपलब्धता योग्य भूमि को बढ़ाया जाए जिसमें सतत पोषणीय कृषि और नई तकनीकी का कृषि में प्रभावशाली उपयोग हो पाये।

संकेत शब्द (Key Words)

- कृषि उत्पादकता
- मृदा स्वास्थ्य कार्ड
- खाद्यान उत्पादन
- ग्रामीण जीवन

IMPACT OF SEED MINIKITS OF PULSES ON ITS PRODUCTION IN BIHAR

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ABSTRACT

Pulses play a key role, particularly in a countrylike India, mainly due to its rich protein content and thus, pulses are said as “the poor men’s meat”. Since India is the largest producer (25%), consumer (27%) and supporters (14%) of pulses in the world. The production of pulses was steadily increasing for the last several decades. Main reasons for poor performance is that the area under pulses is rainfed and mainly grown as a residual crop on marginal lands. Pulses accounted for 23.51 percent of the area under food grains (127.56 million ha) and contributed around 8.86 recent of the total food grains’ production (285 MT) in 2018-19. Pulses are grown in kharif (46.95%) and rabi seasons (53.05%). As a resent of stagnation of pulses production and continuous increases in population, the per capita availability of pulses has decreased considerably. Per capita/day availability of pulses in 1951 was 60 gms that dwindled to 52.09 gms in 2018-19. This proves that increase in population growth affects pulses availability. As per Economic survey (2021-22) GoB, area under pulses and production was recorded 4.49 lakh hectares and 3.79 lakh tones respectively in Bihar.

ABSTRACT mainly based on primary and secondary data. A study was conducted by our centre is two districts of Bihar that was Patna (irrigated) and Muzaffarpur (Dry land) is 2019-20 financial year. 300 sample sizeswere covered with objectives: To assess the relevance and the requirement of seed minikits and to compare the productivity of pulses crops using seed minikits with control farmers/Non-control farmers. A seed minikits distribution progress of pulses in Bihar was initiated in 2016-17 with the view to promote quick spread of new varieties of pulses, not older than 10 years. So, it was essential to evaluate and measure the extent, to which the programme and approach have stood upto the expectation.

Keywords: - Steadily, Stagnation, Dwindled, Evaluate, Extent

FINANCIAL INCLUSION AND COMPREHENSIBLE ROLE OF 'SHG-BANK LINKAGE PROGRAMME: EMPIRICAL ANALYSIS OF BHAGALPUR DISTRICT

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ABSTRACT

Having centred upon multiple models of financial inclusion (FI), its providers can be divided into three broad categories: (i) the universal and SFBs that operate through their own balance sheet;(ii) the NBFC-MFIs, that specialise in 'Inclusive finance (IF)' and (iii) SHGs linked to the banks. It cannot be taken as effort of rescripting that 'Self-help groups (SHGs)' that operate on the principle of mutuality, initially rotating the savings of the members, and later linking to the banking system to leverage the allocative savings and carry out internal lending; and grameen type micro-finance models with Joint liability groups (JLGs), where the Non-Banking Finance company-Micro-Finance Institutions (MFIs) lends to individuals, while they do mutual guarantee and meet in groups.

About 8 years back, in 2014, 'Pradhan Mantri Jan Dhan Yojana (PMJDY) had been introduced for giving leverage to FI drive. It is, no doubt, a national mission for FI to ensure access to financial services, namely: bank savings and deposit accounts, remittances, credit, insurance and pension on affordable basis and manner.
In view of the consolation and desirability of FI in meeting credit related demands of resourceless and marginal & small farmers (in particular), this paper seeks to examine: (i) Role of FI in economic growth, (ii) Conceptualize different models of SHG-Bank linkage programme, (iii) Know the extent of FI in Sultanganj block of Bhagalpur district and (iv) Suggest observation-based action points.

Based on primary and secondary data both, the paper will address its objectives. Sample of 100 SHG Members (selected randomly during the course of primary survey), is taken. Besides secondary data (obtained from various published sources), simple tabular, percentage and growth analysis have been used as statistical tools. A policy push towards 'efficient financial intermediation', besides close and regular monitoring of internal lending interest charged and repayment record of individual members (under SHG-Bank linkage model of Micro-Finance) by independent professional organizations/ institutions and/ Expert bodies should be urgently contrived.

Key words: Financial Inclusion, Inclusive Finance, Self Help Groups, Joint Liability Groups, Micro-Finance Institutions

SUPPLY CHAIN AND VALUE ADDITION OF MAIZE IN BIHAR: AN EMPIRICAL ANALYSIS

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ABSTRACT

Maize (zea maize) is a commodity of high economic significance in the country and also in the state of Bihar. Now a day, its demand and production have been increasing more rapidly as composed to other agricultural produced. Bihar stayed 5th rank in terms of area (8.9%) and 3rdin terms of production (11.56%) in 2020-21 at the country level. Its cultivation had picked-up during 1980 after adoption HYV seeds. It has emerged as an essential grain in the traditional and non-traditional season cultivation during winter season as rabi is becoming a common practices in peninsular India as well as north-eastern plain, which included Bihar to cultivation of maize in rabi season started in mid 1960 in some pockets of Bihar out of total maize production in the state, rabi produces 55.5 percent followed by summer season (28.5%) and kharif (16.0%). Due to apposite production and yield rate of maize in the state, Bihar had been awarded krishikarwan award in 2016-17. Moreover, a scenario change in maize production and its dynamic market leveled change in maize cultivation in Bihar participation of national and multinationals companies in maize marketing have changed the total scenario of maize farmers, traders and other stakeholders. The paper is based mainly on primary and secondary information, collected from two cluster villages of katihar district with objectives of cost of production, supply chain and value addition of maize. Analysis reveals that due to acute efforts of the farmers and Govt. interventions as well, the yield rate of maize in the state has doubled the all-india average but the share of the producers in consumer's rupee has either shrunk of stagnated for the last few years, mainly due to marketing inefficiencies and insignificant level of processing. So, a study relating to supply chain of maize marketing and possibility of its value addition in the state was imperative.

Keywords:- Adoption, Significance, Apposite, Acute, Intervention, Impetration.

SOLAR POWERED IRRIGATION: A SUSTAINABLE APPROACH OF WATER MANAGEMENT IN AGRICULTURE

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ABSTRACT

For nation's drive irrigation is essential for producing more food. Irrigation yields several times more production per unit of land as compared rainfed farming. According to the current estimates, India has 142 million hectares of agricultural land and out of which only 45% land is under artificial sources of irrigation, while the rest of agricultural land relies solely on monsoon. Water and electricity are costly resources in agricultural production system. The deficit in electricity and high diesel costs affects the pumping requirements of community water supplies and irrigation both; so using solar energy for water pumping is a promising alternative to conventional electricity and diesel based pumping systems. Solar energy is the renewable and environment friendly source of energy in the world. Solar power irrigation system uses the photovoltaic (PV) generation approach (*i.e.* polycrystalline, mono-crystalline, amorphous) that converts solar energy into electrical energy to run a DC or AC motor based water pump. International Renewable Energy Agency has projected a 59% cost reduction for electricity generated by solar PV by 2025 compared to 2015 prices. Solar power may act as a catalyst for wider rural electrification and reducing energy costs for irrigation. The advantages of solar energy use include the low running or variable costs, its modular nature, relative reliability or endurance, and the avoidance of emissions as well as pollution or soil contamination from fossil fuels.

Keywords: Agriculture, Irrigation, Pump, Solar Energy.

INTEGRATED FARMING: A TOOL FOR DOUBLING FARMER INCOME

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ABSTRACT

The Integrated Farming System is a comprehensive strategy in which several enterprises collaborate and resources are carefully handled such that waste output from one enterprise is used as input for another. Due to an ever-increasing population, arable land is becoming increasingly scarce. Per capita, resources are becoming increasingly scarce, leaving less possibility for horizontal agricultural expansion. The IFS is a mixed agricultural system in which various enterprises such as dairy, fish, poultry, and other beneficial enterprises provide higher returns with reduced risks, allowing for crop losses to be mitigated in the event of extreme climatic conditions. Under IFS, many firms have decreased reliance on severe weather conditions, thus the farmer is on the safer side in terms of crop losses. Integrated farming systems (IFS) have numerous advantages, including more effective use of agricultural resources and a more environmentally friendly farming method. IFS comprises of at least two independent but logically linked sections like a crop and livestock farming system. IFS can help with water efficiency, weed and insect management, and soil health. It also aids in the preservation of water quality. By integrating a number of enterprises to make the most of the land's natural resources, an Integrated Farming System (IFS) ensures a steady and long-term source of farm revenue. IFS is critical for a farmer's long-term success through increasing production, economic return, job creation, nutritional security, and livelihood. Key words: Farm income, nutritional security, IFS, sustainable development

AGRI-EXPORTS: INCREASE FARMERS' PROFIT & FARMING TECHNIQUES

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ABSTRACT

India's economy is highly dependent on agriculture and its allied sectors. India is a major exporter of agricultural products throughout the world. Agriculture exports increased by 19.92 percent in 2021–22, from $41.25 billion in 2020–21 to $50 billion in 2021–22. Rice, beef, grains, wheat, nuts, onions, fruits, pulses, dairy products, alcoholic drinks, cereals, cashews, vegetables, and other products are exported. Rice is India's most exported agricultural product, accounting for more than 17 percent of the country's overall agriculture exports in 2021-22. Buffalo meat, wheat, and maize are among the most exported items, accounting for 6%, 4%, and 2% of total agriculture exports in 2021-22, respectively. The new farm laws, which promoted the network of storage and agri-logistics, increased stockholding limits, and other efforts in order to improve agri-exports, have since been overturned. The Indian government introduced the agriculture export policy (AEP) in 2018. Significant progress has been achieved in giving farmer producer organisations (FPOs) and farmers a share in the export of this produce during the implementation of AEP. The direct connection of FPOs/farmers to the export market has increased farmers' profit as well as their farming techniques. There is a need for the development of indigenous commodities and value addition; promoting value added indigenous, organic, ethnic, traditional, and non-traditional agricultural products; boosting exports of dairy products and development of the dairy export zones (DEZs); providing an institutional structure for pursuing market access; overcoming barriers; and resolving sanitary and phytosanitary problems.

Key-words: AEP, agri-export, DEZ, farmer profit, FPO, sanitary and phytosanitary problems, value addition.

ENERGY AND PROTEIN REQUIREMENTS FOR MAINTENANCE AND LACTATION OF JAUNPURI BREED OF GOATS

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ABSTRACT:

Jaunpuri breed of goats are prominent breed prevailing in eastern Utter Pradesh, therefore it is essential to know their nutrients need. The objective of this study was to investigate both protein and energy requirements of Jaunpuri Goats. For this purpose three sets of metabolic trials were conducted separately dry and lactating does. For maintenance, Jaunpuri goat required 170.16cal DE and 3.63gmDP/$W_{kg}^{0.75}$ while 1738.41 Kcal DE and 43.46$_{gm}$ DP was required to produce one Kg milk of 4% fat. Goats having low body weight required more DM and DE as compared to goats having large body weight for their maintenance.

GOAT MARKETING AND PRICING PATTERN IN EASTERN UTTAR PRADESH

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ABSTRACT:

India has 117 million goats which is 22.5% of world goat population and rank first in the world(FAO,1994**)** Goat farming in India is mainly practiced by socially and economically backward class of households. Due to poor investment capacity of these households, goat farming could not attain the status of commercial farming The population of goats in India is increasing whereas the scope of goat farming is mainly dependent on availability of proper markets for goats, their products and by products The performance of goat market is mainly determined by the structure of the markets, the channels through which the goats are transacted and the marketing costs Under the present scenario. marketing is an essential as well as an inevitable component of any production system. Therefore, the present experiment was undertaken to study the some of the aspects of marketing system of goats.

GREEN FODDER THROUGH SILVIPASTORAL SYSTEM FOR DOUBLING FARMER INCOME & IMPROVING LIVESTOCK PRODUCTIVITY UNDER MARGINAL LANDS

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ABSTRACTs

The decreasing agricultural land and increasing demand for food production do not leave any room for diverting the agricultural land for green fodder cultivation. Wasteland and dry lands will have to be used and multipurpose trees with grass and grass legumes mixture will have to be grown under silvipastoral systems to meet the increasing demand of forage and fodder. India is sustainably nourishing 18 per cent livestock population of the world with limited grazing sources. The gap between demand and supply of dry forage is regularly increasing, whereas for green forage gap is decreasing with slow rate. Now a day's continuous grazing is hazardous to sustainable fodder production system. Hence, the nutritious fodder production through silvo-pastoral system is one of the options for sustainable fodder production. Cut-and-carry module may help in minimizing problems arises in Rabi season due to open grazing. Introduction of grass/ forage crop components on natural pasture or degraded lands to provide nutritious green fodder round the year for livestock. This system also provides an opportunity to generate employment to the rural people by involving in activities of animal husbandry i.e. collection, processing, and marketing of value added products get from trees and grasses. An appropriate management practices in silvo-pastoral systems will increase production of forage to full fill demand of fodder. Livestock sector is playing crucial role in the overall growth of rural development in agriculture sector sustainably. Live stock population of India is the largest in the world. Fodder has measurable contribution in enhancing the livestock production. The projected requirements for dry and green fodder are 687 & 910 MT by 2030. Cultivated land day to day is decreasing due to increasing pressure of population. There is scope to utilize the wasteland for fulfill demand of food ,fodder and timber of increasing population . The opportunity lies in growing fodder trees, bushes and grasses in wasteland to augment and supplement fodder and feed requirement. In addition to forage production, establishment of Silvipastoral practice on wasteland will provide much needed environmental services such as carbon sequestration , soil and water conservation and resilience for climate change .

***Keywords**:* Waste land, Silvopatoral System,Forage & Fodder.

MODERN STRATEGIES FOR CROP IMPROVEMENT TO COMBAT CLIMATE CHANGE

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ABSTRACT

The main objective of induced mutagenesis is enhancement of mutation rate in a short duration for development of new plant varieties. The frequency rate of spontaneous mutation is very low and difficult for application in plant breeding. Traditionally induced mutagenesis is by physical (*e.g.* gamma radiation) and chemical (*e.g.* ethyl methane sulfonate) mutagen treatment of both seed and vegetatively propagated crops. Recent reports infer the application of high energy ion beams for induced mutagenesis. Through *in-vitro* selection, mutants with desirable agronomical traits including resistance to abiotic and biotic stress can be screened in a short period of time. The application of mutagenesis along with plant tissue culture and length of culture period especially in cereals could enhance the genetic variability. This approach could be applied more frequently before the techniques of genetic engineering become more common and trustworthy tool in plant breeding. Hence, a combination of tissue culture and mutagenesis could promote genetic variability and that is applied by plant breeders during various plant breeding programs. Conventional breeding along with other techniques including mutagenesis, genetic engineering, biotechnology or molecular breeding apply local genetic resources for new cultivars development which could help to combat frequent climatic alterations.

Keywords: biotechnology, climate, genetic engineering mutagenesis, stress

YIELD AND ECONOMICS OF SOYBEAN INFLUENCED OF PLANTING METHODS AND INTERCROPPING SYSTEMS

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ABSTRACT

An investigation was carried out in split plot design to study the effect of planting methods as main treatment namely M_1 (Ridge and furrow), M_2 (Flatbed), M_3 (Broad bed and furrow) and three intercropping systems as sub-treatment C_1: Soybean + pigeon pea (4:2), C_2: Soybean + green gram (4:2), C_3: Soybean + cowpea (4:2) to study crop performance and economic of soybean with different pulse as intercrops. The Research experiment was conducted at AICRP for Dryland Agriculture at College of Agriculture, Rewa (JNKVV) Madhya Pradesh during the *kharif* season 2017-18. A uniform basal dose of 20 kg N, 40 kg P_2O_5 and 20 kg K_2O ha^{-1} **was applied through urea, di-ammonium phosphate and muriate of potash.** The observation on soybean seed yield, soybean equivalent yield and intercrops yield and economics were recorded. The results revealed that soybean crop when grown in the ridge furrow gave higher grain yield (814.66 kg ha^{-1}), soybean equivalent yield (1325 kg ha^{-1}) and benefit cost ratio (1.99) among all the planting of methods. In case of different intercropping system soybean crop gave better grain yield (765.10 kg ha^{-1}), soybean equivalent yield (1251 kg ha^{-1}) and benefit cost ratio (1.87) in intercropped with pigeon pea (4:2) over rest of the intercropping systems. In terms of economically soybean crop gave better gross returns (Rs. 42867 ha^{-1}) and net returns (Rs. 21414 ha^{-1}) among all the planting methods. In all intercropping system the Soybean + pigeon pea intercropping system gave higher gross returns (Rs. 40738 ha^{-1}) and net returns (Rs. 19086 ha^{-1}). Ridge and furrow planting **method to be found** most remunerative for intercropping with pigeon pea for soybean crop.

Key words: Cropping system, soybean, intercropping, planting methods

FRONT LINE DEMONSTRATION TECHNOLOGY FOR ENHANCING THE MUSTARD PRODUCTION IN FARMING FIELDS

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ABSTRACT

A field experiment (Field Level Demonstration, FLD) was carried out at Krishi Vigyan Kendra, Siddharthnagar, Uttar Pradesh on mustard to study oil seed yield under FLD (using seed plus Azotobacter plus phosphate solubilizing bacteria (PSB) plus sulfur plus Mancozeb insecticide in combination) over farmers practices at farmers fields for two consecutive years (2013-14 and 2014-15). The high yielding mustard variety Pusa Jai Kisan is employed in this study. The highest oil seed yield (17.5 q/ha) was observed in 2014-2015 which was 62.03% higher yield over the farmers practice (10.8 q/ha). However, the mustard yield in year 2013-2014 (16.4 q/ha) was slightly lesser compared to yield (17.5 q/ha) in 2014-2015.The study indicates FLD enhances the productivity of mustard over traditional farmers field techniques in every progressive year. The increasing trend in the % increase of yield was found due to variation in agro-climatic factors. The FLD indicates better productivity potential and profitability of the latest technology under existing farming situations.
Keywords: Agro-climatic factors; Azotobacter; FLD; Insecticide; Mustard

STUDIES ON CORRELATION AND PATH COEFFICIENT ANALYSIS FOR QUANTITATIVE TRAITS IN BLACKGRAM (*VIGNA MUNGO* L. HEPPER)

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ABSTRACT

The present investigation was carried out with 22 genotypes during *zaid* 2019 at Experimentation Centre, Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj. The genotypes were planted in Randomized Block Design with three replications with an aim to determine genetic variability, correlation, direct and indirect relationship between yield and its component characters. Mean squares due to genotypes for all the characters were highly significant as revealed from ANOVA indicating substantial amount of genetic variability among the genotypes under study. Mean performance results have shown that genotypes KU-719, KU88-9-1, Shekhar-1 followed by Azad-1 showed better performance for seed yield. Moderate to high GCV, PCV and heritability is coupled with high genetic advance as per cent of mean were being observed for plant height, number of clusters per plant, number of pods per plant, harvest index, seed index and seed yield per plant. Seed yield is significantly and positively correlated with number of clusters per plant, number of pods per plant and harvest index at phenotypic level. Path coefficient analysis revealed that maximum positive direct effect on seed yield per plant was exhibited by number of pods per plant followed by harvest index. Therefore, simultaneous selection for pods per plant, harvest index and number of clusters per plant is suggested for improvement of grain yield per plant in blackgram.

BIO-EFFICACY OF SOLE AND TANKMIX HERBICIDES FOR CONTROL OF COMPLEX WEED FLORA IN CHICKPEA (*CICER ARIETINUM*)

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ABSTRACT

A field experiment was conducted during *Rabi* season of 2019-20 at BAU farm, Sabour to evaluate the efficiency of herbicides against complex weed flora and their effect on yield and economics of chickpea. The twelve weed control treatments were tested in randomized block design with three replications. The variety used was GCP105. The recommended dose of fertilizers i.e. 20-40-0 kg N- P_2O_5- K_2O/ha was applied. Full dose of Nitrogen and Phosphorus were applied as basal. The results revealed that the lowest weed density (2.72/m^2) and weed dry weight (1.54 g/m^2) were recorded under Clodinafop-propargyl+Na-aciflurofen 220 g/ha (Readymix) which were at par with treatments two hand weeding at 60 DAS (3.65/m^2) & (2.63 g/m^2), topramezone (6.10/m^2) & (3.68 g/m^2) these three were superior over rest of the treatments. The highest weed control efficiency at 60 DAS (95.16%) was recorded with Clodinafop-propargyl+Na-aciflurofen 220g/ha (Readymix) but it caused phytotoxicity upto 06 level followed by two hand weedings at 50 DAS (91.73%) , topramezone (88.43%) and imazethapyr (85.82%), However, weed Index % was recorded lowest in treatments topramezone (3.32%) followed by imazethapyr (21.62%). Maximum yield attribute characters as well as grain yield (1.69, 1.63 and 1.32 t/ha) recorded under treatments two hand weeding, topramezone and imazethapyr respectively. The highest gross return (Rs. 82,290/ha) and net return (Rs. 48,824/ha) were recorded by two hand weeding which was statistically on par with topramezone (Rs.79,560) & (Rs.47,404) and followed by imazethapyr (Rs.64,496) & (Rs.37,7790) . The highest B:C ratio (Rs.1.47) was recorded by topramezone followed by two hand weeding (Rs.1.46), imazethapyr (Rs.1.42) and lowest net return (Rs.16,705/ha) and B:C ratio (0.65) was recorded in weedy check.

BIO-EFFICACY OF HERBICIDES COMBINATIONS FOR CONTROL OF DOMINANT WEED FLORA IN WHEAT.

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ABSTRACT

A field experiment was conducted to evaluate the bio-efficiency of herbicides against complex weed flora and their effect yield and economics of wheat at BAU farm, Sabour in Randomized Block Design replicated thrice during Rabi season of 2019-20. The variety used was HD2967. The soil of the experimental plot was sandy loam having pH 7.8, organic carbon 0.54%, Low in available Nitrogen (179.46 kg/ha), Phosphorus (29.3 kg P_2O_5/ha) and Potassium (194.5 kg K_2O/ha). The recommended dose of fertilizers i.e. 150-60-40 kg N- P_2O_5- K_2O/ha was applied. Herbicides were applied with the help of Knapsack sprayer fitted with flat fan nozzle. The results revealed that the highest grain yield of wheat (4.49 t/ha) was noticed under the treatment two hand weeding which was statistically at par with Pendimethalin 1.0 kg a.i/ha (PE) fb sulfosulfuron 0.018 kg a.i/ha (POE) (4.26 t/ha). Among different herbicides combinations, the highest grain yield of Wheat were recorded by Mesosulfuron+Iodosulfuron-methyl (RM) (12 g+ 2.4 g) POE (4.17 t/ha) and Clodinafop 0.06 kg a.i/ha + metsulfuron 0.004 kg a.i/ha at 30-35 DAS (3.93 t/ha) and all these were found significantly superior over rest of the treatments. The highest weed control efficiency was recorded in two hand weeding (96.22 %) which was closely followed by Pendimethalin 1.0 kg a.i/ha (PE) fb sulfosulfuron 0.018 kg a.i/ha (POE) (81.21%). The highest gross return (Rs. 81,426/ha) and net return (Rs. 39,526 /ha) were recorded by two hand weeding which was statistically at par with Pendimethalin 1.0 kg a.i/ha (PE) fb sulfosulfuron 0.018 kg a.i/ha (POE) followed by Mesosulfuron+Iodosulfuron-methyl (RM) (12 g+ 2.4g) POE and Clodinafop 0.06 kg a.i/ha + metsulfuron 0.004 kg a.i/ha. The highest B:C ratio (Rs.2.01) was recorded by Pendimethalin 1.0 kg a.i/ha (PE) fb sulfosulfuron 0.018 kg a.i/ha (30-35 DAS) followed by Mesosulfuron+Iodosulfuron-methyl (RM) (12 g+ 2.4g) POE (Rs.1.96) and two hand weeding (Rs.1.94) and lowest economics were observed in un-weeded control.

EFFECT OF WEED MANAGEMENT PRACTICES ON ECONOMICS AND NUTRIENT UPTAKE OF LENTIL

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ABSTRACT

A field experiment was conducted to study the comparative performance of different pre and post emergence herbicides on economics and nutrient uptake by weeds in lentil. The treatments consist of thirteen weed management practices at BAU farm, Sabour in Randomized Block Design replicated thrice during *Rabi* season of 2019-20. The variety used was HUL-57. The soil of the experimental plot was sandy loam having pH 7.7, organic carbon 0.52%, Low in available Nitrogen (224.00 kg/ha), Phosphorus (39.20 kg P_2O_5/ha) and Potassium (157.0 kg K_2O/ha). The results revealed that the highest gross and net returns was observed under weed free which was at par with of pendimethalin *fb* quizalofop-ethyl + imazethapyr and oxyflurofen *fb* quizalofop-ethyl + imazethapyr and high B:C ratio was recorded under clodinafop-propargyl + Sodium-acifluorfen @ 60 g a.i. ha^{-1} POE. Even though the weed free treatment gets higher net returns, the treatment clodinafop-propargyl + Sodium-acifluorfen @ 60 g a.i. ha^{-1} POE achieved higher B:C ratio because of investing per unit amount of input was lower in this treatment. The maximum uptake of nutrients N (96.48 kg ha^{-1}), P (17.64 kg ha^{-1}), K (41.73 kg ha^{-1}) and minimum depletion of nutrients by weeds was noticed under weed free treatment, next to weed free it was observed under pendimethalin *fb* quizalofop-ethyl + imazethapyr and oxyflurofen *fb* quizalofop-ethyl + imazethapyr. and lowest N, P, K uptake and maximum depletion of nutrients was observed in weedy check. This is because of minimizing the weed density and lowers the crop-weed competition in weed free treatment leads to minimum depletion of nutrients by weeds and it's the way for maximum utilization and uptake of nutrients by the crop at different stages to till harvest and this obviously leads to more dry matter accumulation in seeds and haulm and also higher N, P and K concentrations in seeds and haulm was reported.

THE ROLE OF PLANT MICROBIAL BIOSTIMULANTS IN MITIGATING CLIMATE CHANGE-INDUCED STRESS ON PLANTS.

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ABSTRACT

The global environment is constantly changing, and extreme climatic events such as an increase in global temperature, atmospheric CO_2 levels, tropospheric O_3, and acid rain can cause a variety of chronic stresses on plants, limiting the plant ability to respond. Extreme climate change can have a significant impact on crop yield in terms of quality and quantity by causing various environmental stresses on crops, putting global food security at risk. Microbial biostimulants are vital substances for plant resilience to abiotic stress caused by climate change. A microbial plant biostimulant is a substance or microbe that has the potential to raise a plant's health and growth by stimulating natural biological processes. A prominent category of plant biostimulants is Bacterial Plant Biostimulants (BPBs). The most well-known group in this category is plant growth-promoting rhizobacteria (PGPR), VAM which colonize the plant rhizosphere. These microbial plant biostimulants interacts with the plants by producing metabolites which acts as signals for activating various defence pathways inside the plant under abiotic stress condition. Microbial biostimulants may offer a long-term and cost-effective solution to plant economic loss caused by dynamics of changing climatic variables. Microbial biostimulants are cutting-edge technology that can provide high nutritional agriculture yields while mitigating the negative consequences of environmental change.

Key words: abiotic stress, biostimulants, plant growth promoting rhizobacteria (PGPR), climate change

STUDIES ON EFFECT OF ECO-FRIENDLY WEED MANAGEMENT APPROACHES IN HDPS COTTON

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ABSTRACT:

Field experiment was conducted at Department of Agronomy, College of Agriculture, UAS, Raichur to study the “Studies on effect of eco-friendly weed management approaches in HDPS cotton” during the year of 2017-18 and 2018-19. The experiment was laid out in Randomized Completely Block Design with three replications. There were 14 treatments imposed viz., polythene mulch, paddy straw mulch, cotton stalk mulch, intercropping with green manures at 1:1 ratio (Sunnhemp and Cowpea), four different botanicals extracts @ 20% as PE (Eucalyptus sp., Prosopis juliflora extract, Cassia tora and Parthenium hysterophorus), mechanical, cultural and their combination compared with weed free check, unweeded control and recommended practice. The two years pooled data results registered that, weed free check has recorded significantly greater seed cotton yield (1372 kg ha -1) over rest of the treatments. It was followed by Cotton + Sunnhemp (1:1) subsequently in-situ mulching at 45 DAS (1299 kg ha -1), pendimethalin 38.7 CS @ 680 g a.i./ha as PE fb pyrithiobac sodium 10 EC 75 g a.i./ha + quizolofop ethyl 37.5 g a.i./ha at 25 DAS as PoE (1274 kg ha -1) and black polythene sheet mulch (1262 kg ha -1). These treatments also recorded lower weed density at 50 DAS (4.9, 4.0 and 5.3 respectively), weed dry weight m -2 at 50 DAS (5.5, 4.9 and 5.7, respectively), weed control efficiency at 75 DAS (77.2, 81.2 and 75.3, respectively), weed index (4.60, 6.30 and 7.20, respectively), number of sympodials plant -2 at harvest (15.8, 17.7 and 15.2), number of bolls plant -2 at harvest (16.4, 16.7 and 16.3, respectively), net returns (Rs.52284, 49613 and 42825 ha -1) and BC ratio (3.3, 3.0 and 2.4, respectively). The eco-friendly treatments viz., cotton + Sunnhemp (1:1) and in-situ mulching at 45 DAS, mulching with black polythene sheet, Cotton + Cowpea (1:1) and in-situ mulching at 45 DAS were at par with weed free check and they might be recommended as these were the best options.

Key words: HDPS (High density planting system), Weed density, Weed index, Seed index and Economics

ROLE OF HERBAL MEDICINE FOR PREVENTION, PROTECTION AND MANAGEMENT OF PRE & POST COVID-19

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A B S T R A C T

In December 2019, a patient of pneumonia with unidentified etiology was found positive for pan-β-coronavirus and had close resemblance to another coronavirus, Bat CoV-RaTG13. This new virus was named SARS-CoV-2, and the cause of disease was termed coronavirus disease 2019 i.e. COVID-19.. A total of 104 different viral strains were revealed in whole genome sequencing analysis. It is transmitted through close unprotected contact with infected persons via virus-loaded droplets and aerosols. Due to its novel nature, there is no immune defense present in hosts. COVID-19 pandemic outbreak resulted in a major health crisis globally. The morbidity and transmission modality of COVID-19 appear more severe and uncontrollable. The respiratory failure and following cardiovascular complications are the main pathophysiology of this deadly disease. As per World Health Organization (WHO) 53,52,33,333 confirmed cases of COVID-19 were reported, including 63,20,070 deaths as of June 5, 2022 and recovered 50,61,42,051. Many people around the globe are still in the hospital suffering from COVID-19. Several therapeutic strategies are adopted for effective treatment against this virus from the pharmacological viewpoint but till date there are no specific treatment regime found for this viral infection. The present paper emphasizes the role of herbal plants and herbs-derived secondary metabolites for treatment of SARS-CoV-2 virus and management of post-COVID-19 related complications. This approach will ensure safeguards of using medicinal plant resources to support the healthcare system. Plant- derived phytochemicals have already been reported to prevent the viral infection and to overcome the post- COVID complications like kidney and heart failure, liver and lungs injury, parkinsonism and mental problems. Study revealed herbal medicines and their phyto components used as immunity booster, antiviral

and post-COVID complications. The literature published during 2003-2021 were studied including databases like Google Scholar, PubMed, Science Direct, Scopus and Web of Science to emphasize relevant articles on medicinal plants against pre & post COVID-19 related complications. Based on traditional experiences and scientific evidence, the Ministry of AYUSH recommended the use of a poly-herbal decoction (*Kadha*) containing five different herbs namely, Tulsi (Ocimum tenui-florum L.), Dalchini (C. verum), Kalimirch (P. nigrum), Shunthi (Z. offici- nale) and Munakka (V. vinifera) for boosting immunity. This herbal medicine was later on manufactured by several pharmacological industries. Also several herbs were used for preventive care & post management of disease. It is found that the natural alternatives are in the priority for the management and prevention of the COVID-19, the present study may help to develop an alternative approach for the management of COVID 19 viral infection and post-COVID complications.

Keywords:
SARS-CoV-2 COVID-19, Herbal Plants, Traditional system of medicine, Phytochemicals, Poly-herbal decoction (*Kadha*).

MEDICINAL USES OF TERMINALIA CHEBULA RETZ: A REVIEW

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ABSTRACT

Terminalia chebula is a medicinal tree belonging to the family Combtretaceae. It is known as Harar. Used part is fruit. A large deciduous tree with dark brown bark, young parts covered with rusty hair. Leaves are rough, flowers small creamish yellow, fruits ellipsoid, 3-5 cm long. The taste of fruit is astringent. Its fruit containes tannic acid, gallic acid, chebulinic acid, mucilage, glycoside, carbohydrates, amino acids, phosphoric acid, succinic acid. It is a digestive, laxative, stomachic, rejuvenator, anti-inflammatory, anodyne purgative, carminative, anthelmintic. It is used in constipation, cough, skin disease, asthma, dysentery, uterine debility, anaemia, headache, leaucoderma, trifala etc. Hence, in the present review paper an attempt has been made to consolidate medicinal properties of Terminalia arjuna. Kew words: Terminalia arjuna, medicinal properties, human ailments

ROLE OF AGROFORESTRY SYSTEMS IN CARBON SEQUESTRATION AND CLIMATE CHANGE MITIGATION

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ABSTRACT

Agroforestry activities have a long history in India. Trees on farms, community forestry, and a range of local forest management and ethnic forestry techniques are all part of India's agroforestry systems. In both industrialised and developing countries, agroforestry, or the practise of incorporating trees into farming, has played a key role in increasing land productivity and improving lifestyles. While carbon sequestration through afforestation and restoration of degraded natural forests has long been thought to be beneficial in mitigating climate change, agroforestry has certain specific advantages. Agroforestry offers a one-of-a-kind opportunity to combine climate change adaptation and mitigation goals. Although agroforestry systems are not specifically designed for carbon sequestration, numerous recent studies have confirmed that they can play a significant role in storing carbon in aboveground biomass, soil, and belowground biomass. According to the IPCC, agroforestry systems have a technical mitigation potential of 1.1-2.2 PgC/yr in terrestrial ecosystems over the next 50 years, allowing for synergies between adaptation and mitigation activities. Furthermore, 630 million hectares of unproductive farmland and grassland might be converted to agroforestry, with a carbon sequestration potential of 391,000 MgC/yr by 2010 and 586,000 MgC/yr by 2040. Agroforestry systems have the potential to provide major mitigation alternatives, but adequate management is required to control the amount of carbon sequestered. By overcoming many technological, financial, and institutional constraints, the significance of agroforestry methods in climate change mitigation in India can be fully realised.

Keywords : Carbon sequestration, afforestation, mitigation, croplands, climate change.

GENETIC STRATEGIES FOR DEVELOPMENT OF DROUGHT TOLERANCE IN RICE

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ABSTRACT

Rice production in rainfed areas across Asia is seriously affected by drought. Increased irrigation is often not a realistic strategy for mitigating drought concerns in rainfed rice-growing technology in the field of existing and future water constraint. To increase biomass and yield, drought genetic management techniques must focus on maximising the extraction of available soil moisture and its effective use in crop establishment and growth. Rice germplasm has a lot of genetic variability for drought resistance. The present task is to resolve the complexity of drought resistance in rice and to use all available genetic resources to develop rice varieties that combine drought resistance with high yield potential, quality, and biotic stress resistance.The goal of this technique is to create a pipeline of superior breeding lines and hybrids that can be combined with efficient management practises and given to rice producers. This will entail the creation of high-throughput, high-precision phenotyping systems that will allow genes for yield components under stress to be efficiently mapped and their effects assessed on a variety of drought-related traits, as well as the introduction of the most promising genes into widely grown rice mega-varieties and the scaling up of gene detection and delivery for use in marker-aided breeding.

Keyword: Drought, Germplasm, Genetic resources, Mitigating, Resources,

INDIA'S DEPENDENCE ON PALM OIL

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ABSTRACT

India is the largest importer of edible oil and heavily depends on Malaysia and Indonesia (*for palm oil*), Argentina and Brazil (*for crude soft oil, including soyabean oil*), and Ukraine and Russia (*for sunflower oil*) to meet more than 60% of its annual need..

According to the Solvent Extractors' Association (SEA) During the oil year 2020-21(November-October), the share of imported edible palm oil (which includes RBD palmolein and crude palm oil) in the total edible oil import basket was 62.27 per cent. Of the total edible oil imports of 13.13 million tonnes (mt) during the oil year 2020-21 (November to October), edible palm oil imports stood at 8.18 mt. This is projected to reach 20 million tonnes by 2030, given India's increasing disposable income and shifting food habits. The Palm oil Import bill has been witnessing a steady growth in recent past, thanks to the increase in the prices of palm oil in the international market.

This cannot be sustained just by increasing the import quantity, as this would lead to biodiversity issues in the supplying countries. The Government of India's views to expand oil palm cultivation in India. However, an aggressive push toward domestic oil palm cultivation at the expense of biodiversity is currently underway. Unsustainable expansion of oil palm cultivation in India with short-term economic goals will lead to both biodiversity and social issues.. The necessary, workable solutions for sustainable oil palm cultivation in India is to work within an integrative framework involving scientific research, social measures, and political actions: an integrated approach is critical to achieve global sustainability targets from Paris Agreement at COP21 and 2015–2030 United Nation Sustainable Development Goals.

Keywords *biodiversity conservation, integrated approac, sustainable development*

IN VITRO SCREENING OF FINGER MILLET (ELEUSION CORACANA (L.) GAERTN) VARIETIES FOR SALT TOLERANCE

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ABSTRACT:

Sodic soils occurring in the Indo-gangetic plains in northern india and many other parts of the world, contain a considerable quantity of sodium carbonate in addition to high elevated soil pH and under these conditions the availability of certain plant nutrients is reduced resulting in to severe loss in crop production. Millets are native of semi arid tropics, where salinity and drought are most common phenomena. The aim of the current study is to determine the effect of sodicity stress on early growth, physiology and lignin accumulation in finger millet genotypes. Initial in vitro screening with five finger millet varieties viz.,TRY 1, Paiyur 1,Paiyur 2, CO (Ragi) 14 and ATL 1 were screened for tolerance to various levels of sodicity stresses using sodium bicarbonate ($NaHCO_3$) solution at 0, 25, 50 and 75 mM, based on germination per cent, seedling growth, vigour index and stress tolerance index. Seeds were allowed to germinate in Petri dishes with the design of FCRD with five replication. At high sodicity level of 75 mM, the varieties paiyur 2 and Paiyur 1 registered more than 80 per cent germination. Shoot length of 15 days old seedlings was measured and a significant reduction was noticed in all the varieties subjected to different sodicity levels. Among the varieties, CO (Ra) 14 registered the highest reduction of 73 per cent over control followed by TRY 1 (67 per cent) and Paiyur 1 (60 per cent). The lowest reduction of 40 per cent was noticed in Paiyur 2 followed by ATL 1 (50 per cent). Different levels of sodicity also caused adverse effects on vigour index of finger millet seedlings. The results revealed that with the increase in salinity level, there was a decreasing trend in Stress Tolerance Index in all the varieties, indicating that higher the stress lesser the tolerance. Highest STI was recorded by Paiyur 2 value of 65 showing their tolerance to sodicity stress. Whereas the poor performing variety CO (Ra)14 recorded significantly lower STI of 48 indicating their susceptibility to sodicity stress. Among the selected five finger millet varieties Paiyur 2 performed well and recorded higher germination percentage, Root length, Shoot length, Vigour Index and Stress Tolerance Index compared with other varieties. The selected better performed paiyur 2 and poorly performed CO (Ra) 14 varieties were further studied under field condition in sodic soil using foliar spray of macro, micronutrients and plant growth regulators to ameliorate the sodicity stress tolerance in finger millet genotypes.

PHYSIOLOGICAL EVALUATION OF FINGER MILLET (ELEUSIONCORACANA (L.) GAERTN) FOR SODICITY TOLERANCE AND MITIGATION THROUGH GROWTH PROMOTERS AND NUTRIENTS

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ABSTRACT

The experiment was carried out in Factorial Randomized Block Design with five finger millet varieties viz.,TRY I, Paiyur I, Paiyur II, Co (Ra) 14 and ATL 1 varieities with three replications in sodic soil. Crop was raised on June-July 2021. The foliar spray treatments include Control, DAP (1%), BR (1 ppm), SA (100 ppm) and Nutrient mixture (Calcium Nitrate (0.5%)+K_2SO_4(0.5%)+$ZnSO_4$(0.5%)+Boric acid (0.2%)) applied at active tillering and 15 days after first spray. Morphological, growth, physiological, yield and yield parameters was recorded during active tillering and flowering stages. Plant height was measured from the ground level to the tip of the growing point. Among the varieties Paiyur II recorded highest plant height of 98.03cm at flowering stage. Among the treatments nutrient mixture recorded higher plant height of 102.09 which is on par with BR(1ppm) compared with control. No of leaves and leaf area increase up to flowering stage. Variety ATL1 recorded higher no of leaves (74) and leaf area (760.12) Significant increase in leaf area index was observed by foliar spray of growth regulators and nutrients. The variety ATL 1 recorded higher LAI (2.53) in flowering stage. Among the treatments foliar spray of nutrient mixture recorded higher LAI of 2.48 compared to control (2.05).The variety ATL1 recorded more SPAD(35.60) which is on par with TRY 1(35.39). Among the treatments BR (1ppm) (35.44) recorded more SPAD value which is on par with nutrient mixture spray (34.92) compared to control. The physiological parameters like soluble protein and nitrate reductase activity was recorded at flowering stage. Among the treatments nutrient mixture spray recorded more soluble protein (11.22 mg/g) and nitrate reductase activity of 44.68 compared to control. Significant increase in yield and yield parameters was observed. Among the varieties paiyur II recorded higher grain yield of 2495 kg/ha compared with check variety of TRY 1 (2462) followed by ATL 1 recorded grain yield of 2431 kg/ha. With regards to foliar spray of nutrient mixture recorded more grain yield of 2304 kg/ha compared with control 2016 kg/ha. From this study it is concluded that Paiyur II and ATL I identified as tolerant varieties and Paiyur I and Co14 as susceptible for sodicity stress. The susceptible varieties-Paiyur I and Co 14 showed significant improvement in physiology and grain yield due to foliar spray with nutrient mixture (Calcium nitrate (0.5%) + K_2SO_4 (0.5%) +$ZnSO_4$(0.5%) +Boric acid (0.2%) at active tillering and flowering stage .

EFFECT OF PLANT GROWTH REGULATORS AND EMASCULATION TREATMENT ON FRUITING BEHAVIOUR IN CAPE GOOSEBERRY (*PHYSALIS PERUVIANA* L.)

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ABSTRACT

The plant growth regulators have the ability to regulate all aspects of plant growth and development that can improve yield, quality and postharvest life of fruits. Thus, keeping in this view the present investigation was made to effect of plant growth regulators and emasculation treatment on fruiting behaviour in Cape gooseberry. The concentrations of plant growth regulators were taken as GA_3 @ 50, 100, 200 ppm, 2, 4-D @ 5, 10, 15 ppm, NAA @ 50, 100, 150ppm, IAA @ 15, 30, 45 ppm and Control. The plants growth regulators with varying concentrations were sprayed on emasculated (E_1) as well as unemasculated (E_2) flower buds (30 in each case) except control during the year 2018-19. On the basis of findings, the application of GA_3 @ 50 ppm on emasculated flower buds showed the capacity to induce more fruit retention (86.17 fruits per tree) after one week of spray and more numbers of fruits per plant (36.00 fruits per plant) at fruit maturity, the growth substances did not influence the fruit size but fruit weight (6.00 g per fruit) was increased by the treatment NAA @ 100 ppm and IAA @ 45 ppm. On the basis of findings, it can be concluded that the spraying of lower dose of GA_3 (50 ppm) showed the capacity to retain more fruits while medium dose of NAA (100ppm) and higher dose of IAA (45ppm) produced heavier fruit weight and the emasculated flower buds also significantly performed better in respect to most of the fruiting characters of Cape gooseberry.

Key Words: Cape gooseberry, PGRs, emasculation, fruit number, fruit weight.

SULPHITATED PRESSMUD CAKE AND BIOFERTILIZER INFLUENCING SOIL FERTILITY, PRODUCTIVITY AND JUICE QUALITY OF SUGARCANE IN CALCAREOUS SOIL

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Press mud is one of the most important organic by-product of the sugar industry, its enable to supplying adequate nutrients plant to the soil because of its beneficial impact on soil texture, soil structure, water holding capacity, soil porosity, soil bulk density, infiltration, hydraulic properties and its generally related to basic soil properties, these are followed by increases in soil aggregate stability and the soil ecological system physical climate is important for soil health and sustainable agricultural. The present field experiment was conducted on sugarcane crop in calcareous soil during 2020-2021 at Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar. The treatments comprised of sulphitated press mud cake (SPMC) with *Trichoderma viride*, phosphorus solubilizing bacteria (PSB) and 100 % chemical fertilizer (RDF) were replicated in RBD. The application of SPMC along with *T. viride* and PSB significantly reduced the pH and increased EC of soil. The mean organic carbon varied (0.39 - 0.51 %) significantly with maximum increment (23.80 %) in the plots receiving SPMC @ 12.5 t/ha along with *T. viride* + PSB over control. The application of SPMC with *T. viride* and biofertilizer significantly increased the availability of macro and micronutrients in soil over control after sugarcane harvest. The mean N (235.33 - 283.70 kg/ha), P (11.75 - 19.96 kg/ha), K (103.08 - 157.10 kg/ha) and S (14.7 - 18.5 kg/ha) varied significantly.. The mean value for available micronutrient viz. Fe (9.81 - 14.68 mg/kg), Zn (0.64 - 0.74 mg/kg), Cu (1.31 - 1.65 mg/kg) and Mn (3.82 - 5.71 mg/kg) also varied significantly. The population of bacteria, fungi and actinomycetes increased significantly due to addition of SPMC, treated with *T. viride* and PSB. The addition of SPMC indicated a significant improvement in bulk density, soil moisture content and pore space of post-harvest soil and being the highest in plots receiving SPMC + *T. viride* along with PSB. The growth characteristics, yield attributes and cane yield increased significantly in all the SPMC treatments over control. The highest germination, no. of tiller, plant hight, NMC, cane girth and single cane girth was observed in the plots receiving SPMC @ 12.5 t/ha along with *T. viride* + PSB. The addition of sulphitated press mud cake either with *T. viride* alone or in combination of PSB resulted in profitable yield of sugarcane crop. However, SPMC treatments (SPMC @ 5 - 12.5 t/ha) was found at par. The effect of the treatment on the cane juice quality viz. brix, sucrose, purity and CCS was found to be non-significant. The sugar yield varied (5.34 - 8.37 t/ha) significantly in plots treated with SPMC over control. Based on above findings it may be concluded that application of SPMC @ 5.0 t/ha + T. viride along with PSB was found suitable for obtaining higher cane and sugar yield with significant improvement in the physical, chemical and biological properties of calcareous soil.

Key words: SPMC, *Trichoderma*, Soil Fertility, Productivity, Juice quality, Sugarcane

SUSTAINING SOIL HEALTH AND POSSIBILITY OF MULTI RATOONING OF SUGARCANE AS INFLUENCED BY ORGANIC AMENDMENTS IN TYPIC USTIFLUVENT

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ABSTRACT

The reduction in the yield of ratoon crop arises out of improper management practices and declining fertility status due to lack of organic matter application. The organic carbon content of soils of sugarcane growing area of Bihar hovering under low range. About 40 % of the total sugarcane cultivated area is under ratoon crop having a low average yield (40-50 t/ha). The field experiment was conducted on University Research Project on sugarcane farming system Plant -Ratoon I-Ratoon II in calcareous soil belong to Typic Ustifluvent. The experiment was conducted in randomized block design with various organic amendments viz. control, FYM (farmyard manure) @ 20 t/ ha, biocompost (BC) @ 20 t/ ha, vermicompost (VC) @ 5 t/ ha, green manure with moong, sugarcane trash @ 10 t/ ha, FYM + BC+ VC (1: 1: 0.5) @ 20 t/ ha and recommended dose of fertilizer in sugarcane plant ratoon system. The application of different organic sources significantly increased soil organic carbon after ratoon II harvest. The organic treatment combination FYM+ BC + VC recorded the maximum organic carbon in the surface soil. The availability of NPK and Fe, Zn, Cu and Mn varied significantly in the post harvest soil. The applications of BC, VC and FYM + BC + VC in combination were found at par with each other. The application of FYM recorded highest amount of micronutrients in the surface soil which was maximum in the biocompost treated plots. The microflora population, CO_2 evolution and soil microbial biomass carbon increased significantly, indicating improvement in soil health. The number of tillers, plant heights, cane girths, number of millable canes and cane yield significantly increased in all the treatments over control. The organic sources produced yields statistically similar to the recommended NPK. The uptake of nutrients by plant differed significantly and followed a trend similar to the yield of cane. The brix, pol and purity of cane juice remained unaffected. Application of organic amendments had found imperative for maintaining soil heath for sustaining multi ratooning in sugarcane farming system.

BIOENRICHMENT OF *ARTEMIA* METANAUPLII WITH PROBIOTICS

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ABSTRACT

The experiment was conducted to derive optimum bacterial concentration and duration for bioenrichment of *Artemia* metanauplii with four bacterial strains viz. *L. plantarum* (MTCC 9511),*B. subtilis* (MTCC 10402), P1 and P2 (both isolated from gut of *Litopenaeus vannamei*). *Artemia* metanauplii were reared in the seawater containing above bacterial strains at concentration of 10^3 CFU/ml, 10^4 CFU/ml and 10^5 CFU/ml. Randomly sampled metanauplii were crushed at an interval of every two hours and used to estimate the enrichment level using standard bacterial enumeration method. Maximum enrichment level (3.52 ± 0.02 bacterial cells / metanauplii) was recorded at four hours duration of enrichment in 10^4 CFU/ml treatment. These bioenriched metanauplii can be used for feeding of shrimp larvae to administer probiotics in shrimp larvae which may help to improve survival rate and health status of shrimp larvae and thus, increase the income of shrimp hatchery entrepreneurs and shrimp farmers.

JAL BHAWANI (NDGR-702) NEW RICE VARIETY FOR DEEP WATER AREAS OF UTTAR PRADESH

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ABSTRACT

Deep water rice is distinguished from other rice by its ability to tolerate excess water. The main deep water rice areas are in the eastern districts of Uttar Pradesh. These districts represent major areas of rainfed, 83.41% of total rainfed area of Uttar Pradesh. Out of total area (5.96 million hectares) of rice in Uttar Pradesh, 7% are deep water areas. Flooding is one of the most important limiting factors for rice production. The problems of the areas become more complex as the time of flooding, depth & duration of submergence vary widely depending upon rainfall. Efforts have been made to develop varieties suitable for deep water (70 – 110 cm water depth). The variety NDGR-702 is derived from NDGR-207/IR 49906-B-B-B-10-GHT. The culture has long bold red kernel grain with flowering duration of 115 days. It has good tillering ability, need based elongation, good kneeing ability with submergence tolerance. It has strong thick culm, erect green and long flag leaf. It gives average grain yield of 36.91 q./ha. Quality wise it has 67.9% HRR, 23.4% amylose content, 79.8% hulling recovery, and 70.5% milling recovery. The variety is moderately resistant to neck blast, and stem borer. It has resistance to grain shattering, and better responsiveness to nitrogen.

Due to its abiotic stress tolerance in water logged area it will be preferred by farmers of rain-fed lowland areas of Uttar Pradesh.

The variety was released by SVRC and notified in The Gazette of India,No.8 New Delhi, Monday, January 3,2022

ADVANCES IN WATER LOGGED (DEEP WATER) CONDITION FOR EASTERN UTTAR PRADESH

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ABSTRACT

Rice is an important crop and is consumed widely across the globe as a staple food. India is one of the world's largest producer of rice and occupies second position in production. The area grown to rice in India is about 44 million hectares out of which total 5.96 million hectares under rice is in Uttar Pradesh, about 2.2 million hectares is under rain-fed lowland rice. These areas are located in depressed basins and low-lying areas adjacent to rivers in different eastern districts of the state which are subjected to various types of uncontrolled flooding every year. The most important limiting factor for rice production in such areas are unpredictable drought, submergence, flash flooding, low resource base of farmers, stem-borer infestation and unavailability of appropriate crop management technologies. Erratic rainfall leads to drought during vegetative period, but later on crop may be damaged by submergence due to high rainfall. Damage due to flash flood is quite high.

The experiment was conducted to study the relative performance of elite cultures under deep water situation at crop research station, Ghaghraghat, Bahraich, NRRI Cuttack, RAU Pusa, RRS Chinsura and Gerua during Kharif 2016.

The sixteen entries including check varieties were sown in 10 sq.m. plot size with three replication in randomised block design. The observation were recorded on water depth, days to 50% flowering, plant height, panicle per sq metre, elongation ability, kneeing ability, phenotypic acceptability, grain yield and resistance to diseases and pest. The maximum water depth recorded was 84 cm among all the tested entries.
Based on overall and zonal mean yield superiority of more than 5% over the best check, desirable traits for deep water condition viz days to 50% flowering, plant height and adaptability parameters three entries IET 25882 (NDGR 702) , IET 25881 (CR 3993-13-1-3) and IET 25883 (NDGR 703) were found superior to check varieties for grain yield and other yield attributing traits under deep water situations.

ASSESSMENT OF EFFECT OF NUTRITIONAL COMPLEMENTARY FOOD / WEANING FOOD ON CHILD HEALTH

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ABSTRACT

A field trial was conducted during year 2016-17 in rabi season at Begusarai distric of Bihar in order to compare the performance of application of different formulation of weaning food particularly proper nourishment of the child (six months to one year), This experiment comprised three treatments i,e Farmer's practice(inadequate dietary pattern, low intake of Fe, Ca, vitamins etc.), parboiled rice based weaning food (parboiled rice-150gm, green gram-100gm, Groundnuts-20gm, Gingelly seeds-20gms) and wheat based weaning Food. Moreover, trial was conducted in participatory mode on child health as a multi –locational trial at eight farmer's field as a replication. Among aforesaid experimental variables wheat based weaning of food had showed significantly higher mean weight which indicate proper nourishment to the child health. As far as economical parameters were concerned , the highest & lowest cost of prepared weaning food were associated with the treatment parboiled rice based weaning food (Rs. 3.58/-) and wheat based weaning food (Rs. 3.43/-) respectively which is cheaper than the similar commercial foods (sometimes used by farmer's).

The energy value (424 kcal/100g), protein contents (19.80 g/100g), Fat contents (7.78g/100g), calcium contents (171.28 mg/100g), Fe contents (5.55 mg/100g), phosphorus contents (407.75 mg/100g), β-carotene contents (60.85 µg/100g), Thiamine content (0.59mg/100g), Riboflavin contents (0.22mg/100g), and niacin contents (5.48mg/100g) of wheat based weaning food was higher as compared to the parboiled rice based weaning food, energy value (416kcal/100g), protein contents (16.35g/100g), Fat contents (7.00g/100g), calcium contents (149.77mg/100g), Iron contents (3.00mg/100g), phosphorus contents (307.03mg/100g), Beta carotene contents (23.19 µg/100g), Thiamine contents (0.41mg/100g), Riboflavin contents (0.15 mg/ 100g) and niacin contents (5.10mg/100g).

It is found that wheat based weaning food performed better than control & parboiled rice based weaning food. It means to achieve proper nourishment advantage &

efficient resource utilization, low cost weaning food should be used with wheat based weaning food.

Conclusively, low cost weaning food in Begusarai, distric should be administered with wheat based weaning food in order to control mal nutrition along with adopting the all recommended package of practices.

DEVELOPMENT OF STRESS TOLERANCE IN HORTICULTURAL CROPS TO MITIGATE CLIMATE CHANGE

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ABSTRACT

The greatest concern of mankind in the twenty-first century is global warming and climate change. Due to climate change, established commercial kinds of fruits, vegetables, and flowers will perform badly in an unpredictable manner. The melting of the Himalayan ice cap would diminish the cooling impact required for the flowering of several horticulture crops such as apple, saffron, rhododendron, and orchids, among others. Commercial horticultural plant output particularly that cultivated in open fields will be seriously harmed. Physiological disorders in horticultural crops will be more prominent as a result of the high temperatures, such as spongy tissue in mangos, fruit cracking in litchis, flower and fruit abscission in *solanaceous* fruit. Air pollution has also reduced the productivity of many horticultural crops and increased the severity of certain physiological disorders such as mango black tip. As a result, there is a need to safeguard these vital crops in order to ensure their long-term viability in the face of climate change. Conservation agriculture, renewable energy, forest and water conservation, reforestation, and other methods are the most successful. Modification of current horticultural techniques and increased use of greenhouse technology are two solutions for minimising the effects of climate change on productivity. The main strategies to meet this challenge will be the development of new cultivars of horticultural crops that are tolerant to high temperatures, and produce good yields under stress conditions, as well as the adoption of hi–tech horticulture and judicious management of natural resources.

Keyword: Commercial, minimizing, productivity, vegetables,

MANAGEMENT OF POD BORER, *HELICOVERPA ARMIGERA* (HUBNER) ON PIGEONPEA IN SARAN DISTRICT (BIHAR)

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ABSTRACT

Field experiment was conducted during 2015-16 on farmer's field for management of pod borer, *Helicoverpa armigera* (Hubner) on pigeonpea CV- Narendra Arhar-1 in Saran District. The on farm trial (OFT) revealed that technology option I was most effective against pod borer comprised spray of spinosad 45.1 SC @ 0.33 ml/liter water at time of 50% of pod formation followed by technology option II spray of imidacloprid 17.8 SC @ 1 ml/3 liter of water at 50% pod formation at eight locations. The minimum pod infestation was observed that technology option I *i.e.* 3.20 pod/plant at 190 days after sowing and maximum pod infestation 8.43 pod/plant at 190 days after sowing in farmer's practices field. The maximum grain yield was observed in technology option I *i.e.* 19.70 q/ha which was significantly superior over all the treatments. The studies conducted on impact of various technology options showed that net return and B: C ratio was also higher in technology option I *i.e.* Rs. 71153 and Benefit cost ratio 3.56:1 in compression to farmer's practices Rs. 46088 and 2.53:1, respectively.

Key word pigeonpea *Cajanus cajan,* pod borer *Helicoverpa armigera,* chemicals and B:C ratio

WILT DISEASE MANAGEMENT OF LENTIL (LENS *CULINARIS*)

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On farm trials were carried out at KVK, Sheohar for consequently two years. The experiments were designed four treatments with five replications for the management of Wilt Disease in Lentil crop with following sets of treatments: Technology option -2 i.e. seed treatment with fungicide (carbendazim 50WP) followed by Treatment option -3 i.e. seed treatment with bio-pesticide (Trico derma viride), Treatment option -4 with FIR technique and Technology option -1 farmers practice i.e. control. The data collected from five different locations of trial sites showed the treatment T4 i.e. seed treatment with carbendazim50WP+chloropyriphos20ECand Rhizobium (FIR) technique, better result over other treatments. Bio-pesticide treated seed showed incidence of wilting moderately high i.e. 4.5 out of 10 point scale resulting45% of wilting. The recorded yield was 17.10q/ha. On the other hand seed treated with Fungicide Insecticide and Rhizobium (FIR) technique showed encouraging results. Incidence of wilting was low i.e. 1.5 out of 10 point scale average yield recorded was 20.20 q/ha.

EFFECT OF DIFFERENT IRRIGATION LEVELS ON BIOCHEMICAL PARAMETERS AND YIELD ASSOCIATED WITH DROUGHT TOLERANCE IN WHEAT *(TRITICUM AESTIVUM* L.*,)* GENOTYPES.

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ABSTRACT

The experiment concluded that under three levels of irrigation i.e. I_0(No irrigation), I_1(CRI Stage), I_2(CRI Stage + Flowering Stage) on 10 wheat genotype viz., K7903, K9351, K9465, K8962, K9423, K307, NW1014, K9533 and HD2733. On finding the result wheat genotype viz., K307, K9162, NW1014 and K8962 recorded higher Nitrate reductase activity, super oxide dismutase, total soluble sugar, proline content as compared to other genotype under all levels of irrigation. These genotype also show the greater seed size with hard seed, higher biomass, higher grain growth rate and harvest index. Further these traits possessed significantly positive co-relationship with grain yield and indicates their participation in the process of drought tolerance mechanism. Thus these traits which are simple and easily measurable can be used for screening of wheat genotype for drought tolerance. Therefore these genotype can be used as a suitable donor in breeding program to develop new drought tolerant varieties.

EFFECT OF NUTRIENT SOURCES ON NUTRITIONAL QUALITY OF BARLEY (*HORDEUM VULGARE* L.)

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ABSTRACT

The micro pot experiment was conducted to know the effect of nutrient sources on nutritional quality of Barley (*Hordeum vulgare* L.). Highest nutritional quality were computed in N_{80}, P_{50}, K_{50}, S_{40}, Zn_5 kg ha^{-1} with FYM 5 ton ha^{-1} (T_5) and lowest in absolute control in different cultivars of barley. The nutritional quality of all the nutrients increased with an increase in graded levels of fertilizers with integration of FYM. On an average highest nitrogen content were recorded with combination of FYM 5 t ha^{-1} along with graded levels of nutrients i.e. N_{80}, P_{50}, K_{50}, S_{40}, Zn_5 kg ha^{-1} with FYM 5 ton ha^{-1} (T_5) were found highest 1.63% in Haritima V_1 and 1.71% in Azad v_2 in comparison to lowest nitrogen contents were recorded in absolute control. Similarly, without integration of FYM highest nitrogen content 1.56% was observed in Haritima V_1 and 1.67% in Azad v_2 in comparison to control (T_1). The integrated use of nutrients also significantly increased nitrogen, phosphorus, potassium, sulphur and zinc content in grains and straw of Barley. It can be inferred that highest nutritional quality in barley cultivars could be achieved with integrated use of organic manure (FYM) and inorganic fertilizers N, P, K, S and Zn. The treatment N_{80} P_{50} K_{50} S_{40} Zn_5 kg ha^{-1}+FYM @ 5 t ha^{-1} came out to be best dose for maximum nutrient content.

Key words: Barley (*Hordeum vulgare* L.), FYM, Fertilizers, nutritional quality.

CUSTOMIZED FERTILIZER: AN ARTEFACT FOR ENHANCING NUTRIENT USE EFFICIENCY

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ABSTRACT

In India, among the nutrients, NPK remain the major ones for increased and sustained productivity. The development of high yielding systems, on the other hand, is likely to increase the problem of secondary and micronutrient deficiencies, not only because larger amounts are removed, but also because huge amounts of N, P, and K are applied to attain higher yield targets. As a result, in intensive systems, negative balance, secondary and micronutrient insufficiency are a distinct possibility. Balanced fertilisation, site-specific nutrient management, and customised fertilisers will all be crucial in meeting future goals. The development of site and crop specific or customizable fertilisers based on scientific principles could be more successful in meeting plant requirements and improving nutrient use efficiency. As a result, the holistic strategy should be tailored to the soil, climate, and crop. To meet the crop's needs, it's critical to provide both macro and micronutrients. Customized fertiliser, a multi-nutrient carrier of both macro and micro nutrients, is tailored to meet the region, soil, and crop specific needs designed through specialised smart fertiliser technology and manufactured through a systematic granulation process, as Indian soils are deficient in supplying nutrients, particularly nitrogen and zinc. These personalised fertilisers increase crop yields while also slowing the decline of soil fertility over time.

Keywords: fertility, granulation, holistic, macronutrients, site-specific.

IMPACT OF DIFFERENT WATER MANAGEMENT OPTIONS ON GROUNDWATER ABSTRACTION, ENERGY CONSUMPTION AND CARBON EMISSION IN DIFFERENT DISTRICTS OF BIHAR

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ABSTRACT

Groundwater irrigation plays an important role in increasing agricultural production and food security in India; however, declining groundwater results in increase in energy consumption and carbon emission for groundwater lifting. Energy consumption and green house gas emission are one of the major concern for developing country. In the present study energy consumption and carbon emission due to groundwater pumping was studied. The main objective was to estimate the total energy consumption from groundwater in different districts of Bihar, to estimate carbon emission due to groundwater abstraction in different districts of Bihar and to study the impact of different water management options on the total annual groundwater draft, energy consumption and carbon emission. The ground water draft was calculated by using norm of GEC-1997 and energy required for groundwater abstraction will be estimated as per the methodology provided by Rothausen and Conway, 2011. The carbon emission was calculated by using methodology given by Nelson and Rothausen, 2008.

There are 22877 dugwells, 361952 shallow tubewells, 245881 medium tubewells and 12787 deep tubewells in Bihar state. The total annual draft for Bihar state was found to be 1742812 ha-m with maximum value of 137061 ha-m for Nalanda district and minimum for Sheohar dstrict for 11713 ha-m. The total energy required for groundwater pumping for Bihar was found to be 8256394 MWh. The highest energy requirement for groundwater pumping was found 845720 MWh in Nalanda district and lowest 44397 MWh for Banka district. The total CO_2 emission from pumping of groundwater for the whole state was found to be 808301 tonne. Nalanda contributes highest to carbon dioxide emission of about 828301 tonne and Banka contributes lowest to total carbon dioxide emission from the state that is about 4346 ton. The reduction in the total energy requirement under Sprinkler irrigation system water management options in case-1(a), case-1(b) and case-1(c) were 5%, 10% and 14% respectively. The total carbon emission reduction under Sprinkler irrigation system water management options in case-1(a), case-1(b) and case-1(c) were 4%, 10% and

15% respectively. The reduction in the total energy requirement under Drip irrigation system water management options in case-2(a), case-2(b) and case-2(c) were 8%, 14.6% and 23.1% respectively. The total carbon emission reduction under Drip irrigation system water management options in case-2(a), case-2(b) and case-2(c) were 7.5%, 15% and 22.5% respectively. The reduction in the total energy requirement under laser land leveling water management options in case-3(a), case-3(b) and case-3(c) were 1.25%, 2.5% and 3% respectively. The total carbon emission reduction under laser land leveling water management options in case-3(a), case-3(b) and case-3(c) were 1%, 2% and 2.5% respectively. The reduction in the total energy requirement under bed planting system water management options in case-4(a), case-4(b) and case-4(c) were 3.6%, 8.5% and 12% respectively. The total carbon emission reduction under bed planting system water management options in case-4(a), case-4(b) and case-4(c) were 3.7%, 7.5% and 11% respectively. Among the different water management options drip irrigation is the most efficient for reduction in energy requirement and carbon emission for ground water pumping. The different water management options which includes sprinkler, drip , laser land leveling and raised bed planting can also be used as an alternative for reduction in energy requirement and carbon emission for ground water pumping.

LONG TERM SPATIAL AND TEMPORAL CHANGES OF ARID CLIMATIC REGIONS OVER INDIA

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ABSTRACT

In this study, a quantitative assessment of spatial and temporal extent of arid climatic regions over India was studied for the period 1988-2018 using global climate data sets. Total 625 climatic station data across the country was used to analyze the spatial variation of arid regions over India. Various water balance indices were computed, interpolated and mapped geo-statistically using ArcGIS 10.5. It was noticed a considerable changes in the country's arid and semi-arid climatic zones were observed between the two periods; 1992 and 2018. The results indicated that, there has been a net percent change in hyper arid, typic arid and semi-arid (dry) areas is 5.62, 1.62 and 7.17, respectively. Dryness and wetness are increasing in different parts of the country. There is also change in rainfall, PET and moisture index over a period of time which is vital to determine aridity pattern of any region. The number of rainy days is decreasing which in turn increase Potential Evapo-transpiration (PET). Thus, results are of great significance for studying the assessment of temporal and spatial dry climatic water balance of India, which can help immensely in the management of water resources and sustainability of crop production under changing climatic conditions.

***Keywords*:** Climate change, Arid regions, PET, Interpolation, GIS

STUDIES ON SUITABLE DOSE OF PHOSPHORUS FOR HIGHER YIELD OF GREEN GRAM (*VIGNA RADIATA* L.)

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ABSTRACT

The experiment was conducted at Agronomy Research Farm of the "Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (U.P.). The farm is situated at south-east of Ayodhya-Raibareilly road in a main campus of the university which is 42 Km. away from Ayodhya city. During the kharif season (June-September) of 2016 to find out the Impact of varieties and phosphorus levels on the relative yield of kharif mungbean (*Vigna radiata* (L.) Wilczek. The experiment was laid out in Factorial Randomized Complete Block Design with four replications and constitute of four levels of phosphorous viz., 20 kg P_2O_5 ha^{-1}, 40kg P_2O_5 ha^{-1}, 60kg P_2O_5 ha^{-1}, control (no phosphorous application) in 25 varieties *ie* NDM-1, Meha, Samrat, Amrit, KM 1, Mohni, Pannt mung-1, Pant mung-2, PDM-11, Pusa-105, Pusa Vaisakhi, Sabarmati, Sunaina, Varsa, Type-1, Type-44, Type-51, ML-1, ML-5, ML-131, CO-4, Jawahar-45, K-851, Gujrat-1 and Gujrat-2 of mung. Results revealed that most of the growth characters such as initial plant population, plant height, number of leaves, number of branch $plant^{-1}$ were significantly increased due to application of phosphate fertilizer over control on the similar way application of phosphorous significantly increased the yield and also. The highest grain yield (11.02q ha^{-1} during 2014-15 and 11.31q ha^{-1} during 2015-16) was obtained with 60 kg P_2O_5 ha^{-1} having an increase of 31.85% and 31.92% over the control during first and second year respectively and the lowest with no phosphorous application (7.51 and 7.70q ha^{-1} in first and second years of investigation). Grain yield obtained by application of 40kg P_2O_5 was statistically at par with that of 60kg P_2O_5 ha^{-1}.

Keywords: *Vigna radiata* (L.) wilczek, phosphorous levels, growth and yield characters of mung bean

CHARACTER ASSOCIATION AND PATH ANALYSIS IN ELITE LINES OF WHEAT (*TRITICUM AESTIVUM L.)*

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ABSTRACT

One hundred fifty genetically diverse exotic Germplasm along with three indigenous checks (HP 1731, PBW 343 and NW 2036) of wheat (*Triticum aestivum L.)* were evaluated in Augmented Block Design at Main Experiment Station Faculty of Agriculture , Kamla Nehru Institute of Physical and Social Sciences Sultanpur (U.P.) During Rabi season 2020 -2021. The result indicated that the grain yield per plant showed very strong positive association with biological yield per plant, grain, per spike, tillers per plant,ear length and plant height. Path analysis divulged that, the biological yield per plant and days to maturity emerged as direct contributors towards the expression of grain yield per plant while tillers per plant, ear length, grain per spike and 1000 gram weight were identified as most important indirect yield contributors the residual factors accounted for variability was very low i.e.0.17 An overall, the study showed the importance of days to maturity Number of tillers, grain,per spike and biological yield in selection programs for improvement of grain yield per plant.

Key words: Wheat (*Triticum aestivum L.)* correlation,path, analysis,exotic lines.

EFFECT OF DIFFERENT CROPPING SYSTEMS ON PHYSICAL AND ENZYMATIC ACTIVITY IN CALCAREOUS SOIL OF BIHAR

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ABSTRACT

Cropping system refers to practicing of growing two or more than two crops on same piece of land simultaneously in a particular year. Cropping system has a great impact in maintaining soil health. It has a great effect on various soil parameters. So in order to estimate the effect of different cropping systems on various soil properties the present investigation was undertaken at the research farm of Tirhut College of Agriculture, Dholi, Muzaffarpur, a campus of Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar. In the farm, the different kinds of cropping patterns have been being followed for the last five years or more. Each crop was grown with normal irrigation practice and recommended doses of fertilizer application, i.e, without any stress condition. A number of soil quality parameters were measured during the course of investigation to evaluate the effect of nine cropping systems on soil quality under similar, calcareous nature of the soil. The lower bulk density (1.21Mgm^{-3}) and (1.24 Mg m^{-3}) was recorded under mustard-moongbean and pigeon pea cropping systems followed by tuber-moongbean (1.31 Mgm^{-3}), rice-potato and maize-maize cropping systems over non-cultivated land. The bulk density in sub-surface soil depth increased under all cropping systems. Maximum water holding capacity (WHC) was recorded under pigeon pea cropping system in the surface layer 42.20% and 40.36% in sub-surface layer. The minimum WHC 36.46% and 35.61% was noticed in fallow land at both the soil depths. Mean weight diameter in different treatments varied from 2.51mm to 4.49mm. The highest MWD was recorded under pigeon pea cropping system, whereas the lowest was under fallow lands. The MWD generally promotes the soil aggregation and its stability. Dehydrogenase and alkaline phosphatase enzymes showed variation from 6.87 to 19.91 (µg TPF g^{-1}24 h^{-1}) and 6.77 to 33.55 (µg PNP g^{-1} soil h^{-1}) at the upper surface layer. Among the cropping systems, pigeon pea maintained higher amount of dehydrogenase and alkaline phosphatase enzymes in the soils than the other systems and fallow land showed the lowest value.

EFFECT OF DIFFERENT PHOTOPERIODS ON COLOUR CHANGE OF LIVE BEARER ORNAMENTAL FISHES

(Molly,Guppy,Platy and Swordtail)

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ABSTRACT:

The present study was conducted to find out effect of different photoperiods [(10L:12D and 08L:14D; sunlight),(15 days light and 15 days dark interval),(one month light and one month dark interval),(04L:20D; Green Bulb,15 watts) and (04L:20D; CFL Bulb,15 watts) on colour change of fishes. Total five experiments were conducted for a period of six months, three months each for brooder and youngones. Mainly four live bearer ornamental fishes viz. molly (Poecilia sphenops),guppy (Poecilia reticulata), platy (Xiphophorus maculatus) and swordtail(Xiphophorus helleri) were selected for study. Eight setups constructed named setups- I to IV(each brooder) and setups-A to D (each youngone). Observations done through naked eye. Findings of each experiment : Experiment-1, no colour change observed on brooder and youngones. Experiment 2, colour change on brooder are found to be a little change,,more and transparent while on youngones, dull and transparent in dark phase. Experiment3, after 20 days of trial in dark phase,on brooder colour change found at half portion, about to disappear and fade while on next dark phase completely disappear and dull. Youngones colourless, with little change and dull. Experiment 4, brooders from dark and light phase ,colour starts to come back a little bit to more finally and no change observe on new one. No colour change found on youngones. Experiment 5,on brooder and youngones no colour changes found.Overall concluded sunlight, greenlight and CFL are good for attractiveness, beauty and good crops whereas dark and light phases not recommended which provides economic loss to farmers, entrepreneur and women self group. Hence market demand of fishes become low and its contribution in National income will be low.

Keywords:Brooder,Colour change, Live bearer ornamental fishes, Photoperiods ,Youngones

EFFECT OF NPK ON YIELD OF CARROT UNDER ALLUVIAL SOIL OF CENTRAL UTTAR PRADESH

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SUMMARY

Investigation entitled "Effect of N.P.K. on yield of carrot under alluvial soil of central Uttar Pradesh" were carried out during Rabi seasons of 1990-1991 and 1991-1992 at the department of Horticulture K.A. P. G. Collage Allahabad. The carrot cv. 'Pusa Kesar' was tested in the experiment during both the years of experimentation. It is revealed from the finding that highest and significant yield of carrot was noticed with 120kg N+ 100kg P_2 O_5 and 100 kg K_2 o/ha. and being lowest with control under alluvial soil of central Uttar Pradesh.

Carrot is a cool season crop. It is grown all over the world in spring, summer and autumn in temperate countries and during winter in tropical and subtropical climate. The world wide consumption of carrot has increased over the year and it is now one of the most popular vegetable crops. Green vegetables are rich source of vitamin 'B', whereas 'A' is rich in carrot and it is main source of vitamin 'A' in vegetarian diet of large population of country (38 mg/100 g carotene on dry matter singh, 1963). In order to improve the health of both rich and poor people of the society, Carrot plays an important role in dietery system and supplement vitamin 'A' . The deficiency of vitamin 'A' causes night blindness, Kerotomalcia, retard growth and malnutrition.

Vegetable play a vital role in Indian economy, agricultural industries and export trade. They constitute the most important group of crops and rank second position in the world map with an estimated area of 4.5 million hectares and production potential of about 48 million tonnes (Majeed and Gowda, 1992). Our country is exporting about 34 thousand tonnes fresh vegetable valued Rs. 22 crores per annum (Chada, 1994).

INTEGRATED WEED MANAGEMENT IN JUTE FOR HIGHER FIBRE YIELD AND RETURN IN KOSI REGION OF BIHAR

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INTRODUCTION

Jute is popularly known as 'Golden fiber' which is one of the most important cash crops in the Kosi Region of Bihar. The hot and humid climate with intermittent rainfall during the jute growing season in Kosi Region encourage profuse weed growth resulting severe weed infestation during the early crop growth phase in jute. It was also estimated that 75-80 % of fibre yield is lost due to weed infestation which is quite common in most of the jute growing situations. Therefore, weed free condition in the early stages of growth in jute always maintains higher productivity and profitability. Therefore, present experiment was conducted during 2019-20 at Jute Research Centre, Katihar (BAU, Sabour) under All Iindia Coordinated Research Project on Jute and Mesta. The experiment was designed with nine treatments (IWM practices) and tested under Randomized Block Design with four replications.

From the experimental results (Table:1), it has been found that maximum yield of jute fibre (36.31 q/ ha) was exhibited in case of Two hand weedings (HW)/Mechanical Weeding (nail weeder) at 15-20 DAE and 35-40 DAE due to optimum plant population and other yield attributing factors. But the treatment where application of Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron@ 50 g/ha at 15 DAE + one hand weeding (30 DAE) was made , reflected highest maximum net return (92425 Rs./ha) and B:C ratio (3.84) with fibre yield (34.01 q/ha) in Jute. Therefore, considering the fibre yield and the benefit: cost ratio of the treatments, it could be concluded that application Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron@ 50 g/ha at 15 DAE + one hand weeding (30 DAE) is found suitable for getting higher economic yield over the other IWM practices in Kosi Region of Bihar.

Table-1: Fibre yield and economic return of Jute as influenced by Integrated weed management treatments during 2019-20

Treatments	Fibre yield (q/ha)	Net Return (Rs/ha)	B:C ratio
T_1- Pretilachor @900 g/ha at 45 -48 hrs of sowing with irrigation + one hand weeding (15 DAE)	33.75	68626	2.94
T_2- Quizalofop ethyl 10% @ 38 g/ha at 15 DAE + one hand weeding (30 DAE)	31.89	89153	3.71
T_3- Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron @100g/ha at 15 DAE	22.52	48585	2.52
T_4- Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron@ 50 g/ha at 15 DAE + one hand weeding (30 DAE)	34.01	92425	3.84
T_5- Propaquizafop 10 EC @ 90 g/ha at 15 DAE + one hand weeding (30 DAE)	32.58	84136	3.66
T_6- Pedimethalin 35% EC @ 525 g/ha (48 hours of sowing with irrigation or sufficient rain) + one hand weeding (15 DAE)	25.93	54025	2.54
T_7- Nail weeder at 5 DAE + Quizalofop ethyl 5 EC 60 g at 25 DAE	34.04	91948	3.78
T_8- Unweeded check	21.95	35358	2.20
T_9- Two hand weedings (HW)/Mechanical Weeding (nail weeder) at 15-20 DAE and 35-40 DAE	36.31	98179	3.56

PATHOGENIC VARIABILITY OF A*LTERNARIA LINI* IN INDIA

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ABSTRACT

Alternaria lini causes blight of linseed in India. The leaves showing typical symptoms of Alternaria blight in linseed collected from different part of country and characterized for pathogenic variations. Isolates exhibited variation in disease severity, per cent disease intensity and area under disease progress curve after inoculation on 10 different genotypes of *Linum* spp. Out of 12 isolates Al_{11} collected from Berhampur was found highly virulent for all the test differentials and isolates Al_3 and Al_5 were found less virulent. The genotype Polf-05 and Polf-15 were noted as resistant and T-397, Chambal and Kanpur local as susceptible for all the isolates.

Key words: *Alternaria lini,* Pathogenic Variability

EFFECT OF MANURE AND BIOSOLID APPLICATION ON SOIL FERTILITY FOR CROP PRODUCTION

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ABSTRACT

The Effects of Manure and biosolid on Soil Fertility focuses specially on the behaviour of nitrogen (N) and phosphorus (P) in soil because these two nutrients are the main nutrients for crop production. The amounts of nutrients that become available to the plants depend on the time of year the manure is applied and how quickly it is worked into the soil. The growth in world population has increased food demand, which requires an increase in agricultural production. Manure has been known to have beneficial effects on soil fertility, soil health, and overall contribution to the enhancement of crop production. Animal manure can enhance soil biological activity which favors nutrient cycling. Good soil is not only rich in basic nutrients; it is also physically well-structured and biologically active. Manure and biosolid application increase the abundance of soil fauna, such as bacteria, fungi, and earthworms. Manure and biosolid application also increase microbial respiration and mineralization. The aim of this paper is to compile the research related to the effects of various types of manure and biosolids on soil fertility and consider how manure contributes to enhancing crop production.

CISGENESIS: AN ALTERNATE APPROACH TO TRANSGENESIS FOR CROP IMPROVEMENT

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ABSTRACT

Crop improvement through classical breeding techniques is painstakingly slow and tedious process for introgression of traits from wild germplasm into cultivars. Therefore, a rapid, safe and more acceptable approach is far needed which can combine classical breeding techniques with modern biotechnology to speed up the breeding process. Cisgenesis could be a way other than transgenics which involves only the allele of interest is inserted from sexually compatible or crossable species and interbred using traditional breeding methods, making cisgenics "less controversial" than transgenics. Although a transgenic method may be beneficial to improve crop varieties for specific traits but it involves genes (transgenes) from unrelated organisms this leads to many controversial debates among the scientific and non-scientific communities. Cisgenesis is a better way to enhance the use of existing gene alleles without accompanying linkage drag, a major drawback of classical breeding programmes and this approach also respects species barriers. A cisgene construct includes endogenous promoters and terminators, free from selectable marker genes and vector backbones. In this chapter, we have focused on the applications of cisgenesis in crop improvement as it can directly improve an existing variety without disturbing the genetic make-up of the plant.

Keywords: Classical Breeding, Linkage Drag, Cisgenesis, Crossable Species, Genome Sequencing, Transgenesis, Crop Improvement

NATURAL PROCESSES INVOLVING FIRE IN AN ECOSYSTEM AND IT'S ECOLOGICAL EFFECTS ON THE BIOTIC COMPONENTS OF THE EARTH

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ABSTRACT

Before the emergence of humans on Earth, fire played a key role in the origins of plant adaptations as well as in the distribution of ecosystems. Humans initiated a new stage in ecosystem fire, using it to make the Earth more suited to their lifestyle. However, as human populations have expanded their use of fire, their actions have come to dominate some ecosystems and change natural processes in ways that threaten the sustainability of some landscapes. The origin of land plants to the present, that explores the multitude of roles fire has played on Earth and the ways in which humans have affected those roles. Our general hypotheses are that (a) the world cannot be understood without considering fire, because fire has strong ecological and evolutionary consequences for biota, including humans; and (b) since the rise of humans, people have heavily influenced fire regimes, often in ways that greatly affect the sustainability of some ecosystems. While humans have altered fire regimes since their early history, recent decades have been marked by rapid-fire regime changes as a result of significant shifts in human population, particularly with respect to growth, socioeconomic factors, and land management. At a global scale, the direction and the root causes of these changes exhibit extraordinary diversity and require a regional approach.

Keywords: Fire regimes, Sustainability, Multitude, Socioeconomic factors

MODERN STRATEGIES FOR CROP IMPROVEMENT TO COMBAT CLIMATE CHANGE

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ABSTRACT

The main objective of induced mutagenesis is enhancement of mutation rate in a short duration for development of new plant varieties. The frequency rate of spontaneous mutation is very low and difficult for application in plant breeding. Traditionally induced mutagenesis is by physical (*e.g.* gamma radiation) and chemical (*e.g.* ethyl methane sulfonate) mutagen treatment of both seed and vegetatively propagated crops. Recent reports infer the application of high energy ion beams for induced mutagenesis. Through *in-vitro* selection, mutants with desirable agronomical traits including resistance to abiotic and biotic stress can be screened in a short period of time. The application of mutagenesis along with plant tissue culture and length of culture period especially in cereals could enhance the genetic variability. This approach could be applied more frequently before the techniques of genetic engineering become more common and trustworthy tool in plant breeding. Hence, a combination of tissue culture and mutagenesis could promote genetic variability and that is applied by plant breeders during various plant breeding programs. Conventional breeding along with other techniques including mutagenesis, genetic engineering, biotechnology or molecular breeding apply local genetic resources for new cultivars development which could help to combat frequent climatic alterations.

Keywords: biotechnology, climate, genetic engineering mutagenesis, stress

SURVEY OF MEDICINALLY IMPORTANT INVASIVE ALIEN PLANTS (IAPS) FROM DISTRICT-BAHRAICH, UTTAR PRADESH

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ABSTRACT

Medicinal IAPs have been widely used to treat a variety of infectious and non-infectious diseases. Extracts of IAPs also use to inhibit the growth of phytopathogenic fungi. Bahraich is the Terai (low land) District of Uttar Pradesh; it is bounded by district Shravasti on the east, district Barabanki & Sitapur on the west, district Gonda on the south and district Lakhimpur Kheri on the North. Geographical area of the district Bahraich is 5020.6 km^2 and it is located at $27^0$04' to $28^0$24' N latitude and between $81^0$03' to $82^0$24' E longitude. The study area has tropical moist deciduous type of climate and major vegetation types. The field survey of the different agricultural land areas and forests during year 2019-2020. During field survey, discussion and interview held by the local farmers, old persons and Tharu tribal and thus collect the information of medicinal use of IAPs. During survey I have collected 30 IAPs which are belonging to 18 families. These IAPs are *Ageratum conyzoides* L., *Amaranthus spinosus* L., *Argemone* mexicana L., *Blumea eriantha* DC., *Calotropis procera* (Ait.) R.Br., *Cannabis sativa* L., *Cassia occidentalis* L., *Chenopodium album* L., *Clerodendrum splendens* G. Don, *Cuscuta reflexa* Roxb., *Datura metel* L., *Eclipta prostrata* (L.) Mart., *Eichhornia crassipes* (Mart.) Solms, *Eupatorium adenophorum* Sprengel, *Euphorbia hirta* L., *Hyptis suaveolens* (L.) Poit., *Ipomoea fistulosa* Mart DC., *Lantana camara* L., *Martynia annua* L. *Nicotiana plumbaginifolia* Viv., *Opuntia elatior* Mill., *Parthenium hysterophorous* L., *Prosopis juliflora* (Sw.) DC., *Ricinus communis* Linn., *Sida acuta* Burm.f., *Solanum nigrum* L., *Salvia hispanica* L., *Tridax procumbens* L., *Urena lobata* L. and *Xanthium strumarium* L.

Keywords: IAPs, Medicinal use, Tharu tribal and phytopathogenic fungi.

STUDIES ON THE SHIFT OF PLANTING TIME IN VIEW OF THE RISING TEMPERATURE ON POTATO (*SOLANUM TUBEROSUM* L.)

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ABSTRACT

The experiment entitled "Studies on the shift of planting time in view of the rising temperature on potato (*Solanum tuberosum* L.)" was carried out during the *Rabi* season of 2019-20 and 2020-21 at Farmer's field in district Sant Kabir Nagar. The experiment comprising of five planting dates (15 October, 25 October, 5 November, 15 November and 25 November) and four varieties (Kufri Ashoka, Kufri Pukhraj, Kufri Bahar and Kufri Garima) was laid out in a Randomized Block Design (factorial concept) with four replications. Keeping net plot size 3.6 x 3.6 m. Five plants were selected randomly from each experimental treatments to record data on various parameters, which were influenced significantly by different planting dates and varieties.The per cent plant emergence at 30 DAP significantly maximum in 5 November planting. However, number of haulms per hill, plant height, number of leaves per plant at 45 and 60 DAP, total number of tubers per plant, total tuber yield, number of A and B grade, weight of A, B, C and D grade tubers and total yield of tubers (q/ha) was significantly highest with 15 November planting and number of C and D grade tubers was maximum in 25 November planting.Different varieties exhibited significant difference on growth and yield parameters. The maximum values for growth and yield traits were noted in variety Kufri Garima. Interaction effect of planting dates and varieties showed remarkable variation different parameters. Significantly highest values were registered for number of haulms, number of leaves at 45 DAP, number of tubers per plant, number and weight of A, B and D grade tubers per plant, , total yield of tubers planting on 15 November of variety Kufri Garima.

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH AND YIELD OF POTATO (*SOLANUMTUBEROSUM*L.)

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ABSTRACT

A field experiment was conducted during the *Rabi* season of the year 2020-21 at Farmers' field in Nagipur Village of Milkipur Tahsil of Ayodhya district, to study the **"Effect of Integrated Nutrient Management on growth and yield of Potato (*Solanumtuberosum*L.)"**with variety *Kufri Khayati.* Treatments consisted of five levels of RDF (0, 75, 100, 125, 150%) and two sources of organic manures (farm yard manure @ 20.0 t/ha and vermicompost@ 7.5 t/ha).The experiment was laid out in randomized block design and replicated thrice. The experimental site was sandy loam in texture and slight alkaline in reaction (pH 7.95), low in organic carbon (0.47%), available N (146.60 kg/ha), medium with respect to available K_2O (238.01) and low with respect to available P_2O_5 (15.50 kg/ha).

The results revealed that there wasa significant difference in various plant growth and yield parameters like plant height, number of shoots, leaf area index, dry matter accumulation, bulking rate of tubers, yield attributes and fresh yield of tubers due to various treatment applied in the experimentation.The outcome of the research trial revealed that treatments T_5-100% RDF (150: 90: 100 N, P_2O_5 K_2O kg/ha) + FYM 20.0 t/ha and T_6-100% RDF (150: 90: 100 N, P_2O_5 K_2O kg/ha) + vermicompost 7.5 t/ha gave(325.10 q/ha) and (330.15 q/ha) yield of tubers, respectively which was significantly superior over treatments T_1-Control, T_2-100% recommended dose of fertilizer through chemical fertilizers only, T_3-75% RDF + FYM 20.0t/ha and T_4-75% RDF + vermicompost 7.5 t/ha. These treatments (T_5 and T_6) were found statistically at par to treatments T_7-125% RDF + FYM 20.0 t/ha, T_8-125% RDF + vermicompost 7.5 t/ha, T_9-150% RDF + FYM 20.0 t/ha and T_{10}-150% RDF + vermicompost 7.5 t/ha. Similar result was observed with respect to other crop growth attributes, dry matter accumulation, NPK content, total nutrient uptake by crop, organic carbon, organic matter content, available N, P_2O_5 and K_2O in soil as well as economics among the integrated nutrient treatments. Even though the application of 100% recommended dose of inorganic fertilizer fetched higher B: C ratio than integrated nutrient treatments but keeping the fact of sustainable crop production as well as to improve soil fertility status, the application of 100% RDF + 20 t/ha farm yard manure or 100% RDF + 7.5 t/ha vermicompost can be recommended for potato cultivation.

EFFECT OF BIO-FERTILIZER ON THE GROWTH AND YIELD OF *LYCOPERSICUM ESCULENTUM* L UNDER NATURAL CLIMATIC CONDITION

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ABSTRACT

In organic agricultural system, the use of synthetic fertilizers, pesticides and growth regulators are avoided now days. Instead, the use of bio-fertilizers, crop rotations, crop residues, farm yard manures and green manure, have gained worldwide importance and acceptance in organic farming. The synthetic fertilizers are very harmful to the edible crops especially for the crops which are consuming raw, such as fruits and salad. In the present study *Lycopersicum esculentum* L, crop has been taken. The experiments were conducted at experimental site of Krishi Vigayan Kendra, Sant Kabir Nagar, Uttar Pradesh. In this study the S-22, a determinate hybrid variety was used (the first harvest starts from 55 - 60 days after transplanting) and this variety was collected from vegetable section of Indian Institute of Vegetable Research, (IIVR) Varanasi, India. Two types of experimental work designed, in one experiment biofertilizer given to the tomato crop with the regular intervals of 15 days, and another taken as control (without using any fertilizer). In the biofertilizer based hybrid variety experiment significant results revealed ie, 12.02% increased fresh shoot wt. and 55.17% fresh root wt., 42% more no of fruits, and 25% increase in plant height when compared with controls. The bio-fertilizer also showed positive results on root, shoot biomass and yield of tomato plant. It could be used as ecofrindly and safe fertilizer for the vegetables , fruits and grains

Keywords: Tomato, Biofertilizer, root , shoot, fruit, Hybrid

BIOSYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF SILVER NANOPARTICLES FROM *AGERATUM HOUSTONIANUM* EXPLANT ISOLATED BACTERIAL ENDOPHYTES

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ABSTRACT

Microbes are eco-friendly and cost effective nanofactories, though they have wide applications in the remediation of toxic metals and especially in the field of agriculture and sustainable development. Formation of silver nanocrystallites in bacteria, yeasts and fungi has been well documented. Silver nanoparticles (AgNPs) are among the most attractive nanomaterials, which have been used in a wide range of biomedical applications such as diagnosis, treatment and drug delivery. AgNPs have biomedical applications because of their antibacterial, antifungal, antiviral, and anti-inflammatory activity. The biological activity of AgNPs depends on their size, shape, and surface coatings. Therefore, the synthesis of AgNPs with predetermined morphological and physicochemical features for medical applications in humans is necessary to expand their biomedical applications. The current study reports the synthesis of silver nanoparticles (AgNPs) from the endophytic bacterial isolates CH-1, CH-2, CH-3, and CH-4 isolated from *Ageratum houstonianum* L. roots and shoots. The AgNPs were synthesized by reduction of silver nitrate ($AgNO_3$) solution by the bacterial strains after incubation for 3-6 days at room temperature. The synthesis was initially observed by colour change from cream clour to dark brown which was confirmed by UV-Vis spectrophotometry. The AgNPs were further characterized using instruments such as FTIR, HR-SEM, TEM and X-Ray diffraction analysis. The synthesized nanoparticles were spherical in shape and their size range from 28 nm to 110 nm. The nanoparticles (AgNPs) showed antimicrobial activity against few pathogenic and endophyic bacterial and fungal strains such as *Aspergillus niger B.licheniformis* (R1), *Pseudomonas aeruginosa* (MS-5), *Escherichia coli* and *Azotobacter chroococcum* (CL-13).

Keywords: Endophytic bacteria, Silver nanoparticles, TEM, HR-SEM, FTIR, Antimicrobial activity, *Ageratum houstonianum*

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RESISTANCE TO ZINC STRESS OF SOME MAIZE GENOTYPES IN CALCAREOUS SOIL UNDER ZINC DEFICIENT CONDITION

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ABSTRACT

Soil zinc deficiency limits the growth and crop yield. Zinc is important micronutrient for both crop growth and human nutrition. In maize production, yields are often reduced and Zn concentration in grains is often low when Zn is in short supply to the crop. This may result in malnutrition of people dependent on a cereals based diet. Growing Zn efficient cultivars i.e. cultivars with high yield at low Zn supply would represent a long term solution for sustainable approach to crop production. To evaluate Zn efficiency of 24 diverse maize genotypes, field experiment was conducted during *rabi* seasons for two consecutive year using Zn deficient (0.42 mg kg^{-1}) sandy loam soil, treated with 0 kg Zn ha^{-1} (no Zn low level), 5.0 kg Zn and 10.0 kg ha^{-1}. The relative grain yield i.e. Zn efficiency index from 95 to 81% and relative grain Zn uptake i.e. Zn efficiency from 81 to 53 % among the genotypes. On the basis of grain yield and Zn efficiency, genotypes were classified on efficient and responsive (Hemant, Dewaki, Hemant x Drought-S4, Ganga Safed and RHM-1), efficient and nonresponsive (Shaktiman-1, Shaktiman-2, Shaktiman-4 and Pant 7421), inefficient and responsive (Laksmi, Swan, Talar, 2004-Dholi M_1,Pop-64 and CM-137) and inefficient and non responsive (Lowa, Pop-445-9, CM-400, CM-600 and M-7). From a practical point of view genotypes that produce high grain yield at low level of Zn and respond well to Zn additions are the most desirable because they able to express their high yield potential in a wide range of Zn availability.

Keywords: Zinc, maize, genotypes, grain yield, efficiency.

HOST SPECIALITIES OF POLYPHAGOUS POD BORER, *H. ARMIGERA* (HUB.) IN CHICK PEA, AT SULTANPUR (U.P.)

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ABSTRACT

Helicoverpa armigera (Hub.) (Lepidoptera: Noctuidae) is polyphagous and attacks more than 180 plant species. It is a very destructive insect pest occurring on chick pea, tomato, pigeon pea, cabbage, maize, sorghum, sunflower and many other crops, inflicting substantial crop losses every year in Sultanpur. We assessed *H. armigera* host plant use from 2020 until 2022, in successive spring, summer and winter seasons at college farm of Department of Agriculture, KNIPSS Sultanpur. The hosts affected by *H. armigera* are listed and insect has been collected and reared in lab for pest identification and for host fidelity. This study contributes to an improved understanding of the present day scenario of availability host plants for the build of *H. armigera* population. This study presents the molecular variation and phylogenetic relationship of this species from the collection of *H. armigera* from different hosts. The phylogenetic relationship of cytochrome (cytb) sequences from different hosts revealed that *H. armigera* collected on wheat was divergent from remaining population of Sultnapur U.P. The evolutionary distances of cytochrome (cytb) sequences showed that differences were larger than expected based on evolutionary divergence.

NANOPESTICIDE FOR INSECT PEST MANAGEMENT

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ABSTRACT

Environmental contamination developed by the insect pest are some of the environmental issues related to the aimless utilization of chemical pesticide. Most of the conventional pesticides have several problems like high dosage per unit crop, drift hazards and residues in environment and plants, they also impact on non-target organism The active component released from the pesticide formulations are either biodegraded or hydrolysed in the environment. They can even contaminate the surrounding by leaching. It has become matter of serious concern for environment, food quality and soil health. Nanopesticide or Nano plant protection products an emerging technological development that because they can be used as smart delivery system for the release of the pesticide in timely but control manner for a desired time span and implement this approach one needs to draw on the vast amount of chemical ecological knowledge combine this with recent Nanomaterial and use novel advance pesticides. Precision Nano-pesticides can increase crop protection and food production whilst lowering environmental impacts.

Key Words:- Nanomaterial, Environment And IPM

DEVELOPMENT OF STRESS TOLERANCE IN HORTICULTURAL CROPS TO MITIGATE CLIMATE CHANGE

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ABSTRACT

The greatest concern of mankind in the twenty-first century is global warming and climate change. Due to climate change, established commercial kinds of fruits, vegetables, and flowers will perform badly in an unpredictable manner. The melting of the Himalayan ice cap would diminish the cooling impact required for the flowering of several horticulture crops such as apple, saffron, rhododendron, and orchids, among others. Commercial horticultural plant output particularly that cultivated in open fields will be seriously harmed. Physiological disorders in horticultural crops will be more prominent as a result of the high temperatures, such as spongy tissue in mangos, fruit cracking in litchis, flower and fruit abscission in *solanaceous* fruit. Air pollution has also reduced the productivity of many horticultural crops and increased the severity of certain physiological disorders such as mango black tip. As a result, there is a need to safeguard these vital crops in order to ensure their long-term viability in the face of climate change. Conservation agriculture, renewable energy, forest and water conservation, reforestation, and other methods are the most successful. Modification of current horticultural techniques and increased use of greenhouse technology are two solutions for minimising the effects of climate change on productivity. The main strategies to meet this challenge will be the development of new cultivars of horticultural crops that are tolerant to high temperatures, and produce good yields under stress conditions, as well as the adoption of hi–tech horticulture and judicious management of natural resources.

Keyword: Commercial, minimizing, productivity, vegetables,

MIGRATION OF FARM LABOURERS FROM BIHAR:- INCIDENCE, CAUSE AND REMEDIES

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ABSTRACT

The population of Bihar was recorded to 10.41 crores in 2011, which has increased to 12.31 cores in 2021 with average annual growth rate of 1.66 percent. Out of the total population, 5.12 present of from Bihar had migrated either temporally/ permanently to other states to earn money for his/her livelihood. As per 2011 census, there were 5.4 crores inter-state migrates. As of 2011, UP and Bihar were the largest source of inter-state migrants while Maharashtra and Delhi were the largest receiver states. However, in Bihar, the number is 0.65 per family which represents unskilled labourers working in the states of Punjab, Haryana, Gujarat, Delhi and Maharashtra but with increasing population, the issue of migration still remain unaddressed. The decline in the number of migrant farm labourers to Punjab and other states of the country has not translated in to lower migration rates from Bihar. It has merely shifted the migration trend from the farming sector to the industrial and real state sector. As per research conducted in 2009-10, the report reveals that around 4.42 million people from Bihar migrate every year to various states of the country and that migration has gone-up. As of above context, a pilot study was conducted by me in two villages i.e Pavai and Mahadevpur of Amarpur Block under Banka District with 100 sample size. The study assesses reason of migration and remedies to control it.

However, overall analysis of this study revealed that most of landless and marginal farmers have not got work whole year in agriculture sector. Also, most of respondents viewed that young generation peoples were not interested to do work in agriculture. They have no enough asset to generate their own business in any sector. The study also revealed that most of migrants from Bihar are belonged to SC/ST and most backward castes. The govt. of Bihar has no insightful planning to control it. So, our gesture to the govt. of Bihar is to be initiated a planning to establish small industries for engagement of the landless and marginal farmers.

Keywords: Gesture, Livelihood, Unskill, Merely Remedy, Insightful

CITRUS ESSENTIAL OILS (CEOS) AND THEIR FOOD USES

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ABSTRACT

Citrus is a Rutaceae genus that comprises major crops such as oranges, lemons, pummelos, grapefruits, limes, and other citrus fruits. Citrus essential oils (CEOs) are made up of biologically active chemicals such as pinene, sabinene, -myrcene, d-limonene, linalool, humulene, and -terpineol, which belong to the monoterpenes, monoterpene aldehyde/alcohol, and sesquiterpenes, respectively. These chemicals offer a variety of health-promoting qualities, including antioxidants, anti-inflammatory, anticancer, and antibacterial capabilities, all of which have enormous potential for culinary applications. As a result, the focus of this study was on CEO extraction, purification, and detection methods, as well as their applications in food safety, packaging, and preservation. Furthermore, the issues of optimum dose and safe limits, their interactions with various food matrices and packaging materials, and possible allergic reactions associated with the use of CEOs in food applications were briefly discussed, all of which will need to be addressed in future research, as well as efficient, affordable, and "green" extraction methods, to ensure CEOs as a natural, environmentally sustainable, and cost-effective alternative to synthetic chemical preservatives.

Keywords: Citrus essential oils (CEOs), antimicrobial, microencapsulation, food packaging and preservation.

SURVEY OF MEDICINALLY IMPORTANT INVASIVE ALIEN PLANTS (IAPS) FROM DISTRICT-Bahraich, Uttar Pradesh

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ABSTRACT

Medicinal IAPs have been widely used to treat a variety of infectious and non-infectious diseases. Extracts of IAPs also use to inhibit the growth of phytopathogenic fungi. Bahraich is the Terai (low land) District of Uttar Pradesh; it is bounded by district Shravasti on the east, district Barabanki & Sitapur on the west, district Gonda on the south and district Lakhimpur Kheri on the North. Geographical area of the district Bahraich is 5020.6 km^2 and it is located at $27^0$04' to $28^0$24' N latitude and between $81^0$03' to $82^0$24' E longitude. The study area has tropical moist deciduous type of climate and major vegetation types. The field survey of the different agricultural land areas and forests during year 2019-2020. During field survey, discussion and interview held by the local farmers, old persons and Tharu tribal and thus collect the information of medicinal use of IAPs. During survey I have collected 30 IAPs which are belonging to 18 families. These IAPs are *Ageratum conyzoides* L., *Amaranthus spinosus* L., *Argemone* mexicana L., *Blumea eriantha* DC., *Calotropis procera* (Ait.) R.Br., *Cannabis sativa* L., *Cassia occidentalis* L., *Chenopodium album* L., *Clerodendrum splendens* G. Don, *Cuscuta reflexa* Roxb., *Datura metel* L., *Eclipta prostrata* (L.) Mart., *Eichhornia crassipes* (Mart.) Solms, *Eupatorium adenophorum* Sprengel, *Euphorbia hirta* L., *Hyptis suaveolens* (L.) Poit., *Ipomoea fistulosa* Mart DC., *Lantana camara* L., *Martynia annua* L. *Nicotiana plumbaginifolia* Viv., *Opuntia elatior* Mill., *Parthenium hysterophorous* L., *Prosopis juliflora* (Sw.) DC., *Ricinus communis* Linn., *Sida acuta* Burm.f., *Solanum nigrum* L., *Salvia hispanica* L., *Tridax procumbens* L., *Urena lobata* L. and *Xanthium strumarium* L.

Keywords: IAPs, Medicinal use, Tharu tribal and phytopathogenic fungi.

IN DRY AND IRRIGATED DIRECT-SEEDED RICE, ECOLOGICALLY VIABLE FOR INTEGRATED WEED MANAGEMENT

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ABSTRACT

Weeds are one of the most significant biological restrictions in direct-seeded rice farmers' fields, causing significant rice yield losses due to higher weed flora variety caused by alternating wetness and drying. During the life cycle of the crop, more than three flushes of weed can infest direct-seeded rice (DSR). In India, rice weeds are mostly handled by hand. Manual weeding, on the other hand, is becoming less cost-efficient due to labour shortages at vital periods or rising labour expenses. As a result, it is critical to effectively integrate various aspects of ecological weed management strategies, particularly preventive measures such as stale seedbed technique, summer tillage, precession land levelling, crop rotation, and sowing methods, cultural methods such as competitive varieties, herbicide resistance varieties, seed rate, crop residues/straw mulching, cover crops and live mulching, brown manuring, water and nutrient management (especially organic amending), brown manuring, water and nutrient management (especially organic amending In dry seeded rice as well as irrigated DSR cultivation systems, this research presents many ways to weed management, including preventative, cultural, mechanical, and biological approaches.

Keyword- direct-seeded rice, ecological, weed flora ad Rice

EFFECT OF FOLIAR APPLICATION OF MICRO NUTRIENTS ON YIELD AND PHYSICAL QUALITY OF MANGO (*MANGIFERA INDICA* L.) CV. AMRAPAL

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ABSTRACT

The present investigation"Effect of foliar application of micro nutrients on yield and physical quality of Mango (*Mangifera indica* L.) cv. Amrapali" was conducted at Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) during the year 2017-2018.The experiment was conducted in Randomized Block Design with eight treatments *i.e.*Control (water spray), $ZnSO_4$ 1%, $FeSO_4$ 1%, Borax0.5%, $ZnSO_4$ 1% + $FeSO_4$ 1%, $ZnSO_4$ 1% +Borax 0.5%, $FeSO_4$ 1% + Borax 0.5% and $FeSO_4$ 1% +$ZnSO_4$ 1% + Borax 0.5% in three replications and considering one plants as a unit. The observations were recorded for yield and Physical attributes of mango fruit. The maximum number of fruits per shoot, fruit retention per cent, fruit yield (kg/tree), and minimum fruit drop were recorded with the application of$FeSO_4$ 1% +$ZnSO_4$ 1% + Borax 0.5% followed by$ZnSO_4$ 1% +Borax 0.5%. All the physical characters were influenced by foliar spray of$ZnSO_4$ 1%, $FeSO_4$ 1%, Borax0.5%, $ZnSO_4$ 1% + $FeSO_4$ 1%, $ZnSO_4$ 1% +Borax 0.5%, $FeSO_4$ 1% + Borax 0.5%, $FeSO_4$ 1% +$ZnSO_4$ 1% + Borax 0.5% in alone. The fruit length, width, fruit weight, volume, pulp weight, stone weight, pulp stone ratio were recorded maximum with the foliar application of $FeSO_4$ 1% +$ZnSO_4$ 1% + Borax 0.5% followed by $ZnSO_4$ 1% +Borax 0.5%.

CONSORTIA-BASED BIOFERTILIZERS-A BETTER OPTION FOR SUSTAINING PULSES PRODUCTIVITY

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Looking into the pulse scenario of India agriculture in 2019-20, area, production and productivity were 29.03 mha, 3.04 mt and 817 kg/ha, respectively. Though World Health Organization (WHO) has already recommended consumption of pulses 80 g/capita/day or 29.2 kg/capita/year but per capita net availability of pulses (kg per annum) in India has showed deficit by 32.1 g/capita/day or 11.7 kg/capita/year on the basis of pulse availability that is about 17.5 kg/capita/year in year 2019. Moreover, it has been projected that requirement of pulses by 2050 in India will be 39 million tonnes, which can only be possible by increasing pulse production consistently 0.6 mt per annum in order to meet pulse requirement of our increased population, which will touch the level of 1.69 billion people in the year 2050. So that there is an immense scope to fill the gap between genetic and environmental potential yield of pulses by using recent released variety as well as development of suitable agronomical package of practices for same. The aforesaid data of productivity shows that current productivity of pulse crops is significantly lower than its genetic potential. So that our target of increasing the yield may be achieved by developing the appropriate production technology.

Keeping these facts and figures in view, consortia-based bio-fertilizers in pulses may be the better option not only meet the projected pulse demand in year 2050 but pulses are also seemed to be instrumental to fill the gap between recommended requirement of pulses by WHO and its per capita per annum availability. Apart from it, consortia-based bio-fertilizers in pulses also effectively and efficiently address the various issues like decline in soil organic matter, multi-nutrient deficiency, reduced biodiversity, decline in factor productivity, pests build up, receding water table at alarming rate, environmental pollution and last but not least that is climate change also.

Biofertilizers are natural fertilizers, which are living microbial inoculants of bacteria, algae, fungi alone or in combination and they augment the availability of nutrients to the plants. The consortia biofertilizer involving the inclusion of Plant Growth Promoting Bacteria (PGPR) and *Rhizobium* both, which further incubated with either Vermicompost or FYM may be one of the best approaches to enhance the current yield scenario of pulses in sustainable manner. Because consortium based biofertilizers are better than single biofertilizer for sustaining and augmenting the pulses productivity. Though consortia biofertilizer not only improves soil fertility but it is also helpful in producing plant growth-promoting substances in the rhizosphere. Conclusively, use of consortia biofertilizers is economically viable and pro-environmental too than chemical fertilizers.

INDUSTRIAL SOLID WASTE APPLICATION AS SOIL AMENDMENTS FOR REMEDIATION OF LEAD CONTAMINATED SOIL

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ABSTRACT

In the recent years, soil pollution has emerged as a global issue due to increasing pressure on land resources caused by rapidly increasing population. Recently various industrial by-products like fly ash, press mud, steel slag and red mud has been was used as a potential soil amendment for remediation of contaminated soil. An incubation studies and pot culture experiment was conducted to study the effect various amendments (fly ash, steel slag and press mud) either alone or in combination with FYM and their application rates (1, 2.5 and 5% dry w/w basis) on heavy metal lead stabilization in a Pb contaminated soil. Application of press mud, steel slag and fly ash either alone or in combination with FYM resulted significantly positive effects on soil pH, EC and SOC content after the end of incubation period of 30 days and in pot culture experiment. Application of steel slag significantly increased the soil pH over control; however, FYM application resulted in significant decrease in soil pH. Among the amendments, only press mud and FYM amended lead contaminated Vertisol resulted in significant increase in soil organic carbon (SOC) over control. In a Pb contaminated Vertisol , significant reduction in the bioavailable form of heavy metal (DTPA extractable Pb was observed in soil amended with press mud, steel slag, fly ash and FYM over control. The per cent reduction in DTPA extractable Pb ranged from 3.93% to 21.5% over control in the Pb contaminated soil as result of soil amendment application. Among the amendments, soil amended with press mud showed significantly greater reduction (21.50%) in bioavailable Pb content of post harvest soil sample. The incubation study reveals that the Press mud and FYM application at 5% proved to be better amendment in stabilizing lead in lead contaminated soil due higher phosphorus and TOC content in press mud and FYM as compared to fly ash. Also the result from the pot culture studies reveals that in Pb contaminated soil, the highest per cent reduction in lead content of spinach leaf was observed to the tune of 56.49 % in press mud amended soil over control. Therefore, press mud either alone or in combination with FYM was proved to be a better management option for sustainable crop yield and simultaneously reducing the transfer of potentially toxic heavy metal (Pb) to edible plant parts (leaf) in a Pb contaminated.

ROLE OF TITANIUM IN AGRICULTURE

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ABSTRACT

Titanium (Ti) is measured a valuable element for plant growth. Ti applied via leaves or roots at low concentrations has been recognized to improve crop performance through motivating the activity of certain enzymes, enhancing chlorophyll content and photosynthesis, promoting nutrient uptake, strengthening stress tolerance, and improving crop yield and quality. Commercial fertilizers containing Ti, have been used as bio stimulants for improving crop production; however, mechanisms underlying the beneficial effects still remain unclear. There has been an increasing amount of attention in the literature regarding effects of TiO_2NPs on plant performance. TiO_2NPs have been studied for influence on seed germination. Seeds treated with TiO_2NPs suspensions exhibited increased germination rates, enhanced root lengths or improved seedling growth.

GERMPLASM EVALUATION, GENETIC VARIABILITY, GENETIC DIVERGENCE ANALYSIS AND CHARACTER ASSOCIATION IN WHEAT GERMPLASM (*TRITICUM AESTIVUM* L. EM. THELL)

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ABSTRACT

A field experiment was conducted to study the character association for 11 yield and its contributing traits in the 93 diverse indigenous genotypes of wheat (including 3 checks). The experiment was laid out in Augmented Block Design under normal irrigated condition following standard cultural practices. The characters studied were days to 50% flowering, days to maturity, plant height, tillers per plant, spike length, flag leaf area, peduncle length, 1000-grain weight, biological yield per plant, harvest index and grain yield per plant. The variation due to block was highly significant for days to 50% flowering, flag leaf area, plant height, days to maturity, spike length, peduncle length, biological yield, grain yield per plant, test weight and harvest index. In general, PCV were higher than the GCV for all characters indicates influence of environment. The grain yield per plant showed highly significant and positive correlation with biological yield per plant (0.7791), tillers per plant (0.4265), test weight (0.4093), harvest index (0.3921) and spike length (0.2757). While Flag leaf area (0.0926) and plant height (0.0615) showed non- significant and positive correlation with grain yield per plant. The highest positive direct effect on grain yield per plant was observed by biological yield per plant (0.8837) followed by harvest index (0.5620), days to 50% flowering (0.0436), test weight (0.0347) and tillers per plant (0.0211) while remaining traits showed negative direct effect on grain yield per plant. Hence, for the development of high yielding wheat varieties these traits possessing highly significant positive associations should be given more weightage in breeding or selection programe.

The study of genetic divergence among ninety-three indigenous genotypes (including three checks) was performed by employing Non-hierarchical Euclidean cluster analysis for eleven quantitative traits. The all ninety-three genotypes were grouped in to ten different non-overlapping clusters. Cluster (IX) contained maximum number of

nineteen genotypes, followed by cluster (I) comprising ten genotypes and cluster (VII) having eleven genotypes. The maximum intra-cluster distance was found for cluster (III) (21.843), while the minimum intra-cluster distance was recorded for cluster (V) (7.282). The highest inter cluster distance was recorded between cluster (III) and cluster (X) (47.061). Cluster (III) and cluster (X) were highly divergent. The crossing between the entries belonging to cluster pairs having large inter cluster distances and possessing high cluster mean for one or other characters needs to improved, and may be recommended for isolating desirable recombinants in the segregating generations in wheat for yield enhancement.

Key Words: Wheat, (*Triticum aestivum* L), co-relation, path, genetic divergence, Euclidean cluster analysis

TRAITS FOR DEVELOPING SUPERIOR INTERASPECIFIC RICE HYBRIDS USING CMS LINES

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ABSTRACTS

A set of 51 F_1's and 20 parents (including 17 testers and 3 CMS lines) evaluated in RBD for various parameters under selection criteria during *Kharif* 2018-19, showed high phenotypic and genotypic coefficient of variation for majority of the traits except spikelets per panicle and plant height having moderate and days to 50% flowering showed low estimates of PCV and GCV, while panicle length had moderate PCV with low GCV. High estimates of heritability were recorded for all the characters, except spikelets per panicle which exhibited moderate estimate of heritability. The genetic advance in per cent of mean was high for all the traits. Panicle length exhibited moderate genetic advance while days to 50% flowering exhibited low estimate of genetic advance in per cent of mean. High heritability coupled with high genetic advance was observed for all the characters except panicle length, days to 50% flowering and spikelets per panicle. The high estimates of direct selection parameters for the characters viz., grain yield per plant, spikelet fertility, panicle bearing tillers per plant, 1000-grain weight, L:B ratio, harvest-index, kernel breadth, kernel length and biological yield per plant, indicated that these would be ideal traits for improvement through selection for development of high yielding cultivar for timely sown under irrigated ecology. The high estimates of genotypic and phenotypic coefficient of variation and high heritability in broad sense along with very high genetic advance in per cent of mean recorded for grain yield per plant, spikelet fertility, panicle bearing tillers per plant, 1000-grain weight, harvest-index, and biological yield per plant indicated that these would be ideal traits for improvement through selection in context of materials evaluated owing to existence of high genetic variability and high transmissibility/heritability.

PERFORMANCE OF NEW CULTIVARS OF APPLE ON CLONAL ROOTSTOCKS UNDER MARGINAL AREA OF APPLE CULTIVATION

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ABSTRACT

The study to evaluate the performance of new cultivars of apple has been conducted at Regional Horticultural Research & Training Station, Bajaura, Kullu (HP) located at an elevation of 1034 m amsl. Eight cultivars viz., Jeromine on M-9, Red Velox on M-9, Scarlett Spur-II on MM-106, Super Chief on MM-106, Gale Gala on M-9, Redlum Gala on M-9, Auviel Early Fuji on M-9 and Red Cap Valtod on MM-106 were taken to evaluate the performance in respect to vegetative growth and yield parameters. The study revealed that highest plant height (316.84 cm) was recorded in Redlum Gala which was statistically at par with Auviel Early Fuji (309.16 cm). However, the lowest plant height (191.41 cm) was recorded in Scarlet Spur –II. The shoot extension growth (42.67 cm) was also recorded highest in Redlum Gala which was statistically at par with Red Velox (39.46 cm), Auviel Early Fuji (38.64 cm) and Gale Gala (34.24 cm). The highest fruit set (26.57 %) was recorded in Redlum Gala which was statistically at par with Gale Gala (24.33 %). However, the lowest fruit set (15.24 %) was observed in Red Cap Valtod. The highest fruit yield (10.6 kg/plant) was recorded in Redlum Gala which was statistically at par with Gale Gala (8.8 kg/plant)

Key words: apple, clonal rootstocks, vegetative growth and yield

IMPACT OF HERBICIDAL WEED CONTROL MEASURES ON YIELD ATTRIBUTES, YIELD AND ECONOMICS OF CLUSTER BEAN [*CYAMOPSIS TETRAGONOLOBA* (L.) TAUB]

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ABSTRACT

A field experiment was conducted at the Agronomy Research Farm, RVSKVV, College of Agriculture, Gwalior (M.P.) during the *kharif* seasons of 2019. The experiment was laid out in RBD (Randomized block design) with three replications and ten treatments namely pendimethalin 38.7 EC @ 1000g/ha (PE), diclosulam 84 WDG @26g/ha (PE), quizalofop-ethyl 5EC @50g/ha (PoE), propaquizafop10EC @62.5 g/ha (PoE), imazethapyr 10SL @75g/ha (PoE), imazethapyr 10SL @50g/ha (PoE), imazethapyr + imazamox 70WP @ 70g/ha (PoE), two hand weeddings at 20 and 40 DAS, one hand weeding at 30 DAS and weedy check. The major weeds viz. *Digera arvensis, Celosia argentea, Parthenium hysterophorus, Commelina bengahalensis* among broad-leaved and *Ecchinochloa colona*, *Dactyloctonium aegyptium, Cynodon dactylon* and *Ecchinochloa crusgalli* among narrow leaved weeds were present in the experimental field. The relative density of broad-leaved weeds was 55.67% and 57.02% while narrow leaved weeds were to the extent of 44.34% and 42.98% of total weed population at 20 and 60 DAS respectively. The results revealed two hand weeding as most effective measure for weed control with lowest density and dry weight of all the weed species followed by one hand weeding at 30 DAS, Imazethapyr + imazamox 70WP @ 70g/ha and Imazethapyr 10SL @ 75g/ha as post emergence at all stages of observations made. Significantly highest Weed Control Efficiency aT60 DAS and harvest stage was registered with two hand weeding (98.9 and 96.95%) with lowest weed index (0.00%) followed by one hand weeding (91.38 & 89.33%) with weed index of 12.80% and Imazethapyr + imazamox 70WP @ 70g/ha. Significantly highest values of yield attributes viz. pods/plants (61.2), seeds/pod (8.99), pod length (6.43cm) and test weight (29.5g) along with seed yield of (1832 kg/ha) and straw yields (4233 kg/ha). However, Imazethapyr + imazamox 70WP @ 70g/ha with pods/plants (55.00), seeds/pod (8.43), pod length (6.10 cm) and test weight (27.67g) along with seed yield of (1545 kg/ha) and straw yields (3737 kg/ha) and Imazethapyr 10SL @ 75g/ha. Treatment two hand weedings at 20 and 40 DAS gave highest net income of Rs. 50,954 per hectare followed by Imazethapyr + imazamox 70WP @ 70g/ha with net income of Rs. 48,415 per hectare. However maximum B:C ratio of 3.60 was recorded with the treatment Imazethapyr + imazamox 70WP @ 70g/ha which made it more remunerative. Lowest net income of Rs. 8325 per hectare was obtained under weedy check with B:C ratio of 1.51.

Key words: Herbicide, Hand weeding,

LONG TERM SPATIAL AND TEMPORAL CHANGES OF ARID CLIMATIC REGIONS OVER INDIA

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ABSTRACT

In this study, a quantitative assessment of spatial and temporal extent of arid climatic regions over India was studied for the period 1988-2018 using global climate data sets. Total 625 climatic station data across the country was used to analyze the spatial variation of arid regions over India. Various water balance indices were computed, interpolated and mapped geo-statistically using ArcGIS 10.5. It was noticed a considerable changes in the country's arid and semi-arid climatic zones were observed between the two periods; 1992 and 2018. The results indicated that, there has been a net percent change in hyper arid, typic arid and semi-arid (dry) areas is 5.62, 1.62 and 7.17, respectively. Dryness and wetness are increasing in different parts of the country. There is also change in rainfall, PET and moisture index over a period of time which is vital to determine aridity pattern of any region. The number of rainy days is decreasing which in turn increase Potential Evapo-transpiration (PET). Thus, results are of great significance for studying the assessment of temporal and spatial dry climatic water balance of India, which can help immensely in the management of water resources and sustainability of crop production under changing climatic conditions.

***Keywords*:** Climate change, Arid regions, PET, Interpolation, GIS

PATHOGENIC VARIABILITY OF A*LTERNARIA LINI* IN INDIA

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ABSTRACT

Alternaria lini causes blight of linseed in India. The leaves showing typical symptoms of Alternaria blight in linseed collected from different part of country and characterized for pathogenic variations. Isolates exhibited variation in disease severity, per cent disease intensity and area under disease progress curve after inoculation on 10 different genotypes of *Linum* spp. Out of 12 isolates Al_{11} collected from Berhampur was found highly virulent for all the test differentials and isolates Al_3 and Al_5 were found less virulent. The genotype Polf-05 and Polf-15 were noted as resistant and T-397, Chambal and Kanpur local as susceptible for all the isolates.

Key words: *Alternaria lini,* Pathogenic Variability

"THE ROLE OF DIFFERENT HORMONES AND THEIR DOSES ON ROOTING OF CUTTING IN DIFFERNT CULTIVARS OF CARNATION (Dianthus caryophyllus L.)"

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ABSTRACT

Carnation (Dianthus caryophyllus L.) is a herbaceous perennial flowering plant. It is most famous for its use as a cut flower, belonging to the family Caryophyllaceae. A study was carried out in the Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj , to investigate the effect of different hormones in different cultivars for its growth quality and yield parameters under polyhouse condition .The Experiment was laid out in a FRBD having 17 treatments with three replications. The results revealed that among the varieties studied, variety Liberty recorded maximum rooting percentage (89.3%), Plant height (8.92cm.), Number of leaves per plant (128.7), Number of shoots per plant (5.3), Minimum days to flower bud initiation (109.3), Minimum days to flower bud opening (19.9), Flower diameter (6.4 cm.), Vase life (6.9) and Number of cut flower stalks per plant (8.8).The data on different concentrations studied revealed that concentration of IBA@400ppm (R2) was superior compared to the other treatments. Maximum rooting percentage (97.2%), Plant height (84.3 cm.), Number of leaves per plant (110.1), Number of shoots per plant (5.4), Minimum days to flower bud initiation (112.4), Minimum days to flower bud opening (16.8), Flower diameter (7.0 cm.), Vase life (7.8) and Number of cut flower stalks per plant (10.0).Interaction data revealed that treatment T3(V1R2)Liberty U+ IBA@400ppm is recorded maximum rooting percentage (98.2%), Plant height (85.4cm.), Number of leaves per plant (130.2), Number of shoots per plant (5.4), Minimum Days to flower bud initiation (115.1), Minimum days to flower bud opening (17.4), Flower diameter (8.2 cm.), Vase life (7.9) and Number of cut flower stalks per plant (10.8). Key words: Carnation, polyhouse, varieties, IBA.

EFFECT OF NPK ON YIELD OF CARROT UNDER ALLUVIAL SOIL OF CENTRAL UTTAR PRADESH.

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SUMMARY

Investigation entitled "Effect of N.P.K. on yield of carrot under alluvial soil of central Uttar Pradesh" were carried out during Rabi seasons of 1990-1991 and 1991-1992 at the department of Horticulture K.A. P. G. Collage Allahabad. The carrot cv. 'Pusa Kesar' was tested in the experiment during both the years of experimentation. It is revealed from the finding that highest and significant yield of carrot was noticed with 120kg N+ 100kg P_2 O_5 and 100 kg K_2 o/ha. and being lowest with control under alluvial soil of central Uttar Pradesh.

Carrot is a cool season crop. It is grown all over the world in spring, summer and autumn in temperate countries and during winter in tropical and subtropical climate. The world wide consumption of carrot has increased over the year and it is now one of the most popular vegetable crops. Green vegetables are rich source of vitamin 'B', whereas 'A' is rich in carrot and it is main source of vitamin 'A' in vegetarian diet of large population of country (38 mg/100 g carotene on dry matter singh, 1963). In order to improve the health of both rich and poor people of the society, Carrot plays an important role in dietery system and supplement vitamin 'A' . The deficiency of vitamin 'A' causes night blindness, Kerotomalcia, retard growth and malnutrition.

Vegetable play a vital role in Indian economy, agricultural industries and export trade. They constitute the most important group of crops and rank second position in the world map with an estimated area of 4.5 million hectares and production potential of about 48 million tonnes (Majeed and Gowda, 1992). Our country is exporting about 34 thousand tonnes fresh vegetable valued Rs. 22 crores per annum (Chada, 1994).

APPARENT RATE OF INFECTION AND AREA UNDER DISEASE PROGRESS CURVE OF CHARCOAL ROT OF SESAME

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Sesame (*Sesamum indicum* L.) is an important oilseed crop of worldwide. Charcoal rot of sesame incited by *Macrophomina phaseolina* is the most destructive root and stem rot disease. Incidence of charcoal at different plant age has a major influence on the sesame crop. Disease progression was monitored twice a week on the two sesame cultivars viz., HT 1 and HT 2 throughout the growing season. Incidence of charcoal rot caused by *M. phaseolina* decreased with delay in sowing. Calculation for A-value (Area under disease progress curve – AUDPC) and r-value (apparent infection rate) in crops sown on different dates identified the speed of progress of the disease incidence. The dates of sowing enabling slow disease progress or the weather conditions coinciding with the different crop stages demarcated the advantageous dates of sowing from the disadvantageous ones. However, cultivar HT1 is more susceptible as compared to the other cultivar HT 2, as apparent infection rate was higher in former. Highest per cent disease incidence for season highly correlated with date of sowing *i.e*. early date of sowing showed highest per cent disease incidence..

Keywords: *Sesamum indicum*, *Macrophomina phaseolina*, AUDPC, apparent rate of infection

GENOTYPE x ENVIRONMENT INTERACTION AND STABILITY ANALYSIS OF RAINFED LOWLAND RICE (*Oryza sativa L.*) GENOTYPES

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ABSTRACT

In the present study, twenty four elite rice genotypes of diverse origin were evaluated for ten different characters namely days to 50% flowering, days to maturity, plant height (cm), tillers per square meter, panicle length (cm), spikelet fertility (%), grain filling period (days), grain filling rate (kg/days), 1000 grain weight (g), grain yield (q/ha). The stability parameters were done with respect to grain yield through creating four effective environments at four different locations of Eastern India viz., RAU Pusa, Samastipur, Bihar, ARI Mithapur Patna Bihar, RRS Mashodha, Faizabad, UP and CRRI Cuttack, Orissa. The experiment was laid out in the randomized block design with three replications for each set of experiment. Five competitive plants from each experiment plot were randomly selected for recording the observation on different characters except days to 50% flowering and days to maturity which was recorded on plot basis. Pooled analysis of variance reflects existence of genotype and environment interaction and contribution of both linear and non-linear components to genotype x environment interactions. Stability parameters analysis showed that the genotypes NDR 9930070, NDR 9830130 showed high grain yield and non-significant deviation from linear regression indicating their stability over the environments and were suitable for all environments. The genotypes namely OR 1898-2-35, NDR 9830131 and RAU 729-12-81 were suitable for better environments. Genotypes CR 874-23, Savitri and RAU 649-108-5 were identified for poor environments.

Key words: stability, G x E interaction, yield.

GENETIC DIVERGENCE STUDY IN RICE (*Oryza sativa* L.) UNDER DIRECT SEEDED CONDITION

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ABSTRACT

Present investigation entitled "**GENETIC DIVERGENCE STUDY IN RICE** (*Oryza sativa* L.) **UNDER DIRECT SEEDED CONDITION"** was carried out at research farm of Tirhut College of Agriculture Dholi, Muzaffarpur, Bihar during Kharif 2020-21 in RBD design with three replication. Genetic divergence assessed among 15 rice genotypes using Mahalanobis D^2 statistic. D^2 analysis differed significantly with regard to the character and distributed 15 genotypes into four clusters, of which cluster I was the largest with 12 genotypes and Cluster II, Cluster III and Cluster IV had single genotype each. The pattern of distribution of genotypes from different eco-geographical region into various clusters was at random indicating that geographical diversity and genetic diversity were not related. Cluster I had maximum intra-cluster value of 206.52 and maximum inter-cluster distance was observed between the cluster III and IV (2197.20) followed by cluster I and III (819.96) indicating the impotence of the genotypes present in these cluster on genetic divergence for quantitative characters. The genotypes IR-64 of cluster IV, IR-127299-32-2-2 of cluster III and genotype IR-127339-11-1-1-1-1 of cluster 1I are diverse in nature, Hence these genotypes are used as better parent in hybridization programme for direct seeded condition, likely to produced wide variability with desirable segregates. The characters viz. grains yield plant^{-1}, number of tillers plant^{-1}, number of panicle plant^{-1}, days to maturity and days to 50% flowering contributed maximum towards genetic divergence among the genotypes.

Keywords: Genetic divergence, Genetic variability, Mahalanobis D^2.

MITIGATING EFFECT OF SALICYLIC ACID ON BIOCHEMICAL TRIATS IN RABI MAIZE (ZEA MAYS 1.) GENOTYPES UNDER NORMAL AND DELAYED SOWING

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ABSTRACT

A filed experiment was carried out during the winter (Rabi) season (2018-19) at Agricultural Research Farm, Tirhut College of Agriculture, Dholi, Muzaffarpur, Bihar to study the mitigating effect of salicylic acid on biochemical traits in maize genotypes i.e., DQL-2241 and Dholi Inbred-2011 under normal and delayed sowing. The experiment was laid out in split plot design comprising eight treatment combinations in three replications. Seeds were pried with salicylic acid (SA) @20 µg mL^{-1} and 40 µg mL^{-1} along with hydro priming (distilled water) for overnight and non-primed seeds as control before both sowings i.e., normal and delayed sowing. Observations were recorded at 20, 40 and 60 days after sowing for total chlorophyll, total soluble sugar, protein and proline contents in leaves. It was found that for the studied biochemical traits, genotype DQL-2241 primed with 20 µg mL^{-1} salicylic acid significantly increased in delayed sowing as compared to normal sowing. This finding suggests that maize genotypes were found to differ in their ability to respond to delayed sowing under influence of seed priming with salicylic acid.

EFFECT OF LIQUID BIO-FERTILIZERS ON PRODUCTIVITY AND PROFITABILITY OF LENTIL

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ABSTRACT

A field experiment was conducted on lentil during Rabi season of 2021-22 at farmer field of Rohtas district to study the effect of integrated nutrient management in lentil along with liquid bio-fertilizer. The Bio-fertilizers enhance soil fertility and supply or mobilize plant nutrients for crop nutrition with four categories: N fixers; P-solubilizing microorganisms; P mobilizers and organic matter decomposers. These may include cyano-bacteria, symbiotic and free living bacteria and Arbuscular Mycorhizal. The Liquid formulation is a budding technology and has specific beneficial microorganisms capable of fixing or solubilizing or mobilizing plant nutrients by their biological activity. The experiment was laid out in randomized block design. Combined application of inorganic nutrients along with liquid biofertilizes - rhizobium + PSB (RDF [20:50:0] (80% of N+ 80 % P) + 1.0 L ha^{-1} Liquid Rhizobium + 1.0 L ha^{-1} liquid PSB) recorded highest grain yield (12.36 q ha^{-1}), stalk yield (35.65 q ha^{-1}), biological yield (48.01 q ha^{-1}) and harvest index (25.74%) as compared to T_1 (RDF [20:50:0] (80% of N) + 1.0 l/ha Liquid Rhizobium. Plant height, no of branches and pod per plant also increase significantly in treatment 3 where rhizobium and PSB applied along with inorganic fertilizers. It is possible due to nodulation was significantly enhanced in treatments comprising of liquid rhizobium and phosphate solubilizing bacteria (PSB) along with recommended dose of fertilizer (RDF) in comparison to others. RDF + liquid rhizobium + liquid PSB recorded the highest net returns (Rs 41591 ha^{-1}) and B:C ratio (2.46). It can be concluded that the recommended dose of nutrients should be applied along with liquid rhizobium and PSB.

Keywords: grain yield, lentil, net returns, rhizobium, PSB

EFFECT ON YIELD LOSS AND MANAGEMENT OF BANANA PSEUDO STEM WEEVIL, *ODOIPORUS LONGICOLLIS*

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Keys word: Yield, Banana, loss**,** Banana pseudo stem weevil

ABSTARCT

Banana is one of the important fruit crop in India, grown in an area of 884 thousand ha with a production of 30807.5 thousand tons per year. In Bihar, banana is grown in an area of 31.07 thousand ha with a production of 1396.39 thousand tons per year (Horticulture statistics division DAC&FW, 2018). India is the largest producer of banana. The banana pseudo stem borer, *Odoiporus longicollis* emerged as a major pest of banana and can cause complete crop destruction in endemic area where condition are favorable. The female weevil lays eggs inside the air chamber of the outer sheath of the pseudo stem through holes made by its rostrum. Emerging grubs make extensive tunnels in the pseudo stem for feeding and pupate inside the pseudo stem to become adults. Owing to the extensive damage to the pseudo stem, it often becomes hollow and weak and bears either undersize fruit or no fruit at all depending on the damage. It can be managed by Indoxacarb 14.5 SC @ 0.01% spraying at the appearance of BSW + leaf filling after one month of spraying.

EVALUATION AND IMPACT ASSESSMENT OF DAESI PROGRAMME AT NCOH, NOORSARAI NALANDA

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ABSTRACT

The study on "Evaluation and Impact Assessment of DAESI programme" aimed at assessing the impact of DAESI programme implemented during the years 2016 2017 to 2020-2021 as per the objectives of the overall programme. The study was intended to throw light on the outcomes of the programme and shortcomings in its execution to facilitate corrections, if any, to enable enhanced performance in the future. The evidences of the study clearly shows that the DAESI training has resulted in significant positive behavioural changes as per the objectives of the programme resulting in significant gain in their knowledge and skills related to various dimension of modern farm technologies and farming conditions. The dealers have not only gained technical knowledge and skills in modern farming technology but their mental outlook (attitude) has also been positively affected through increased sensitiveness to the problems of farmers, inculcation of positive attitude towards scientists and agricultural officers, increased scientific orientation and enhanced confidence on providing advisories. The evidences of the study further show that farmers had observed positive changes in behaviour and attitude of dealers due to DAESI programme with respect to improvements in interaction with the farmers, providing new farm inputs such as seeds, chemicals and fertilizers, providing new farm information and practices. The DAESI training has enabled dealers to provide quality extension services including farm advisories and inputs at the last mile – village level. Thus the DAESI has transformed the dealers into last mile agricultural extension agents .The evidences related to perceived high level of satisfaction of a majority of farmers on services provided by DAESI trained dealers indicate that they were able to satisfy farmer's farm information and inputs needs of a vast majority of farming community. This also shows the greater level of acceptance of DAESI trained dealers as credible extension agents at village level. The study further shows that DAESI training had significant changes in customers base and business volume of dealers. The results of the study show evidences of impact of DAESI at framers level through a significant increase in adoption of modern farming practices resulting in enhanced yield and income. A higher level of satisfaction level of DAESI dealers with various aspects of organisation and management of DAESI provides evidences for continuation of DAESI in the present structure of implementation even though there so enough scope for further refinements.

Key words:DAESI,Farmers,Training

APPLICATION OF TEMPORAL MICROWAVE AND OPTICAL REMOTE SENSING TO ESTIMATE YIELD OF SOYBEAN IN THE NIZAMABAD DISTRICT OF TELANGANA

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ABSTRACT

In Nizamabad, Soybean crop is mainly grown during kharif season as short duration rainfed crop. The persistent cloud cover during the kharif season cause hindrance to monitor the soybean crop growth and acreage estimation using satellite data in optical electromagnetic spectrum. Optical remote sensing can't resolve the problem due to its inability to penetrate through clouds. Microwave Synthetic Aperture Radar (SAR) having the capability to penetrate through clouds, is used in the present study in combination with optical data to monitor the soybean crop growth stages and to estimate soybean acreage and yield.

Key words: SAR, Ortical remote sensing, soybean

CHARACTERIZING JEEVAMRUTHAM MADE OF COW DUNG AT DIFFERENT TIMINGS OF PREPARTION AND COLLECTED FROM ACROSS TELANGANA

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ABSTRACT

An experiment was conducted on Jeevamrutham to study the effect of cow dung collected from different locations and different days of preparation on Phosphorus solubilizing Bacteria (PSB) population. Ten cows were selected from 9 different districts of Telangana for the preparation of Jeevamrutham**.** Jeevamrutham was prepared and characterized for PSB population at different days of preparation. The maximum microbial population was recorded in between 10th to 15th day of preparation of Jeevamrutham and among the breeds, the Gir breed selected from IFS units, College farm, PJTSAU, Rajendranagar, Hyderabad was recorded with higher PSB population as compare to other breed of other location.

Key words: Jeevamrthum, PSB.

ASSESSMENT OF IRRIGATION WATER QUALITY IN KALESHWARAM COMMAND AREA OF TELANGANA

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ABSTRACT

The natural resources of any country are the national treasure and need proper planning to make best of them. Due to the inadequacy of surface water, the ground water is becoming more and more important in India's agriculture and food security in the recent years. Majority of people in India depends upon fresh water supplies from dug wells, ponds, bore wells, springs and the lake. Apart from domestic use, these sources provide the water essential for irrigation and small scale industries. It has become the main source of growth in irrigated areas over the last 3 decades and now it accounts for over 60 per cent of the irrigated area in the country. It is estimated that over 70 per cent of India's food grain production comes from irrigated agriculture in which ground water plays a major role (Gandhi and Namboodiri, 2009).

LONG-TERM FERTILIZER EXPERIMENTS AND THEIR EFFECT ON SOIL BIOLOGY

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ABSTRACT

Rice based cropping systems (RBCS) are the major food production systems in the country cultivated in about 28.0 m ha with a wide range of crops of varied productivity levels and inherent problems of nutrient availability and physical impairments. Intensive double and triple-crop continuous rice systems (6.0 m ha), Rice–Wheat (R–W) (nearly 10.0 m ha) and in the recent years Rice-Maize cropping systems constitute dominant food production systems in the irrigated ecology while Rice-Lathyrus, Rice-Gram/Pulse are grown in rain fed ecosystems at a cropping intensity of >175% with nutrient removal through crop uptake (400-650 kg ha-1 yr-1) far exceeding nutrient inputs (260 – 450 kg NPK ha-1 yr-1), which at the national level currently show an apparent negative balance of nearly 15 m t in crop production. Continuous cropping with imbalanced and blanket fertilizer use, decreasing use of organic manures and less consideration for field variability in soil fertility are known to influence nutrient dynamics in the soil, crop nutrition, response to applied nutrients and consequently impact crop yields, soil quality and its productivity in the long run particularly in intensive cropping systems. This has been the major production constraint in sustainable agriculture(Prasad and Power, 1997).

Key words: RBCS, rice, Maaize

FARM MECHANIZATION: A POTENTIAL APPROACH TO DOUBLE FRAMER'S INCOME

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ABSTRACT

Doubling farmers income is the major concern for the governments, to achieve full flourished growth of the nation. The income from agriculture can be amplified by methods such as improvement in productivity, resource use efficiency or saving in cost of production, increase in cropping intensity and diversification towards high value crops. The involvement of agricultural workers in non-agricultural work has aggravated scarcity of labour. The insufficiency of water and energy has increased the cost of production and along with climate variability, form major challenges for the sustainable income of the farmers. To accelerate the process of doubling farmer's income, the technological development in agriculture such as mechanization, sensor fusion technologies, IOTs and artificial intelligence has major role to play. Farm mechanization shrinks human power requirement at the field reducing drudgeries involved in monotonous operations such as weeding, planting etc. thus alleviating the input cost. The introduction of drones in agriculture for spraying, yield mapping and harvesting will have positive impact on the net income of the farmer. The use of drones with smart machines optimizes the inputs such as seed, fertilizers and water and reacts faster to the threats such as weeds, pests and fungi. The development of machines such as mechanical weeders have increased the use of zero till drill and super seeder as the problem of weed infestation can be controlled mechanically at lower rates. Hence it can be concluded that adoption of mechanization to agriculture has potential to improve the net income of the farmers.

Key words: *smart machines, IOTs, sensors, drone, income*

IMPORTANCE OF CHEMISTRY IN AGRICULTURE

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ABSTRACT

Chemistry has been essential for the protection of crop. The control of fungal pathogens, insect pests and weeds has made a crucial contribution to food provision worldwide by ensuring the harvested yield of the world's crops. As we make progress in the new millennium, it is timely to take stock of the current situation and to look forward to future improvements that may be provided by new chemical technologies. Advancements in the discovery process for new molecules for crop protection in which the chemistry is guided by experiments that indicate the properties which constitute premium products that contribute to agricultural sustainability. These include tests that provide early information on environmental and toxicological properties as well as the spectrum of biological activity.

Keywords: Chemistry, Fungicide, Insecticides and Agriculture

ROLE OF PHYTOCHEMICALS IN AGRICULTURE

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ABSTRACT

Phytochemicals like Chalcones, Flavones, Isoflavones, Homo-isoflavones, Chromones etc. have been identified as major targets to be used as agrochemicals. Many chalcones have been found to be active against TMV (Tobacco Mosaic Virus). The phytochemicals are supposed to be less costly as well having no toxic effects. The phytochemicals compounds provide protection against predators, bacteria, viruses, and fungi. They can be responsible for the colour of flowers and fruits and for the attraction of pollinators. They also participate in plant-microorganism symbiosis. These relationships can be used to naturally control weeds and insect pests and reduce stress and diseases in order to increase crop yield. They also have protective roles as physical barriers to opportunistic pathogens. Researchers are to develop some novel molecules which have significant role as agrochemicals and cost effective so that new advancement will lead to increase the income of farmers.

Keywords: Phytochemicals, agrochemicals and chalcones.

CHALCONES AS PLANT GROWTH PROMOTER

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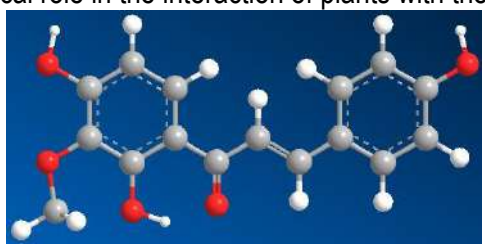
ABSTRACT

Chalcones are flavonoids which are abundant in nature. They have several roles such as suppression the inhibitors of auxin (the key growth hormones), pigments production, phytoalexins production, UV protectants, signal molecules in plant-microbe interactions, antioxidants, and pollinator attractants or feeding deterrents. Many chalcone derivatives have a critical role in the interaction of plants with their environment.



Many naturally occurring chalcones are shown to be toxic against a large variety of plant pathogens which leads to significant agronomic and economic losses worldwide. They have been also found to exert toxicity against fungal pathogens like Colletotrichum falcatum, Curvularia pallescens, Ceratocystis paradoxa, Fusarium moniliforme, Periconia atropurpurea and Ustilago scitaminea being even more active than commercial fungicides. Chalcones are compounds highly toxic for many phyto-parasitic nematodes, even more than some commercial nematicidal as in the case of trans-chalcone that showed a strong nematicide and nematostatic action against the potato cyst nematodes. Many synthetic chalcones are highly active against Meloidogyne exigua that causes important coffee crop losses. Thus, chalcones can be an efficient alternative to currently available fungicides and nematicides and this might lead to increase in farmer's income.

Keywords: Chalcone, fungal pathogens, nematocidal, auxin inhibitor.

ISOFLAVONOIDS AND THEIR ROLE IN ENHANCING SOIL FERTILITY

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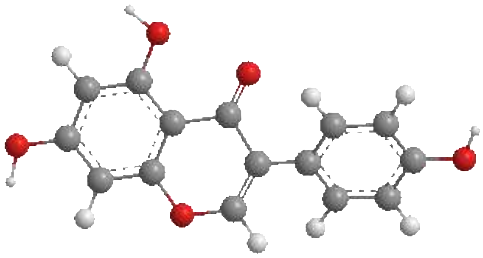
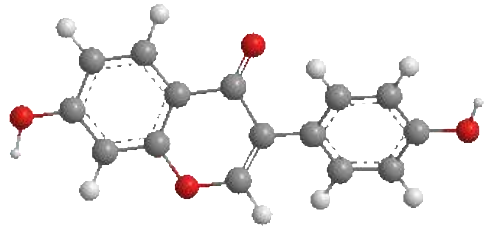
ABSTRACT

Plant growth promoting rhizobacteria are non-pathogenic bacteria able to trigger plant's defensive metabolism. In some plant species as legumes, they play a role in plant defence through their role in rhizosphere plant-microbe interactions. It has been observed that daidzein and genistein secreted by soybean roots induce the symbiotic interaction with rhizobia and may modulate rhizosphere interactions with microbes.



Genistein



Daidzein

In soya roots, isoflavone contents and composition did not change with crop growth, but the expression of UGT_4, an isoflavone-specific 7-O-glucosyltransferase, and of ICHG (isoflavone conjugates hydrolysing β-glucosidase) was decreased during the reproductive stages. Isoflavone contents were found to be higher in rhizosphere soil than in bulk soil during both vegetative and reproductive stages, and were comparable in the rhizosphere soil between the two stages.

Keywords: Isoflavones, rhizosphere, plant-microbe interaction, plant defence.

USE AS MEDICINAL AND CHEMICAL OF PLANT EXTRACT IN MANY DISEASES AS GOOD NATURE OF CHEMICALLY EFFICIENT MOITY AND STUDY OF IT'S METABOLITES.

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ABSTRACT

Different species of Cassia found in U. P. are consumed as daily vegetables have high nutritional value. Most of them are underutilized and display varied ethenomedicinal values. The work was carried out with an aim to document three ethno medicinal properties of three different species of Cassia, Cassia fistula, Cassia siamea and Cassia ovata. The documentation was done among 100 l people residing in the regular area near U. P & M. P. border area. The knowledge revealed that the three plants were used in almost every tribal houses as a dietary supplement and various medicinal uses. According to the Munda Vaidya's the plant Cassia is of pitta nature and its different part have different uses. The root is used against tuberculosis glands, diabetes, as a tonic, the root and bark paste mixed in equal amount is used against snake bite. traditionally it is used as laxative, for the treatment of leprosy and various skin disorders. the present study aimed to screen and quantify primary and secondary metabolite by quantitative and qualitative method. The pigments (chlorophyll and carotenoid) were characterised by UV visible spectroscopy. Concentration of chlorophyll-a, chlorophyll-b and carotenoid was calculated by Arnon method (80% acetone extract). The spectrophotometric study of the different pigment of the three species of Cassia, Cassia fistula (chl-a 254.516, chl-b 305.741, total chl 533.7 carotenoid 10.6), Cassia siamea (chl-a 257.88, chl-b 393.16, total chl 630.2 carotenoid 9.395), Cassia ovata (chl-a 266.36, chl-b 271.96, total chl 538.32 carotenoid 16.3). The result revealed that chl-a was highest in Cassia tora followed by Cassia siamea and Cassia fistula. Chl-b pigment followed C. siamea> C. fistula>C. ovata pattern, total chl C. siemea>C. ovata>C. fistula and the carotenoid amount C. ovata > C. fistula > C. siamea. In screening of secondary metabolites tannin, saponins alkaloids, terpenoids, resin Phyto-sterols were carried out on the aqueous extract showed +ve test for all except phyto-sterols and on the powdered specimen gave –ve result in aqueous, ethanol as well as acetone extract.

Keyword: Plant extracts (Acetonic & alcoholic), Cassia;chl-a;chl-b;carotenoid, primary metabolites.

APPLICATION OF PROBIOTICS AS DISEASE CONTROL IN AQUACULTURE

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Abstract

Diseases are considered to be the major limitation in aquaculture production and they cause mortality in shrimp larviculture and fish hatcheries. They are also a constraint on consistent production of fishes. The abuse of antimicrobials can result in the development of resistant strains of bacteria. Such resistance can be readily transferred to other strains either following alterations to the existing genome or by transfer of genetic material between cells through plasmids or bacteriophages. The enormous use of antibiotics for the control of diseases has been questioned by acquisition of antibiotic resistance in disease causing agents and the need of alternative measures to control these diseases is of prime importance. As an alternative strategy to antibiotic use in aquatic disease management, probiotics have recently attracted extensive attention in aquaculture. Today preventive and management measures are central concern to overcome such outbreak of diseases. This review article gives a brief explanation on the role of probiotics as an alternative control measure in shrimp farming, mode of action, types of diseases they can control (particularly, vibriosis) and the diagnostic procedures involved in aqua farming.

Key Words: probiotics, disease, vibriosis, antibiotics, management.

DOUBLING FARMERS INCOME UTILISING AGRICULTURE AND LIVESTOCK WASTE

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In India, the condition of farmers has been beleaguered vis-à-vis others and therefore Government of India in its annual budget of 2016-17 envisaged doubling of farmers' income by 2022-23. Another more disturbing condition is the continuous deterioration of climate change around the world. It is inevitable to address these two problems simultaneously because of inseparable relationship of environment and farming. The use of agriculture and livestock waste to produce biogas has a significant potential to address both problems at the same time. Given the huge availability of feedstock in the form of agricultural residue and livestock waste (535.78 million livestock population) has the ability to meet a very substantial part of energy demand in India.

Installing biogas plant has many direct and indirect economic benefits like biogas can be utilized for self use or sold out, its positive impact on health expenditure by reducing indoor pollution and enhancing hygienic environment, the time that is saved using biogas can be utilized in other economic activities, use of bio-slurry (by-product of biogas generation) in farm can enhance productivity and reduce need of chemical fertilizers.

Environmental benefits are reduction in organic waste available to decompose in open that produces different GHGs and sometimes seep down and contaminate water, the use of biogas for cooking reduces the need of biomass (combustion of biogas is much more efficient than that of biomass) and so deforestation that has positive bearing on carbon sink, use of slurry instead of chemical fertilizers that exploits soil quality,

ECONOMIC IMPACTS OF DEADLY PATHOGEN *USTILAGINOIDEA VIRENS* (COOKE) TAKAHASHI ON RICE PRODUCTION AND POSSIBLE STRATEGIES TO CONTROL FALSE SMUT OF RICE

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Abstract:

Rice is the staple food for more than half of the world population. False smut of rice caused by *Ustilaginoidea virens* (Cooke) Takahashi is one of the devastating diseases of rice causing threat to the rice production worldwide. In the Indian subcontinent the disease was first reported in Tirunelveli district of Tamil Nadu in 1878. Depending upon the variety disease incidence range between 5 to 85 % and yield loss between 0.2 to 49 %. Disease is frequently reported from Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu and Kashmir, Jharkhand, Karnataka, Maharashtra, Pondicherry, Punjab, Tamil Nadu, Uttar Pradesh and Uttaranchal of India. In Northern India as a whole disease incidence ranges between 2 to 57 %. In order to feed the ever-increasing population, there is an urgent need to control the disease. Cultural practices like early plantation, field sanitation, removal of stubble from the field are reported to reduce the disease severity. Seed treatment with carbendazim @ 2.0 g/kg and spray of mancozeb or carbendazim or copper-oxychloride @ 1ml/l are found effective in controlling the disease.

Key words: False smut of rice, rice production, cultural practices, carbendazim, mancozeb.

AGRONOMIC BIO-FORTIFICATION OF IRON AND ZINC IN RICE (*ORYZA SATIVA* L.)

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Recent estimates indicate that nearly half of world population suffers from zinc deficiency and more than 80% female deficient are anemic. The reliance on rice-based diets may induce Zn and Fe deficiency- related health problems in humans due to fact that rice (*Oryza sativa* L.) is the dominant staple food for more than half of the world's population . Life styles of human also cause mineral deficiency as polishing remove most of minerals. Among the strategies, major solution to Zn and Fe deficiency, plant breeding strategy (eg. genetic bio-fortification) appears to be a most sustainable and cost- effective approach useful in improving Zn and Fe concentrations in grain. The breeding approach is, however, a long-term process. A successful breeding program for bio-fortifying food crops with Zn and Fe is very much dependent on the size of plant-available Zn and Fe pools in soil even after development of elite varieties but, 50% and 20% of Indian soil are deficient in Zn and Fe, respectively. In most part of the cereal- growing areas, soil have, however, a variety of chemical and physical problems that significantly reduce availability of Zn and Fe to plants roots Hence, Various approach require to improve Zn concentration in cereal grains. Application of Fe and Zn fertilizers, Zn/Fe-enriched NPK fertilizers, chelated and nano fertilizers and microbes i.e. VAM (e.g. agronomic bio-fortification) offers a rapid solution to the problems. Agronomic bio-fortification strategy appears to be essential in keeping sufficient amount of available Zn/Fe in soil Solution and maintaining adequate transport to the seeds during reproductive growth stage, finally, agronomic bio-fortification is required for optimizing and ensuring the success of genetic bio-fortification of rice grains with Zn and Fe. In case of greater bioavailability of the grain Fe derived from foliar applications than from soil, agronomic bio-fortification would be a very attractive and useful strategy in solving mineral deficiency- related health problems globally and effectively.

CROP RESIDUE MANAGEMENT AND SOIL HEALTH-A SYSTEM ANALYSIS

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Present- scenario agriculture evolved as we controlled nature to meet our food and fiber needs and to support the increasing population and urbanization of society. In India, 2/3rd of total cultivated land is rainfed which contributes about 44% of the country's food requirement. In such areas crop production becomes relatively difficult due to irregular weather conditions, degraded soil having low inherent fertility and low water holding capacity (WHC). Burning of crop residues has a serious negative impact on human health as well as environmental consequences. It was reported that in - situ crop residue burning in Asian countries accounted for more than one-third of total biomass burning. The particulates (PM) released from such burning, like PM10, PM2.5, and greenhouse gases (GHGs) are also responsible for environmental pollution.

Residues turn as the pool of plant nutrients, prevention of nutrients leaching, increased cation exchange capacity (CEC), provision of amicable environment for biological N- fixation, increase in microbial biomass, and enhanced enzymes activities such as dehydrogenase and alkaline phosphatase. Moreover, residue retention on the soil surface helps in soil moisture conservation by reducing evaporation losses up to 45 mm and increasing water holding capacity by 5- 10% during the wheat growing season. Residue retention also decreases soil temperature due to the shading effect of residues in summer season. It also increases infiltration, reduces the formation of soil crust and runoff.

Some traditional uses for crop stubble are animal fodder, fuel materials, cattle shed bedding, and mulching in soil. A few other options, such as its use as fuel in power plants, utilization in mushroom farming, for the removal of bio-lubricants, in paper and pulp industry, and for biogas generation. Alternate utilizations i.e. gasification as a fuel for boilers, conversion into briquettes, composting in situ, fodder, mushroom cultivation.etc. The mile stone step to check this stubble burning is to set up alcohol refineries to create sustainable bio-energy from this farm yield residue by employing various models. Sustainable approach i.e., in situ biogas plants can also be employed for the disposal of crop residues, such as straw or stubble, meet the energy and fuel demands of cultivators.

Successful integration of crop residue management strategies into cropping systems requires understanding of how crop residues influence cycling of nutrients from soil and fertilizers, as well as their effects on soil chemical, physical and biological properties, and crop production. Information is needed as to whether crop residues can be removed from cropping systems for alternative uses without detrimental impact on soil properties, productivity and the environment.

TATUS OF ROOT KNOT NEMATODES IN POINTED GOURD FROM THREE DISTRICTS OF BIHAR

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Abstract

Amongst the major vegetables grown in Bihar, pointed gourd (*Trichosanthes dioica* roxb.) is the most economy earning and most common vegetable grown by the farmers. Pointed gourd is very much susceptible to root-knot nematodes (*Meloidogyne incognita*). It is one of the cash crops in Bihar and because of high infestation, farmers are leaving the cultivation because it is long duration crop and people are cultivating it as monocropping. Once infested, it is very difficult to prevent the crop from this nematode. The losses reported are 44 – 90 %. The present investigation is carried out to survey the root-knot nematode population in this crop in the nearby districts, Samastipur, Vaishali and Muzaffarpur districts. To know the population build up of root-knot nematodes, a nematological survey has been done in these three districts. From each district, five blocks have been chosen and from each block, soil and root samples were collected from 10 (ten) villages. The samples were collected from rhizosphere, about 250 cc soil upto a depth of 15 cm. and extracted by Cobb's sieving and decanting method. The root samples were analysed for the population of root-knot nematodes and other nematodes. The root-knot index has also been calculated. It was found that the most dominant species associated with rhizosphere soil and root of pointed gourd in all the three districts, is *M. incognita.* The root knot index ranged from 4-5. Frequency of occurrence of *M. incognita* ranged from 40-100 %. The population of *Meloidogyne incognita* in pointed gourd ranged from 517-1303, 559-891 and 519-918 per 250 cc soil in Samastipur, Vaishali and Muzaffarpur districts, respectively. The other nematodes found, were, *Helicotylenchus* sp., *Tylenchorhynchus* sp., *Hoplolaimus* sp. and *Tylenchus* sp. Considering these data, eco-friendly management of root knot nematodes became essential and different management options may be incorporated for high returns.

Keywords : Pointed gourd, root knot nematodes, *Meloidogyne incognita*, frequency of occurrence, root knot index

GAMMA RAY INDUCED PEDIGREED MUTANT POPULATION OF TOSSA JUTE (*CORCHORUS OLITORIUS* L.): A KEY RESOURCE FOR FORWARD AND REVERSE GENETICS

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Abstract

Narrow genetic diversity in available germplasm is a serious limiting factor for academic progress and agronomic improvement of crops like *C. olitorius*, an economically important bast fibre crop. Mutation breeding with its proven ability to improve both qualitative as well as quantitative traits can be employed to augment germplasm diversity. In the present study gamma rays used to treat the seeds of two promising varieties JRO 204 and JRO 8432; LD_{50} doses for gamma rays were 200 Gy and 300 Gy for JRO 204 and JRO 8432 respectively. Irradiation of two varieties has resulted in development of a large number of macro mutants such as twisted bark, extreme dwarf, non-abscission leaf, soft stem, hard stem and round pod mutants. Morphological and anatomical studies of these mutants gave new light on secondary growth in the species. Beside the academic utility, these mutants will prove of immense importance to plant breeders aiming at improvement of fibre quality. Moreover, novel mutants will help to develop new plant architecture suitable for diversified applications of the genus.

Keywords:*Corchorus*• mutation• gamma ray• pedigreed mutant population•

EVOLVING CONTOURS OF CHANGING CLIMATE AND ITS PERCEPTION BY FARMING COMMUNITY IN HILLY REGION: A MICRO STUDY FROM JHARKHAND, INDIA

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Abstract

Climate change is a natural process, but its pace has been accelerated by human interventions that draw attention of academicians, researchers and policymakers. Since last few decades it remained central theme of global discussion but general perception particularly among farming community is far from satisfactory. Agriculture is intricately interlinked with climate; hence any adverse change in climate will adversely affect agriculture. In this back ground, present study undertaken. The findings of the study revealed significant increase in maximum temperature and decrease in minimum temperature. At the same time annual precipitation found declining. Overall 72.5 per cent farming community found perceived the change across season. In nut shell, this is the first report on emerging contours of changing climate in the hilly region supplemented with community perception that may be foundation stone for future climate smart initiatives in the region.

Key words: Climate change; Trend analysis; Perception; Agriculture; Agro-ecology; Ranchi

A CONTEMPORARY REVIEW ON ALGAL BIOFUELS AND ITS FUTURE OUTLOOK

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ABSTRACT

The over exploitation and increasing demand of fossil fuel reserves is creating an inevitable situation where human being will be forced to comprehend about innovative ways to produce alternative source of energy for sustainable socio-economic growth. Algae belongs to autotrophic microorganisms having rich nutritious content and high photosynthetic utilization capability. They generally flourish in both aquatic and terrestrial habitats and exhibit quick growth, outstanding biomass yield, and high lipid and carbohydrate content which makes them suitable and potent candidate for green energy production. Algal biofuel productivity does not require arable land so they can be employed to meet ever-growing global demand of fossil fuels without affecting food crops or jeopardizing forest ecosystem. These organisms have potential physiological mechanism to transform and produce bioenergy such as biogas, biodiesel and bio-oil. Algal species are reported to have a great potential to cater a remarkable share of energy demand in the form of non-conservative source of green energy. Due to highly versatile metabolic activity, various algal species are known to have an ability to transform municipal wastewater and carbon dioxide emitted from industrial flue gas into products with a wide variety of compositions and applications such as lipids, carbohydrates and proteins that can be potentially processed into biodiesel, ethanol, and edible products for consumption of human and animals, respectively. The algal strains having potential for green energy production can be genetically engineered to allow for favourable process modification or optimization. However during the investigation process only a limited number of algal strains have been observed as potent biofuel sources. This review outlines the current status of algal biofuels, strategies of algal biofuel production, and the crucial commercial production issues.

NUTRITION AND HEALTH OUTCOMES LINKED WITH FOOD INSECURITY AND HIDDEN HUNGER

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ABSTRACT

Nutrition is a foundation stone that influences and defines the physical condition of all people. Conversely, malnutrition makes us all more vulnerable to chronic disease and premature death. It is a devastating problem, particularly for the poor and unprivileged as poverty is a fundamental cause of household food insecurity and consequently malnutrition which continues to be one of the major and most pressing health problems affecting children and adults. Food insecurity influences the nutritional status of children by limiting the quantity and quality of dietary intake. Imbalanced diets low in fruits, vegetables, nuts, and whole grains are responsible for existing hidden hunger and greatest health burden worldwide. In addition to imbalanced diets, about 2 billion people are overweight and obese, 2 billion have nutritional deficiencies, and about 800 million are still suffering from hunger due to poverty and poorly developed food systems. Therefore, food security is vital issue of present time. The phenomenon of food security is based on three aspect, as food availability, food accessibility and food utilization. Food availability refers to that all people have ample amount of food constantly supplied by domestic production, while food accessibility refers to that all people have access sufficient food at all times in terms of purchasing power of the households, without any risk of unexpected event. Further the food utilization or we can say as food absorption, which implies that the person being able to assimilate the food eaten, to lead a healthy and long life. In the past few decades, rapid urbanization, growing urban slums, overcrowding, pollution in developing countries, especially in India is a cause of concern. Lack of safe drinking water, sanitation and deprivation in multiple domains are other reasons for the increase in infectious diseases, malnutrition and cognitive development in the early formative years of life. Universal food security can be achieved only through an integrated approach which requires to include

initiatives and investments to increase agricultural productivity, superior access, measures to improve rural development, community security for the most vulnerable including strengthening their resilience to conflicts and natural calamities, and precise nutrition programmes, particularly to concentrate on micronutrient deficiencies in mothers and children under five years of age. Therefore, we need sustainable, resilient and efficient food system to deliver food and nutrition security for present and future generations.

Key words: Food availability, Food accessibility, malnutrition, fruits, vegetables

NEW APPROACHES FOR FARMER WELLNESS BY GOVERNMENT OF INDIA

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ABSTRACT

Agriculture plays a vital role in India's economy. 54.6% of the total workforce is engaged in agricultural and allied sector activites (Census 2011) and accounts for 17.8% of the country's Gross Value Added (GVA) for the year 2019-20 (at current prices). Given the importance of the agriculture sector, Government of India has taken several steps likes MSP (Minimum support price), doubling the farmer income, Atmanirbhar Bharat Abhiyaan (ABA), Agriculture Infrastructure Fund (AIF), The Farmers' (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act , 2020 etc. for better pricing and marketing the production.. Steps have been taken to improve the income of farmers. Further, to mitigate risk in the agriculture sector, a scheme "Pradhan Mantri Fasal Bima Yojana" (PMFBY) was also launched in 2016. Schemes such as Formation & promotion of 10,000 FPOs & the Agriculture Infrastructure Fund have also been launched recently to benefit the sector. PM-KISAN Scheme (Pradhan Mantri Kisan Samman Nidhi) The PM-KISAN Scheme was introduced to provide financial support to farmers. Under this scheme, the government offers Rs 6,000 every year in three instalments of Rs 2,000 each to over 14.5 crore farmers across India. Farmers can adopted better market strategies for better pricing of crops. Farmers try to modern market strategies for decrease the cost of production and increase the income and profit. Further, to mitigate risk in the agriculture sector, a scheme "Pradhan Mantri Fasal Bima Yojana" (PMFBY) was also launched in 2016. Schemes such as Formation & promotion of 10,000 FPOs & the Agriculture Infrastructure Fund have also been launched recently to benefit the sector.

DIGITILIZATION IN AGRICULTURE & ALLIED ACTIVITIES.

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ABSTRACT

The agriculture sector, is the backbone of india. currently agriculture is one of the major sectors in the Indian economy. GDP contribution by the agriculture sector is likely to 15 to 20% in the past years, increasing continously. Over the years, the government has taken major steps to aid and enhance the agriculture sector with proven farming technologies and supportive policies. The recent evolution of digital technology in farming will further accelerate growth by ensuring higher crop yields and enhance sustainability by reducing water consumption and the use of agrochemicals.

Digital technologies, such as artificial intelligence (AI) and machine learning (ML), remote sensing, big data, block chain and IoT, are transforming agricultural value chains and modernizing operations. While several countries, such as the Netherlands, the US, Australia and Israel, have successfully adopted and exploited digital solutions to revolutionise agriculture, their adoption in India is still in its infancy. The future adoption of digital agriculture in India is anticipated to nurture under the Public-Private Partnership (PPP) mode.

SUSTAINING SOIL HEALTH AND POSSIBILITY OF MULTI RATOONING OF SUGARCANE AS INFLUENCED BY ORGANIC AMENDMENTS IN TYPIC USTIFLUVENT

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ABSTRACTS

The reduction in the yield of ratoon crop arises out of improper management practices and declining fertility status due to lack of organic matter application. The organic carbon content of soils of sugarcane growing area of Bihar hovering under low range. About 40 % of the total sugarcane cultivated area is under ratoon crop having a low average yield (40-50 t/ha). The field experiment was conducted on University Research Project on sugarcane farming system Plant -Ratoon I-Ratoon II in calcareous soil belong to Typic Ustifluvent. The experiment was conducted in randomized block design with various organic amendments viz. control, FYM (farmyard manure) @ 20 t/ ha, biocompost (BC) @ 20 t/ ha, vermicompost (VC) @ 5 t/ ha, green manure with moong, sugarcane trash @ 10 t/ ha, FYM + BC+ VC (1: 1: 0.5) @ 20 t/ ha and recommended dose of fertilizer in sugarcane plant ratoon system. The application of different organic sources significantly increased soil organic carbon after ratoon II harvest. The organic treatment combination FYM+ BC + VC recorded the maximum organic carbon in the surface soil. The availability of NPK and Fe, Zn, Cu and Mn varied significantly in the post harvest soil. The applications of BC, VC and FYM + BC + VC in combination were found at par with each other. The application of FYM recorded highest amount of micronutrients in the surface soil which was maximum in the biocompost treated plots. The microflora population, CO_2 evolution and soil microbial biomass carbon increased significantly, indicating improvement in soil health. The number of tillers, plant heights, cane girths, number of millable canes and cane yield significantly increased in all the treatments over control. The organic sources produced yields statistically similar to the recommended NPK. The uptake of nutrients by plant differed significantly and followed a trend similar to the yield of cane. The brix, pol and purity of cane juice remained unaffected. Application of organic amendments had found imperative for maintaining soil heath for sustaining multi ratooning in sugarcane farming system.

ENVIRONMENT, SOCIETY AND HUMANITY: OUR HOLISTIC APPROACHES VASUNDHARA SAMVAD

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ABSTRACT

Society is second largest web of life, after nature's food web on this planet in which human civilization coexists with the environment. This relationship between human and environment is depending upon equilibrium of components. In race of globalization, we are just exploiting valuable environmental components of our Earth. Though, we know that among entire solar family, we have only single planet which unconditionally support life and we all called this planet, "home". Now, with concept of thinking globally and acting locally, we started campaigning from 31st August 2016 targeting youth of age group 08-26 year in Uttar Pradesh. The contents of our campaigns consist of lecture series, song, poetry, essay writing, quiz and painting and we covers primary schools, convent schools, inter collages and degree collages. Since 2016 to 2018 January 31st we organized 156 programs in 125 primary schools, convent schools, inter collages and degree collages of state benefiting 60,980 students. We have selected both formal and non-formal mode of education to spread awareness on core environmental issues of water conservation which include rainwater harvesting and watershed management, pollution, sustainable development, global warming, climate change, ozone depletion, importance of sanitation and hygiene in our society. We selected education as mode of awareness because it is single largest tool to transfer information from one generation to another. We are still continuing our awareness program which is now supported by

Yuvak Biradari (Bharat) a nongovernmental organization and supportive training program under Tarun Bharat Sangh.

Keywords – Awareness, Bonding, Earth, Environment, Formal Education, Non-formal Education, Society, Sustainable Development, Vasundhara Samvad

DOUBLING FARMERS INCOME: WOMEN PROSPECTIVE

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ABSTRACT

Agriculture is the backbone of our country. The livelihood of more than 60% of India's total population is dependent on agriculture and its allied sectors. Rural women account for 47% percent of agricultural laborers. Indian women and especially the rural women, have traditionally achieved more with less.They play a pivotal role in producing staple crops, livestock, goat-rearing, forestry, fisheries, dairy, pig- farming, mushroom production etc. In recent year, a large no. of women is making fortune and getting recognized for their work in the field of agriculture. But altogether, low level of farmers' income and the erratic weather is a serious matter of concern for all of us. To secure the future of our country and to improve the livelihood of more than 60% of our agrarian fellows we have to focus on increasing their income. For that there are several farmer-cum-business women are there in our society who all are busy in doing their business tirelessly. A farmer-cum-business women namely Vinita kumari has developed her business of spawn production and other product of mushroom.Milk Lady Savita Devi has remarkably improved the lives of others by her venture in the field of dairy. Beside boosting allied sectors, such as animal husbandry, dairying and fisheries many farmer friendly equipment's like bhindi plucker, sugarcane bud chipper, maize dehusker-cum-sheller has been developed to make farmers especially women farmers to do their work more efficiently without much drudgery, hence conserving energy and saving time at the same time doubling the farmers income.

Key Words: Farmer, agriculture, income, profit-making, women.

GENETIC DIVERGENCE STUDY IN RICE (*Oryza sativa* L.) UNDER DIRECT SEEDED CONDITION

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ABSTRACT

Present investigation entitled "**GENETIC DIVERGENCE STUDY IN RICE** (*Oryza sativa* L.) **UNDER DIRECT SEEDED CONDITION"** was carried out at research farm of Tirhut College of Agriculture Dholi, Muzaffarpur, Bihar during Kharif 2020-21 in RBD design with three replication. Genetic divergence assessed among 15 rice genotypes using Mahalanobis D^2 statistic. D^2 analysis differed significantly with regard to the character and distributed 15 genotypes into four clusters, of which cluster I was the largest with 12 genotypes and Cluster II, Cluster III and Cluster IV had single genotype each. The pattern of distribution of genotypes from different eco-geographical region into various clusters was at random indicating that geographical diversity and genetic diversity were not related. Cluster I had maximum intra-cluster value of 206.52 and maximum inter-cluster distance was observed between the cluster III and IV (2197.20) followed by cluster I and III (819.96) indicating the impotence of the genotypes present in these cluster on genetic divergence for quantitative characters. The genotypes IR-64 of cluster IV, IR-127299-32-2-2 of cluster III and genotype IR-127339-11-1-1-1-1 of cluster 1I are diverse in nature, Hence these genotypes are used as better parent in hybridization programme for direct seeded condition, likely to produced wide variability with desirable segregates. The characters viz. grains yield plant^{-1}, number of tillers plant^{-1}, number of panicle plant^{-1}, days to maturity and days to 50% flowering contributed maximum towards genetic divergence among the genotypes.

Keywords: Genetic divergence, Genetic variability, Mahalanobis D^2.

GENOTYPE x ENVIRONMENT INTERACTION AND STABILITY ANALYSIS OF RAINFED LOWLAND RICE (*Oryza sativa L.*) GENOTYPES

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ABSTRACT

In the present study, twenty four elite rice genotypes of diverse origin were evaluated for ten different characters namely days to 50% flowering, days to maturity, plant height (cm), tillers per square meter, panicle length (cm), spikelet fertility (%), grain filling period (days), grain filling rate (kg/days), 1000 grain weight (g), grain yield (q/ha). The stability parameters were done with respect to grain yield through creating four effective environments at four different locations of Eastern India viz., RAU Pusa, Samastipur, Bihar, ARI Mithapur Patna Bihar, RRS Mashodha, Faizabad, UP and CRRI Cuttack, Orissa. The experiment was laid out in the randomized block design with three replications for each set of experiment. Five competitive plants from each experiment plot were randomly selected for recording the observation on different characters except days to 50% flowering and days to maturity which was recorded on plot basis. Pooled analysis of variance reflects existence of genotype and environment interaction and contribution of both linear and non-linear components to genotype x environment interactions. Stability parameters analysis showed that the genotypes NDR 9930070, NDR 9830130 showed high grain yield and non-significant deviation from linear regression indicating their stability over the environments and were suitable for all environments. The genotypes namely OR 1898-2-35, NDR 9830131 and RAU 729-12-81 were suitable for better environments. Genotypes CR 874-23, Savitri and RAU 649-108-5 were identified for poor environments.

Key words: stability, G x E interaction, yield.

MICROGREENS- SUPER FOOD FOR NUTRITIONAL SECURITY OF INDIA

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ABSTRACT

With a population of 140 billion in 2022; the nutritional security of India is now becoming a very serious threat in the decades to come. Merely filling the stomach does not warrant any kind of nutritional security of the ever growing population. Although, we are self sufficient in Food grains and vegetable production; still malnutrition is a major issue needs immediate attention to avoid heavy cost on medicine and to have a healthy and active workforce for a productive nation. Use of high amount of pesticides makes vegetables unsafe for human health and that is why the focus is now more on Natural farming, organic farming and people are becoming more conscious towards origin of what they eat. Microgreens provide an important range of food material that can be easily grown at home organically in portrays without use of any kind of pesticide and with little or no amount of inorganic fertilizers. Microgreens; which are commonly called as 'Vegetable Confetti' are soft juvenile greens raised from the seeds of grains, vegetables or herbs as well as its wild types. These are approximately 7-12 days old and 2.5cm to 7.5 cm in length. They can easily be grown in protrays in our houses. Important seeds that can be grown in microgreens are Cauliflower, cabbage, broccoli, radish, carrot, fennel, celery, garlic, onion, leek, amaranth, chard, wheat, pea, sunflower, etc. Besides, carbohydrates, protein, fats, vitamins; our body also requires many minerals viz. Calcium, Phosphorus, Potassium, Sodium, Iron, Iodine, Zinc, Chromium, Copper, Fluoride, Selenium, Molybdenum and Manganese. In deficiency these minerals, our body suffer from many diseases and disorders. Most of the microgreens, studied so far; are rich in Potassium, Iron, Zinc, Magnesium and Copper. They are reported to contain forty times more nutrient than their mature counterpart. They also rich in many vitamins like Vitamin A, Vitamin B, Vitamin C, Vitamin E and Vitamin K as well as are good source of antioxidants. They may boost our immunity and prevent us from many diseases like heart attack, Alzheimers diseases, Diabetes, cancers, etc. Seeing the nutrient content; they are kept in the category of super food. Although, a little research work has been initiated in India, it has a bright future prospect in days to come basically to combat the problem of malnutrition.

AGRICULTURE BIOINFORMATICS: THE NEXT GENERATION SEQUENCING ERA TOOLS FOR CROP IMPROVEMENT

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ABSTRACT

Bioinformatics is a set of tools for analysing biological data, rather than a discipline. Being at the intersection of modern biology and informatics, it entails the discovery, development, and implementation of computational algorithms and software tools that aid in the understanding of biological processes, with the primary goal of serving the agriculture and healthcare sectors, but with several spinoffs. One of the most useful applications of bioinformatics technologies is the capacity to represent high-resolution physical and genomic maps of plants. As the amount of data expands tremendously, so does the demand for data management, visualisation, integration, analysis, modelling, prediction tools and interpretation also grows parallelly. The emerging science of Bioinformatics plays a significant role in the development of the agricultural sector, agro-based industries, agricultural by-products utilization and proper management of the environment.

Crop improvement is done in order to increase yield, stress tolerance, and/or disease resistance. This can be supplemented in a very realistic way by utilising the biological data that we have access to, such as genomic, proteomic, transcriptomic, interactomic, metabolomic, and other-omics data. Developments in web based stages for omics based investigation, and application of such data has given the essential stage to advance molecular based research in mode l plant, as well as other important crop plants. With the help of these information, DNA based resources and sequencing, RNA and variation analysis, proteomics, structural proteins, and post translation modifications, metabolomics, phenomics and plant comparative analyses could be done easily at one platform. Predictive plant growth manipulation will have an impact on agriculture at a time when food security, land availability for agricultural use, environmental stewardship, and climate change are all significant societal concerns.

Keywords: *Bioinformatics Tools, Genomics, omics, Proteomics, Sustainable Agriculture*

PLANT SECONDARY METABOLITE: A SUSTAINABLE APPROACH FOR SUPPORTING BETTER HEALTH

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ABSTRACT

Infections by bacteria, fungi, viruses, and parasites, as well as inflammation, colds, digestive issues, discomfort, and a variety of other health problems and diseases, have always plagued humans. Only in the last 150 years have modern medications, which are based on synthetic pharmaceuticals and antibiotics, become available. Humans had to rely on natural drugs, largely from plants, but also from fungus and animals, in the past. Traditional Chinese Medicine, Kampo medicine, Ayurvedic medicine, European medicine, and traditional medicines of Africa, Australia, and the Americas. Treatment of diseases and health problems with herbal medicines is usually not or not fully a placebo medicine, but rather utilizes active natural compounds (so-called secondary metabolites), which are found in all plants and are mostly of low molecular weight with a wide structural variety. Plant secondary metabolites are primarily responsible for curing a variety of disorders. Secondary metabolites, often known as plant constituents or natural chemicals, are pharmacological and toxicologically important to humans. On the basis of chemical structure and metabolic derivation, the chemical compounds found in plant sources are classified as primary and secondary metabolites. Secondary metabolites have a variety of pharmacological activities that can be categorized further depending on their chemical structure and functional groups. Terpenoids, phenolics, flavonoids, alkaloids, and glycosides are among the most important secondary metabolites, serving as a source of single bioactive components in nutraceuticals and modern pharmaceuticals. Antioxidant, anti-inflammatory, antibacterial, antihelminthic, anticoagulant, antidiabetic, and lipid-lowering effects are all present in several of these substances. Some chemicals are cytotoxic, preventing angiogenesis and tumour progression while also promoting cancer cell death through programmed cell death. Some molecules protect nerve cells against chemicals and oxygen deprivation (stroke), promote nerve cell regeneration, protect the skin from ultraviolet damage, protect the liver from poisons like carbon tetrachloride, and reduce calcium loss from bone.

KEYWORDS: *Alkaloids, Flavonoids, Glycosides, Phenolics, Secondary metabolites, Terpenoids*

MITIGATING EFFECT OF SALICYLIC ACID ON BIOCHEMICAL TRIATS IN RABI MAIZE (ZEA MAYS 1.) GENOTYPES UNDER NORMAL AND DELAYED SOWING

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ABSTRACT

A filed experiment was carried out during the winter (Rabi) season (2018-19) at Agricultural Research Farm, Tirhut College of Agriculture, Dholi, Muzaffarpur, Bihar to study the mitigating effect of salicylic acid on biochemical traits in maize genotypes i.e., DQL-2241 and Dholi Inbred-2011 under normal and delayed sowing. The experiment was laid out in split plot design comprising eight treatment combinations in three replications. Seeds were pried with salicylic acid (SA) @20 µg mL^{-1} and 40 µg mL^{-1} along with hydro priming (distilled water) for overnight and non-primed seeds as control before both sowings i.e., normal and delayed sowing. Observations were recorded at 20, 40 and 60 days after sowing for total chlorophyll, total soluble sugar, protein and proline contents in leaves. It was found that for the studied biochemical traits, genotype DQL-2241 primed with 20 µg mL^{-1} salicylic acid significantly increased in delayed sowing as compared to normal sowing. This finding suggests that maize genotypes were found to differ in their ability to respond to delayed sowing under influence of seed priming with salicylic acid.

DOUBLING OF FARMERS INCOME THROUGH PROCESSING OF FISH

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ABSTRACT

Fish is one of the main food item of the majority of the people . Fish is an excellent and cheapest source of high quality animal protein consumed by the people since the days of our forefathers. It is also an excellent source of high quality protein which contains essential amino acid, lipid, long chain n-3 unsaturated fatty acid, which is very important for the normal functioning of nervous system and blood clotting of human body. If carefully exploited, the freshwater fish as a renewable natural resource can be utilized to meet of protein requirement. Fish is highly perishable commodity having shorter shelf life. Spoilage of fish commences immediately after harvesting. Processing and value addition.in the form of drying, smoking and fermentation of fish are considered as Manipur-specific technologies for preservation and value addition of fish. It can increase the shelf life and can makes the product more attractive to the buyers and also increase the taste, texture and color of the finished product. and can also made the product available throughout the year. Promotion of value added product is essential to minimize post harvest loses and also to obtain optimum profit.. Establishment of enterprise on preservation and value addition of fish helps to generate more profit which indirectly helps for increasing and betterment of the livelihood of women and also to increase employment opportunities of women folk and empowerment of women in the family as well as in the society. The enterprise on processing of fish can double the income of farm women as the benefit cost ratio is very high. The demand of the fish product is very due to its high nutritional content.

Key words: Enterprise, fish, shelf life, preservation and value addition

APPARENT RATE OF INFECTION AND AREA UNDER DISEASE PROGRESS CURVE OF CHARCOAL ROT OF SESAME

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ABSTRACT

Sesame (*Sesamum indicum* L.) is an important oilseed crop of worldwide. Charcoal rot of sesame incited by *Macrophomina phaseolina* is the most destructive root and stem rot disease. Incidence of charcoal at different plant age has a major influence on the sesame crop. Disease progression was monitored twice a week on the two sesame cultivars viz., HT 1 and HT 2 throughout the growing season. Incidence of charcoal rot caused by *M. phaseolina* decreased with delay in sowing. Calculation for A-value (Area under disease progress curve – AUDPC) and r-value (apparent infection rate) in crops sown on different dates identified the speed of progress of the disease incidence. The dates of sowing enabling slow disease progress or the weather conditions coinciding with the different crop stages demarcated the advantageous dates of sowing from the disadvantageous ones. However, cultivar HT1 is more susceptible as compared to the other cultivar HT 2, as apparent infection rate was higher in former. Highest per cent disease incidence for season highly correlated with date of sowing *i.e*. early date of sowing showed highest per cent disease incidence..

Keywords: *Sesamum indicum*, *Macrophomina phaseolina*, AUDPC, apparent rate of infection

EFFECT ON YIELD LOSS AND MANAGEMENT OF BANANA PSEUDO STEM WEEVIL, *ODOIPORUS LONGICOLLIS*

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ABSTARCT

Banana is one of the important fruit crop in India, grown in an area of 884 thousand ha with a production of 30807.5 thousand tons per year. In Bihar, banana is grown in an area of 31.07 thousand ha with a production of 1396.39 thousand tons per year (Horticulture statistics division DAC&FW, 2018). India is the largest producer of banana. The banana pseudo stem borer, *Odoiporus longicollis* emerged as a major pest of banana and can cause complete crop destruction in endemic area where condition are favorable. The female weevil lays eggs inside the air chamber of the outer sheath of the pseudo stem through holes made by its rostrum. Emerging grubs make extensive tunnels in the pseudo stem for feeding and pupate inside the pseudo stem to become adults. Owing to the extensive damage to the pseudo stem, it often becomes hollow and weak and bears either undersize fruit or no fruit at all depending on the damage. It can be managed by Indoxacarb 14.5 SC @ 0.01% spraying at the appearance of BSW + leaf filling after one month of spraying.

Keys word: Yield, Banana, loss**,** Banana pseudo stem weevil

CROP RESIDUE MANAGEMENT AND SOIL HEALTH-A SYSTEM ANALYSIS

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Present- scenario agriculture evolved as we controlled nature to meet our food and fiber needs and to support the increasing population and urbanization of society. In India, 2/3rd of total cultivated land is rainfed which contributes about 44% of the country's food requirement. In such areas crop production becomes relatively difficult due to irregular weather conditions, degraded soil having low inherent fertility and low water holding capacity (WHC). Burning of crop residues has a serious negative impact on human health as well as environmental consequences. It was reported that in - situ crop residue burning in Asian countries accounted for more than one-third of total biomass burning. The particulates (PM) released from such burning, like PM10, PM2.5, and greenhouse gases (GHGs) are also responsible for environmental pollution.

Residues turn as the pool of plant nutrients, prevention of nutrients leaching, increased cation exchange capacity (CEC), provision of amicable environment for biological N-fixation, increase in microbial biomass, and enhanced enzymes activities such as dehydrogenase and alkaline phosphatase. Moreover, residue retention on the soil surface helps in soil moisture conservation by reducing evaporation losses up to 45 mm and increasing water holding capacity by 5- 10% during the wheat growing season. Residue retention also decreases soil temperature due to the shading effect of residues in summer season. It also increases infiltration, reduces the formation of soil crust and runoff.

Some traditional uses for crop stubble are animal fodder, fuel materials, cattle shed bedding, and mulching in soil. A few other options, such as its use as fuel in power plants, utilization in mushroom farming, for the removal of bio-lubricants, in paper and pulp industry, and for biogas generation. Alternate utilizations i.e. gasification as a fuel for boilers, conversion into briquettes, composting in situ, fodder, mushroom cultivation.etc. The mile stone step to check this stubble burning is to set up alcohol refineries to create sustainable bio-energy from this farm yield residue by employing various models. Sustainable approach i.e., in situ biogas plants can also be employed

for the disposal of crop residues, such as straw or stubble, meet the energy and fuel demands of cultivators.

Successful integration of crop residue management strategies into cropping systems requires understanding of how crop residues influence cycling of nutrients from soil and fertilizers, as well as their effects on soil chemical, physical and biological properties, and crop production. Information is needed as to whether crop residues can be removed from cropping systems for alternative uses without detrimental impact on soil properties, productivity and the environment.

ASSESSMENT OF AEROBIC BACTERIAL DEGRADATION OF PENTACHLOROPHENOL ENRICHED FROM TANNERY EFFLUENT SLUDGE OF JAZMAU, KANPUR

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ABSTRACT

The leather tanning industry, regulations to reduce pollution have been in place since 1986, but measurements of the effluent from the industry still show that the concentrations of chemicals and organic matter are too high. In India, tannery industries have occupied a significant place in economic. It is the 7th major sector of earning foreign exchange in India. Export of leather goods comprises of several leather products of economical values which reclaimed new height of $2.8 billion in 2007-08, comparing with 1965-66 which was $65.5 million and still increasing rapidly. Chlorinated xenobiotic compounds tend to persist in the environment and may become environmental and public health hazards. Pentachlorophenol (PCP) is a priority pollutant that has been used widely as a general biocide in commercial tannery industries. Owing to rapid industrial growth, serious soil and water pollution by PCP has been reported in Jajmau Kanpur, India, present investigation an aerobic bacterial strains were isolated from two different sites PSCS1 and PSCS2 (Kanpur, Jajmau, U.P. India) and screened for their PCP degrading potential by using minimal salt agar medium containing, sodium salt of pentachlorophenol (NaPCP) as sole source of carbon and energy along with bromothymol blue as screening agent. Strains utilizing PCP were characterized morphologically and biochemically. For identification of metabolite during PCP degradation, two types of pathways for aerobic degradation of PCP have been described, one is through formation of chloro-catechols and other is

through formation of subsequent hydroquinone. In pathway of chloro-catechols, the subsequent chlorophenols formed are further metabolized via ortho or modified-ortho ring cleavage pathways. In the hydroquinone pathway, subsequent dechlorination leads to formation of hydroquinone, which is subsequently cleaved by *ortho* ring cleavage enzyme. Further, hydroquinone pathway form protonated tetrachlorohydroquinone which is further converted into trichlorohydroquinone and 2,6-dichlororohydroquinone. The HPLC profile of noble metabolite formed during PCP degradation by an aerobic bacterial consortium was studied by justifying the hydroquinone pathway.

Key words: Bioreactor, Chemostat, Consortium, Enrichment, Pentachlorophenol (PCP), Ring cleavage, Trichlorohydroquinone

DESIGN AND WORKING MODEL OF A SMALL SCALE WASTE WATER TREATMENT PLANT FOR RIVERS

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ABSTRACT

Rivers and streams drain water that falls in upland areas. Moving water dilutes and decomposes pollutants more rapidly than standing water, but many rivers and streams are significantly polluted all around the world. A primary reason for this is that all three major sources of pollution (industry, agriculture and domestic) are concentrated along the rivers. Industries and cities have historically been located along rivers because the rivers provide transportation and have traditionally been a convenient place to discharge waste. The Gomti River originates from Madhoganj Tanda village in Pilibhit district, U.P. It passes through the district of Shahjahanpur, Kheri, Hardoi, Sitapur, Lucknow, Barabanki, Sultanpur, Jaunpur and ultimately merges in Ganga. Gomti receives huge quantities of untreated sewage, agricultural runoff, brings lot of pesticides, fertilizer, street washouts bringing oil, asphalt, sediment and many types of heavy metals. From industrial effluents to domestic discharge, the river becomes more of a flowing dumping yard. In present investigation for the treatment and application of Gomiti River water, we designed lab scale treatment plant. In this lab scale model, the water of Gomti River Passed by designed instruments like Screen, Grit Chamber, Clarifier, Oxidation Pond, Multigrade Filter (MGF), Activated Carbon Filter. The physicochemical parameters in water of river Gomti were assessed to know about the water quality in designed instruments. Total of Three sampling sites were selected between Sitakund Ghat and Behind K.N.I.P.S.S. ,The parameters selected temperature, Total Solids (TS), Total Suspended Solids (TSS), Total Dissolved Solid

(TDS), pH , Dissolved Oxygen (DO), Biological Oxygen Demand (BOD),Mix Liquor Suspended Solid (MLSS) ,Mix Liquor Volatile Suspended Solid (MLVSS), Acidity, Alkalinity, Free CO_2 .After we pass the water through lab scale multigrade filter, the parameter selected in our investigation shows permissible limits with in significant values given by CPCB for drinking water purpose In order to check application of our lab scale treatment plant we designed man engineered ecosystem in the form of aquarium, in which we used inherent fishes and planktons sampled from sampling sites and we found 100 % significant outcomes.

Keywords: Designed Instruments, Gomiti River, Lab scale Water Treatment plant, Man Engineered Ecosystem, Physico-Chemical Parameters, Water quality.

RESPONSE OF LENTIL (*LENS CULINARIS*) DEMONSTRATED TECHNOLOGY UNDER CLUSTER FRONT LINE DEMONSTRATION IN SAMASTIPUR, BIHAR

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ABSRACT

The cluster front Line demonstration programme on lentil were carried out 2018-19 and 2019-20 in operational area of Krishi Vigyan Kendra, Birauli, Samastipur with the objective to demonstrate the improved technologies of pulse production potential on farmers field under different farming situations. The plots were selected from different villages/ cluster, each of 0.2-0.4 ha from the district. The variety HUL-57 was used in both the years in the area of 30 ha and 10 ha, respectively. Seed treatment, fertilizers, herbicides, irrigation application and plant protection measures were taken as per improved packages of practices. During the demonstration programme, it was found that the seed yield of lentil was 12.80 q/ha during 2018-19 and 15.85 q/ha during 2019-20 in demonstration field as compared to seed obtained from farmers field 9.97q/ha in 2018-19 and 8.57q/ha in 2019-20 respectively. The technology gap was found to be 7.20 q/ha & 4.15 q/ha and 4.23q/ha & 5.88 q/ha extension gap were found during both the years. The technology index 36% and 20.75% in 2018-19 and 2019-20 respectively. Higher gross return (Rs. 38400/ha and Rs 60230/ha), net return (Rs.13000/ha and Rs 34910/ha) and benefit cost ratio of (1.51 and 2.38) were found in demonstrated field as compared to benefit cost ratio of 1.27 and 1.40 in case of local, check in both the years, respectively. The significant yield is attributed due to introduction of HUL-57, an unexplored and most suited variety for this region in cluster mode with improved packages of practices which facilitated better crop management and enhanced productivity of lentil.

A VIEW ON FARM RECORDS FOR SUSTAINABLE AGRICULTURE.

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ABSTRACT

The objectives of farm records are to control the farm business, guide future decisions and provide data required for sound farm planning. For the sustainable Agriculture its use, the more beneficial if it to do maintain farm records. Some benefits are: Identification of defects in the existing organization of Farm business is the first step in farm planning. Analysis of farm records helps in diagnosis the Omissions in the current plan. It also provides data required for farm planning. Maintenance of farm records inculcates the business outlook as well as better insight into the working of farm business. Systematic recording of farm business transaction helps the farmer in knowing the strength and weaknesses of the business. Farm records help to check the unproductive expenditure and identify profitable enterprises. Beside, the gap between current income and potential income can be examined. The records provide information on the income generating capacity of the farm and thereby indicates the credit worthiness of the farmer. Records indicate the requirement of various inputs and input services in advance so as to organize the farm business smoothly. So farm Record. Keeping is to help reduce stress and meet a goals and impact as follows.

NCAT agriculture specialists teamed up with the Independent organic Inspectors Association to provide training on organic farming for southern producers, co-op extension educators and other technical support personal. The Tennessee meeting reviewed records from organic farms.

Gary and Patricia Belli of Belli Dairy in Ferndale, California noticed their herd is milk production had dropped. They were keeping track of their Purchases of organic feed. With lot numbers and amounts delivered from various sources. By looking at their feed purchase records, they could see the relationship between the drop in production and the time when they used feed from a certain source. They asked their supplier to avoid a batch of feed that appeared to be of poor quality. When they resumed feeding the better quality feed from other lots, their production problem was solved.

Key word-: *Farm Record, organic Farming, Milk productions.*

DETERMINATION OF LETHALITY IN A FRESHWATER INDIAN MAJOR CARP *LABEO ROHITA*, EXPOSED TO PYRETHRUM AND ATRAZINE

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ABSTRACT

Pyrethrum (a plant based pesticide), and atrazine (herbicide) are frequently used in crop field to control different type of insects and various unwanted weeds respectively. They reach to the water bodies from agriculture fields through surface runoff and contaminate water bodies. Mostly organic farmers use pyrethrum as an insecticide for fruit and vegetable crops.

Pyrethrum belongs to the Asteraceae family and used for pyrethrum production. Atrazine is a triazine class herbicide. These chemicals control harmful insects and unwanted weeds but they are often toxic to non-target organisms (NTOs) like fishes (*Labeo rohita*).

The static renewal acute toxicity test was carried out to find out the 24h, 48h, 72h, and 96h, LC_{50} value of pyrethrum and atrazine, on the freshwater major carp *Labeo rohita.* The fish were exposed to different concentration of pyrethrum and atrazine for toxicity bioassay. All data were subjected to Finney's Probit analysis and processed with SPSS-21. The LC_{50} values of pyrethrum and atrazine for 24h, 48h, 72h, 96h were 0.75µg/l, 0.70 µg/l, 0.62 µg/l, 0.55 µg/l, and 34mg/l, 32.5mg/l, 31.2mg/l, 30.5mg/l respectively. On exposure to pesticide during bioassay fishes exhibited altered bahaviour. At higher concentration level of pyrethrum and atrazine, the fish showed changes such as higher mucus production, jumping, vertical position, sinking to the bottom, jerky movements, higher opercular rate due to higher respiration rate, and change in body colour.

EFFECT OF WATERLOGGING ON MAIZE PRODUCTION IN KOSHI ZONE (BIHAR)

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Maize (Zea mays) is primarily cultivated during kharif & Rabi in India, it is one of the most versatile emerging crops having wider adaptability. Globally, maize is known as queen of cereals because of its highest genetic yield potential. A period during which the crop experiences significant damage due to excess soil moisture in the root zone. In North Bihar alone, more then 15% of the total maize farming area is affected by waterlogging and flooding. In India excess soil moisture is the second most serious abiotic stress after drought, limiting maize productivity. The stress caused by waterlogged soil reduced the weight of 100 seeds and grain yield but did not affect the number of kernel rows, ear length or prolificacy. Selection for yield resulted in higher yields. Waterlogging stress was imposed after 20 days of sowing (DOS) in maize placing pots in water-filled containers in such a way that the water level remained 2.5 to 3.0 cm above the soil surface in pots. Under waterlogged condition stomatal conductance decreased significantly in maize genotypes. Variations in the contents of leaf N, Mg, Ca, Fe, Cu, Mn and Al were observed under the influence of waterlogging stress. Maize plants experienced N, Ca, Mg, Fe, Mn, Zn and Cu deficiency. There are reports that excess soil moisture causes an average of 25-30% losses in maize production each year . The risk of crop failure or yield reduction is more in short duration genotypes when exposed to short-term waterlogging, as the recovery period is less than medium- and long-duration genotypes .Reduced plant growth and poor crop productivity under waterlogged condition is attributed to reduced oxygen concentration in the root zone, which results in switching of plant metabolism from aerobic to anaerobic .Decreased photosynthesis and transpiration are among the initial important changes under waterlogging condition. Waterlogging in fact has been shown to decrease photosynthetic efficiency and biological yield in maize. Intercellular CO2 concentration of leaf increases linearly with the duration of flooding despite reduction in stomatal conductance. Waterlogging results in the reduction in transpiration rate and stomatal conductance in maize

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Keywords*:* Abiotic, Waterlogging, Stomata, agriculture production, Genotype

APPRAISAL OF NEW FUNGICIDES AGAINST *MACROPHOMINA PHASEOLINA* (TASSI) GOID CAUSING STEM AND ROOT ROT OF JUTE

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ABSTRACT

A field experiment was conducted in RBD with seven treatments and one control with olitorious jute variety JRO-204 for three consecutive years (2015-2018) at the Jute Research Station, Katihar. The experiment was carried out with recommended dose of fertilizers N:P:K @ 80: 40:40 kg/ha in a plot size of 4m x 5m with a row spacing of 30 cm. This study was undertaken to evaluate the relative efficacy of fungicides and some selected combinations of fungicide, viz., Carbendazim, Propineb. Tebuconazole, Difenaconazole, Hexaconazole, Tricyclazole + Propiconazole and Azoxystrobin + Difenaconazole against *Macrophomina phaseolina*. Under field conditions it was observed that Tebuconazole @ 0.15 % and Azoxystrobin+ difenaconazole@0.1% treated seeds and spraying of same fungicide in same concentration after 45 days of sowing were reported no seedling blight infection and minimum incidence of root rot and percent disease index (PDI) of stem rot was reported as compared to control. It was followed by jute seed treatment with Carbendazim and spraying of same fungicide after 45 days of sowing. The highest yield (28.17 q/ha) was observed in the Tebuconazole treatment of seed and their foliar spraying after 45 days of sowing.

Keywords: *Macrophomina phaseolina*, Fungicide, Jute, Stem rot, Root rot, Disease Incidence, Yield

THE WAYS OF ACHIEVE THE TARGET OF DOUBLING OF FARMER'S INCOME BY 2021-2022

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ABSTRACT

Agriculture is a prime source in Indian country, more than 58% of the rural people depending on agriculture and their related activities of cattle management, fisheries, agro-forestry and their related by products. According to Malhotra (2017) ways of increasing farmers' income are achieving productivity led growth in crop production modern tools of science such as biotechnology can play critical role in increasing crop yields, nutritional quality, tolerance to biotic and abiotic stresses. Enhancing seed availability for adoption of high yielding varieties and hybrids are technological changes in seed production, techniques for production of hybrid seeds. Integrated Farming system envisages the integration of agroforestry, horticulture, dairy, sheep and goat rearing, fishery, poultry, pigeon, biogas, mushroom, sericulture and by-product utilization of crops with the main goal of increasing the income. Water use technology for high efficiency, it is imperative to manage the water by posing questions of when, where and how to use this resource to draw maximum efficiency and productivity. In Budget 2016, Rs 5717 crore was allocated under PMKSY, of which Rs 2340 crore was allocated to micro irrigation. e-NAM addresses the challenges by creating a unified market through online trading platform, both, at State and National level and promotes uniformity, streamlining of procedures across the integrated markets, removes information asymmetry between buyers and sellers. We need to globally position Indian food and agri produce such as North Eastern region as Organic Zone, Ratnagiri Mangoes, Tea of Darjeeling, Soybean of Indore and Nilgiris and so on. Reducing post harvest losses a lot more emphasis needs to be given to post harvest management of fruits and vegetables. In order to make horticulture a viable enterprise, value addition is essential. Covering risk through crop insurance will bring stability in farm income for farmers.

AGROFORESTRY: A SUSTAINABLE FARMING APPROACH

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ABSTRACT

Agroforestry rehearses in Madhya Pradesh (MP), India existed in the early stage times, which can be proven practically in each locale of the state; in which, the speed of logical incorporation in agroforestry and its extension is quite slow. In Madhya Pradesh, agroforestry is being drilled in practically every region of the state as traditional agroforestry since days immemorial and the extension of agroforestry practices is slow in a large portion of the regions. Generally, trees like teak, mahuwa, jamun, mango etc. The ecosystem services generated from agroforestry adoption will help ameliorate the micro climate of farmlands to promote climate-resilient crops. These agroforestry will be an effective tool and system for climate mitigation and adaption mechanism to counter climate change and sink for greenhouse gases. Deductively talking, agroforestry is gotten from environment and is one of the three principle land-use sciences, the other two being agriculture and forestry. Agroforestry contrasts from the last two administrators by setting an accentuation on joining of and communications among a mix of components instead of only focusing on every component separately. There is absence of need and restricted work has been done identified with agroforestry practices, potentially because of the presence of large natural forest area in the state. Madhya Pradesh Forest and Agriculture Department, and NGOs in collaboration with private wood-based industries are promoting agroforestry and farm forestry at a large scale in the state.

Keywords: Agroforestry, Climate mitigation, Wood-based industries

STUDY OF PLANT PARASITIC NEMATODES ASSOCIATED WITH CAULIFLOWER AND EVALUATION OF BIO CONTROL AGENTS AGAINST MAJOR PLANT PARASITIC NEMATODE IN CONCERN WITH YIELD LOSS

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ABSTRACT

Survey was conducted in Theni, Krishnagiri, Erode, The Nilgiris and Coimbatore districts of Tamil Nadu to explore the plant parasitic nematodes associated with Cauliflower. A total of sixty samples were collected from cabbage varieties at a depth of 10 -15 cm. The survey results revealed that, the root knot nematode *Meloidogyne incognita,* lesion nematode *Pratylenchus penetrans*, spiral nematode *Helicotylenchus dihystera*, lance nematode *Hoplolaimus indicus*, dagger nematode *Xiphinema americanum* and *Tylenchus filiformis* were found in the samples. The root knot nematode, *Meloidogyne incognita* was most frequently occurred in all the districts and the incidence of damage was more in Krishnagiri followed by The Nilgiris and Coimbatore districts. The molecular studies found that PCR with *M. incognita* species specific universal primers produced a single band of 560 bp for Cauliflower populations and ITS rDNA were successfully sequenced. The accession numbers were obtained Cauliflower isolate (MK828107) after storing of the sequences in to NCBI Gene Bank. Soil drenching with liquid formulation of *P. lilacinum* (IIHR) @ 5 ml/ lit was found effective in enhancing the plant growth parameters and significantly reduced the soil and root population of *M. incognita* on Cauliflower.

Keywords: Plant parasitic Nematodes (PPN), survey, Cauliflower, *M. incognita*

THE LIVELIHOOD SECURITY OF CASSAVA FARMERS IN HILL AREAS OF WESTERN TAMIL NADU

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ABSTRACT

The present study is concerned with the cassava production system and livelihood security of farmers in hill areas of western Tamil Nadu. The general objective of this study is to assess economics of cassava production and the livelihood security of farmers in the selected areas. Salem and Namakkal districts were purposively selected since these are the major cassava growing districts of western Tamil Nadu. A list of cassava cultivators was obtained from Village Administrator Officers of the selected villages. From the list, 30 farmers were selected randomly from each villages. Thus the total sample size is 180. The methodology used for the study was Gini coefficient, Livelihood Security index, Composite index and Tobit model. The results of Gini coefficient of Kalvarayan and Kolli hills were 0.56 and 0.66 respectively. It is evident that income inequality was higher in Kolli hills when compared to that of Kalvarayan hills. The results of livelihood security index revealed that the overall livelihood security of both Kalvarayan and Kolli hills was just around 50 per cent, indicating that welfare of the cassava farmers were under deprived situation. The Tobit analysis revealed that only education level, farm size and annual income are positively significant in case of Kalvarayan hills. While in case of Kolli hills, age, education level, farming experience, farm size and annual income are positively significant.

PARTHENIUM HYSTEROPHORUS GROWTH AND POST EMERGENCE HERBICIDES EFFICACY ON CLIMATE CHANGE

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ABSTRACT

Changes in the climate, specifically rising temperature, change in atmospheric carbon dioxide and rainfall pattern can alter the growth and development of weedy plants. These climate changes also alter the herbicide efficacy, crop-weed interaction, and weed management. The objectives of this research were to quantify the impact of elevated temperature and moisture stress on different growth parameters and post emergence herbicide efficacy of *Parthenium hysterophorus*. *P.hysterophorus* is a problematic weed in agronomic and horticultural crops worldwide. Post emergence herbicide 2, 4-D (selective herbicide), and glyphosate (non-selective) controls in *P.hysterophorus. P.hysterophorus* plant height (15DAS, 30DAS, 45DAS), dry weight (20DAS, 40DAS, 60DAS) recorded maximum at elevated temperature +4^{o}C and excess moisture. The minimum plant height and dry weight recorded at ambient temperature and drought. *P.hysterophorus* reproduction capacity highest elevated temperature +2^{o}C and excess moisture and lowest at elevated temperature +4^{o}C and drought. The efficacy of herbicide was increased with elevated temperature +4^{o}C and excess moisture and herbicide efficacy was reduced at ambient temperature and drought. Either temperature or different moisture regimes affected herbicide absorption into the leaf. The translocation of herbicide was slightly reduced for closer stomata in drought conditions reduced the herbicide efficacy on *P.hysterophorus.* Although the weed-grown under elevated temperature and excess moisture taller than the ambient and drought condition. However, the weed flower emergence and seed maturity earlier at elevated temperature and drought condition compared to ambient temperature and excess moisture.

Key words*: Elevated temperature, different moisture regimes, weed growth, herbicide efficacy*.

FIXATION OF DORMANCY DURATION IN LANDRACES OF NUTRI-CEREALS OF TAMIL NADU

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ABSTRACT

The minor millets or small millets have been renamed as “Nutri-cereals” in India. Dormancy is a form of developmental arrest and mechanism by which seeds maintain their viability in unfavourable conditions. It is also an adaptive trait that promotes the survival of many organisms. In spite of this advantage, dormancy creates problems for seed analysts and seed producers, especially when the germination per cent of seed lot must be determined in a few weeks after harvesting. Knowledge on the duration of seed dormancy is very much useful to the farmers who take up seed production or crop production immediately after harvest. Understanding the mechanism, nature of dormancy will help the scientists to find out cost effective dormancy breaking methods. The existence of dormancy was found during seed development and maturation which was not yet reported in traditional nutri-cereals. In the present investigation, the seeds of twelve nutri cereals varieties were after harvested seeds did not germinate which indicates the occurrence of dormancy. To predict the duration of dormancy the germination test was conducted with freshly harvested nutri cereals varieties and the germination was noted at five days intervals until the seeds recorded germination above Indian Minimum Seed Certification Standards (IMSCS) of 75 % for nutri cereals. The finger millet, foxtail millet, barnyard millet, little millet, proso millet and kodo millet exhibited dormancy up to 35, 30, 30, 40, 5 and 45 days after harvest respectively. In this information very useful for farmers, seed analysts and seed production programmes.

STABLE BOUNDARY LAYER METEOROLOGY FOR CROP GROWTH

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ABSTRACT

The atmospheric boundary layer over land experiences a clear diurnal cycle driven by that of the incoming solar radiation. During the evening transition period, the earth's surface radiation budget turns negative due to longwave radiative loss and so the surface cools to a temperature below that of the air above. Consequently, the potential temperature increases with height, producing a stable boundary layer (SBL). SBLs prevail at night, but also during daytime in winter in mid-latitudes, in polar regions, and during daytime over irrigated regions with advection. The SBL is governed by a multiplicity of processes such as turbulence, radiative cooling, the interaction with the land surface, gravity waves, katabatic flows, fog and dew formation. Despite extensive earlier research, these processes and their interactions are not sufficiently understood, primarily because of their diversity and their general non-stationarity, which prevent an unambiguous interpretation of observation. This ambiguity is a major obstacle to the development of model parameterizations.

Keywords: Radiation, dew formation, boundary layer interaction, transition period

STUDY ON HETEROSIS BREEDING FOR BIOMETRICAL AND QUALITY TRAITS IN BRINJAL (*SOLANUM MELONGENA* L.)

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ABSTRACT

Throughout the last century, Brinjal breeding has been based on various standard methods, which has ultimately resulted in the development of improved brinjal cultivars and hybrids having high quality and yield. In the present study, consisting of 6 diversified genotypes of brinjal along with their hybrids and one standard check were evaluated during *kharif* season under randomized block design with two replications. Data on quantitative characters were recorded and per cent better-parent and standard heterosis were determined. Significant levels of heterosis were detected for all the traits studied. Pronounced heterosis over standard check was observed for Plant height **22.49 per cent in Seetipulam Local x Sevathampatti Local**, number of branches per plant in **Spiny Local x Sevathampatti Local (46.97 per cent)**, fruit yield per plant in **Sevathampatti Local x Spiny Local** (34.57 per cent) and number of fruits per plant fruit in **Spiny Local x Manaparai Local** (36.68 per cent). The crosses **the highest negative and significant heterosis was exhibited by the hybrids Sevathampatti Local x Seetipulam Local and Seetipulam Local x Sevathampatti Local (-10.06 per cent)** over standard check for earliness (days to first flowering and days to first harvesting). In this study **Seetipulam Local x Sevathampatti Local** found superior for most of the characters (earliness and yield per plant) and it can be commercially exploited after assessing their stability.

Keywords: Heterosis, brinjal, better parent, standard check, earliness, yield

HORTI- EXTENSION A NEED FOR DOUBLING THE INCOME OF FARMERS

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ABSTRACT

In developing countries such as India, public spending on agriculture is one of the most important government instruments for promoting economic growth and alleviating poverty in rural areas. Amongst various types of government spending for agriculture and allied, horti-extension system is said to be one of the most critical for promoting farmers income. Horticultural Research and extension education is found to be one of the most critical for promoting farm yields, which contributes towards augmenting incomes of peasantry and thus reducing rural poverty. India spends about 0.7 percent of its Agricultural-GDP on Agri-Research, Education extension and Training together, of which 0.54 percent goes for research and education alone while 0.16 percent is allocated to Extension and Training. Within the expenditure incurred on extension and training, almost two-thirds goes to crop husbandry and 10 percent to livestock, despite the fact that livestock sector contributed 26 percent of value of output of agriculture and allied activities. The increasing global tilt towards technology and digitization compounded with sustainability and resource management has widened the definition of extension from a traditional focus on increasing yields via technology transfers and adoption, the extension system has over the recent years embraced a more decentralized, participatory, and a demand- driven approach. Despite this, the effectiveness of the extension education system of technology dissemination to deliver value to small and marginal Indian farmers is impaired by constraints and challenges in the form of capacity, accountability and quality. A well spread horti- extension system may be a game changer in doubling the farmers income. Extension for Horticultural Technologies and advisories are needed on time, information related to input supply, market price, transport facilities and relation with stakeholder.

Keywords: Extension education, Demand- driven, Income, Farmers, Dissemination.

MICROBIAL ANALYSIS OF MANUFACTURING FUNCTIONAL KALAKAND BY USING INULIN AND WHEATGRASS POWDER

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ABSTRACT

Kalakand is a traditional milk product made by heating milk and adding sugar and coagulant as needed. Despite the fact that both types of milk had the same nutritional content, Kalakand made from cow milk and acidic milk was shown to have lesser acceptance than Kalakand made from buffalo milk. Danedar Khoa is used to make traditional Kalakand, and buffalo milk is favored over cow milk due to its higher fat content. It's also critical to utilize the proper amount of citric acid and sugar in the mix, as these ingredients have a significant impact on the end product's texture and flavor. The purpose of this study was to see how inulin and wheatgrass powder affected microbiological analyses in kalakand. In this study, 1.0 percent inulin powder was blended with 4 percent, 6 percent, and 8 percent wheatgrass powder in the O_a, O_b, and O_c treatments, with powdered sugar added to the Kalakand preparation. The O_d, O_e, and Of treatments used 2.0 percent inulin powder with 4%, 6%, and 8% wheatgrass powder, respectively; the O_g, Oh, and Oi treatments used 3.0% inulin powder with 4%, 6%, and 8% wheatgrass powder, respectively; and the O_j, O_k, and O_l treatments used 4.0 percent inulin powder with 4%, 6%, and 8% wheatgrass powder, respectively. Control (O_0) has an average value of 8.12. The above table also shows that treatment combinations (O_b) and (O_0) had the highest and lowest Standard Plate Count (105 cfu/g) compared to the other treatments, with control (O_0) having the mean value of 2.95. The above table also shows that treatment combinations (O_d) and (O_0) had the highest and lowest yeast and mold (cfu/g) concentration, respectively, compared to the other treatments.

Keywords: Microbial analysis, standard plate count, yeast and mold count, coliform, wheatgrass Powder, Inulin, and Milk products.

POLYHYDROXYALKANOATE (PHA)- A GREEN PLASTIC OF ENVIRONMENTAL INNOVATION

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ABSTRACT

In the world of advancements today, almost every product is of some kind of polymer. The dependence of plastic materials in the 21st Century is such that it becomes difficult to describe a daily situation in which an object made wholly or partly of plastic is not present. Petrochemicals are used for the production of synthetic plastic. These conventional materials, by their nature, are stable from the chemical point of view, which means they remain unchanged for long periods of time in the environment without degradation. For this reason, it is necessary to develop lines of research to obtain new materials capable of replacing them, via the production of bioplastics. There is a large family of compounds intracellularly accumulated in stationary phase by bacterial species up to 90% inside the cell to serve as energy reserve materials. These materials have physico-chemical properties similar to those of conventional petrochemical based plastics.Among these new materials stand out polyhydroxyalkanoates (PHA), plastic biopolymers produced by bacteria. PHAs are linear polymers of (R)-3-hydroxy acids and produced mainly by species of *Ralstonia*, *Azotobacter, Bacillus* and *Pseudomonas* where carbon source is rich. PHAs can be produced by bacteria on inexpensive substrates such as whey, banana peel, whey and pineapple pomace, some of which are considered as agro industrial waste. PHA is present intracellularly in bacterial cell and extracted using solvents such as acetone, ethanol and chloroform. Synthetic plastic is made biodegradable by incorporation of PHA at various proportions. PHA based plastics are recyclable, natural materials and can be easily degraded to carbondioxide and water by natural soil or aquatic s microflora.

KNOWLEDGE AND UTILISATION PATTERN OF M-KISAN PORTAL IN EMPOWERING FARMERS OF NAGARKURNOOL DISTRICT OF TELANGANA

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ABSTRACT

This study was conducted to know the knowledge and utilisation pattern of m-Kisan Portal by farmers of Nagarkurnool district of Telangana. Among the various projects in operation, m-Kisan Portal was selected for the study. Twelve respondents were selected randomly from each village that constituted 120 respondents for the study. An effort was made to study the knowledge of farmers on m-kisan. The study found that considerable number of farmers (63.34 per cent) had medium to high level of knowledge on m-kisan project. Most of the farmers had medium to high knowledge about them. About one third of farmers were having low knowledge of ICT projects who need special attention to make them well informed of functioning of ICT projects. In the era of market driven agriculture, farmer will have relative advantage in the market economy if they know right information at right time, which is only possible through ICTs. It was observed that out of 120 respondents more than two-fifth (45.00 per cent) of farmers were utilising services with 5.83 per cent, 17.50 per cent and 21.67 per cent were using it weekly once, monthly once and whenever needed respectively. Low utilisation is because of poor awareness among farmers and lack of timely and relevant advisories. Further, the study also revealed that little more than one-third of the farmers (37.50 per cent) were utilising services for information regarding crop protection followed by 31.66 per cent for cultivation practices and weather information, 30.83 per cent for market prices and 25.83 per cent for quality inputs. Whereas 21.66 per cent, 20.00 per cent, 15.83 per cent and 13.33 per cent were utilizing m-Kisan for irrigation practices, livestock, alternate crops and post-harvest practices information respectively. From this study it was found that m-Kisan Portal utlisation among farmers usage was less. The reasons for this pattern may be because farmers were interested in getting information which need regular update like crop protection practices, crop production and weather information.

Keywords: ICTs, information technology, utilisation pattern, m-Kisan

CROP GEOMETRY AND NITROGEN MANAGEMENT STRATEGIES FOR EXTRA EARLY RICE VARIETY (ADT 48) IN IMPROVING YIELD UNDER CHANGING CLIMATE

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ABSTRACT

The field experiment was conducted at Agricultural College and Research Institute, Madurai, Tamil Nadu, India, during 2016 - 2017 to study the effect of crop geometry and nitrogen management on growth and yield of extra early rice (ADT 48). The Factor I comprised of four crop geometry *viz.,* 15 x 5 cm, 15 x 10 cm, 15 x 15 cm and 20 x 10 cm, while, Factor II consisted of six N levels and splits (100 kg N ha^{-1} and 120 kg N ha^{-1} each level with three different splits). The experiment was laid out in factorial randomized block design (FRBD) with three replications. Results of the study revealed that, competition between plants was clearly noticed under closer spacing of 15 x 5 cm which resulted in lesser number of primary, secondary and tertiary tillers. Crop geometry of 15 x 10 cm and 20 x 10 cm along with application of 120 kg N ha^{-1} with four splits as 20:40:40:20 kg during basal, AT, PI and flowering stages registered maximum number of primary (8.05 $hill^{-1}$), secondary (10.83 $hill^{-1}$) and tertiary tillers (3.66 $hill^{-1}$), higher dry matter production (13108 kg ha^{-1}), panicles (512 m^{-2}) and grain yield (5860 kg ha^{-1}) in ADT(R) 48. The present investigation clearly indicated that, self-thinning was observed at closer spacing of 15 x 5 cm, whereas, the population reduction was marginal at wider spacing. Among the crop geometry, self-thinning and natural drying was marginal in 15 x 10 cm, 15 x 15 cm and 20 x 10 cm spacing. Crop geometry of 15 x 10 cm (or) 20 x 10 cm with application of nitrogen at 120 kg N ha^{-1} (four splits @ 20:40:40:20 kg during basal, AT, PI and flowering) may be recommended for getting maximum yield and economic return in extra early rice, ADT 48.

Keywords: Extra early rice, Drought avoidance, Split dose of nitrogen, Tillers, Yield

CHANGES IN SOIL PHYSICO-CHEMICAL AND CHEMICAL PROPERTIES UNDER DIFFERENT CROPPING SYSTEMS IN AN *INCEPTISOL*

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ABSTRACT

Cropping system is an important component of a farming system representing a cropping pattern adopted on a farm, which is supposed to maintain and enhance soil health. The present study was undertaken in *kharif* and *rabi*, 2019-2020 (after third year) to monitor the changes on soil physico- chemical properties and nutrient status as influenced by different cropping systems in the ongoing long-term field trial initiated during the year 2017-2018, AICRP on IFS unit at an experimental farm located at College of Agriculture, Rajendranagar, Hyderabad on sandy loam soil. The surface soil samples were collected at 0-15 cm depth in various treatments within different cropping systems after harvest of *Kharif* and *Rabi* crops at the completion of third year of the experiment and analysed for soil pH, Electrical conductivity (EC), soil organic carbon (SOC) and nutrient availability *viz*., Nitrogen (N), Phosphorus (P) and Potassium (K) by following standard procedures. The soil was neutral to alkaline (pH 7.81), the N status was low (112 kg ha^{-1}), medium in available P (23.40 kg ha^{-1} P_2O_5), available K status was in medium range (170 kg ha^{-1} K_2O), soil organic carbon (3.9 g kg^{-1}) and electrical conductivity (0.11 dSm^{-1}) were in low range at the initiation of the experiment.

Treatments consist of ten combinations of cropping sequence *viz*., CS_1: Rice – Maize, CS_2: Bt cotton – Fallow, CS_3: Bt cotton + Green gram (1:3) row inter crop – Groundnut, CS_4: Pigeon pea + Green gram (1:3) inter crop – Sesame, CS_5: Maize + Pigeon pea (1:3) row inter crop – Groundnut, CS_6 : Pigeon pea + Groundnut (1:7) row intercrop – Ragi, CS_7: Fodder sorghum + Fodder cowpea (1:2) row inter crop – Horsegram – Sunhemp, CS_8: Fodder maize – Lucerne, CS_9: Sweet corn – Vegetables (Tomato) and CS_{10}: Bhendi – Marigold – Beetroot in RBD design with three replications. The results indicated a positive effect in all the cropping systems on improving SOC and nutrient

availability (N, P, K and S) and maintaining the soil pH and Electrical conductivity (EC) over the initial soil values. It was observed that CS_4: Pigeon pea + Green gram recorded high for SOC (SOC= 4.5 g kg^{-1}), CS_4: Pigeon pea + Greengram – Sesame high for N (N=228.57 kg^{-1}), CS_8: Fodder Maize – Lucerne high for P (P=48.27 kg^{-1}) and CS_1: Rice – Maize high for K and S (K=207.63 kg^{-1}) after third year post-harvest. So, it is evident that inclusion of legume component, fodder crops and cereal crops in the cropping system improved nutrient status in comparison with other cropping system.
Therefore, it is imperative to raise awareness to the farmers to adopt crop diversification on long term experiments to sustain the soil resources under intensive cropping.

KEYWORDS: Cropping, Physico- chemical properties, Chemical properties, *Inceptisol*

ISOLATION, BIOCHEMICAL CHARACTERIZATION, AND IDENTIFICATION OF CHITINASE PRODUCING BACTERIA IN RHIZOSPHERE SOILS OF GROUNDNUT FROM DIFFERENT LOCATIONS OF TAMILNADU

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ABSTRACT

Chitin, a beta 1,4 linked polymer of N-acetyl-D-glucosamine, is one of the most abundant polysaccharides in nature, next to cellulose. Chitinase is a group of enzymes that play a pivotal role in recycling chitin in nature. They are known to perform many biological functions and are produced by organisms such as bacteria, fungi, actinomycetes, insects, and high plants. Chitinase can be classified into two types as endochitinase or exochitinases. Chitinolytic bacteria can degrade chitin by using the chitinase enzyme. In this present study chitinase producing bacterial strains were isolated from the rhizosphere soils of groundnut from different locations of Tamil Nadu. The chitinase-producing bacterial strains were identified as *Bacillus subtilis, Bacillus licheniformis, Bacillus thuringiensis, Bacillus circulans, Stentrophomonas maltophila, Aeromonas puncata, Aeromonas hydrophila, Serratia marcescens, Pseudomonas fluorescence* based on their biochemical characteristics.

Keywords: Chitinolytic bacteria, chitinase, Rhizosphere, and Biochemical Test

ASSESSMENT OF CORRELATION ANALYSIS FOR QUALITY AND PHYSIOLOGICAL TRAITS IN HEAT TOLERANT TOMATO LINES

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ABSTRACT

Correlation coefficients were worked out at phenotypic and genotypic level for eightquality and physiological characters in fifteen heat tolerant lines and five local adaptable varieties of tomato at Vegetable Research Station, Agricultural Research Institute, Rajendranagar, Hyderabadduring *Kharif,* 2014.Correlation analysis results revealed that the fruit yield per plant has positively and significantly correlated with relative water content (0.5470 P, 0.6221 G) while it has significant negative correlation with total soluble solids (-0.5290 P, -0.6977 G) and chlorophyll content (-0.2970 P, -0.3183 G). This could be interpreted on the basis, that there was a strong inherent genotypic relationship between the traits studied, but their phenotypic expression was impeded by influence of environmental factors.

Keywords: Tomato, heat tolerant genotypes, correlation coefficient, quality characters

THREATS OF POLLINATORS AND THEIR CONSERVATION PRACTICES

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ABSTRACT

Pollinators play a key functional role in most terrestrial ecosystems and provide important ecosystem service to maintain wild plant communities and agricultural productivity. The decline in pollinators has been related to anthropogenic disturbances such as habitat loss, alterations in land use, and climate change. The surge of mobile telephony has led to a marked increase in electromagnetic fields in the atmosphere, which may affect pollinators and pollination. Urban intensification, chemicals, climate change all negatively affect pollinators. Maintaining good areas of habitat for pollinators, such as those found in domestic gardens, and improving management approaches in urban green space and highly urbanized areas may benefit pollinator conservation.

FACTOR- PRODUCTION ANALYSIS FOR DOUBLING THE FARMER INCOME

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ABSTRACT

Agriculture sustains livelihood for more than half of India's total population. Doubling farmers' income in such a short period is an overwhelming task for decision makers, scientists and policymakers because of its continued role in employment, income and most importantly in national food security. Doubling farmers' income is possible through increasing total output and better price realization in the market, reduction in production costs,diversification of product, efficient post-harvest management, value addition, etc.extension of Irrigation Facilities coverage of irrigation facilities needs to be extended while ensuring an effective water conservation mechanism. Improve Agricultural Credit An inclusive approach to provision for agricultural credit has to be undertaken to address the issue of skewness in its regional distribution, it said. Land ReformAs the proportion of small and marginal holdings is significantly large, land reform measures like freeing up land markets can help farmers improve their Income. Allied sectors, such as animal husbandry, dairying and fisheries, need to be given a boost to provide an assured secondary source of employment and income, especially for small and marginal farmers. Farm Mechanisation is also a need to address the issue of lower farm mechanisation in India which is only about 40% as compared to about 60% in China and around 75 % in Brazil. Improving Food Processing Sector More focussed attention" is required to be given to the sector due to its significant role in reducing post-harvest losses and creation of an additional market for farm outputs.The food processing sector is growing at an average annual growth rate of more than 5% over the last six years ending 2017-18. Exploring Global Markets is a need to give increased focus on exploring global markets for agricultural commodities to give an additional source of market for the surplus of agricultural produce India currently has. other Issues such as investment in agriculture, insurance coverage, water conservation, improved yields through better farming practices, access to market, availability of institutional credit, increasing the linkages between agricultural and non-agricultural sectors need urgent attention.

EFFECT OF INSECTICIDES ON FORAGING BEHAVIOR OF POLLINATORS

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ABSTRACT

Present study was aimed to highlight the effects of insecticides on foraging behavior of pollinators including honeybees. Many of studies have revealed the anthropogenic activities as threats to pollinators. Exposure to lethal and sub-lethal levels of insecticides can be harmful to pollinators for abnormal foraging activities. The method and timing of application, chemical composition of insecticide can also make a difference in their toxicity to pollinators. Insecticides should be used only on affected plants and only in the late evening when the bees are not active. Insect pest populations can be controlled by crop rotation from year to year, as most pests are uncommon to particular pests. Some insects are beneficial to us indirectly or directly in form biological controllers. Actually some insects help us by eating harmful insects. Beekeepers and gardeners should be careful about the location of the beehive before applying insecticide.

PESTICIDES EXPOSURE SAFETY AND RISK ASSESSMENT INDICATORS

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ABSTRACT

Pesticides are widely used in most sectors of the agricultural production to prevent or reduce losses by pests and thus can improve yield as well as quality of the produce even in terms of cosmetic appeal, which is often important to consumers. Serious concerns have been raised about health risks resulting from occupational exposure and from residues in food and drinking water. Pesticides can also improve the nutritional value of food and sometimes its safety. Regarding the adverse effects on the environment (water, soil, and air contamination from leaching, runoff and spray drift as well as the detrimental effects on wildlife fish plants and other non target organisms).The risks assessment of the impact pesticides either on human health or on the environment is not an easy and particularly accurate processes because of differences in the periods and leaves of exposure, the types of pesticides used, and the environmental characteristics of the areas where pesticides are usually applied. The development of new pesticides with novel modes of action and improved safety profiles, and the improvement of the already used pesticides formulations towards safer formulation (eg. microcapsule suspensions could reduce the adverse effects of farming and particularly the toxic effects of pesticides. The overall optimization of pesticides handling strictly according to the regulations and also considering the public concerns about pesticides residues in food drinking water could contribute to reduction of the adverse effects of pesticides on human health and environment. All these may sound difficult, but seem to be a promising way for sufficient supply of safe food production within a viable agricultural production system.

Key word- Pesticides exposure safety issue.

STUDY ON THE IMPACT OF DETERGENT ON FRESH WATER FISH, *CHANNA PUNCTATUS* AT DISTRICT SULTANPUR (U.P.)

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ABSTRACT

Tide is a detergent which is widely used in household purpose mainly for washing the clothes and as cleaning agent for toilet and floor.some amount of detergent goes into river, ponds etc. through drainage system. They gradually accumulate in the water bodies and effect the flora and fauna of aquatic ecosystem .Aim of this study was to observe acute toxicity and behavioural changes of this detergent on the fresh water fish *Channa punctatus*.The fish were exposed to different concentration 30ml/L, 50ml/L, 70ml/L and 100ml/L of detergent Tide. The result of the present study indicates that as the concentration of detergent is increased ,the frequent surfacing, opercular movement, jerky movement, erratic swimming, convolution and body embalancing is increased in different manner. Within 24 hours at 100ml/L, 100% mortality takes place. at higher concentration all the fish staying on bottom After few hours.

The LC50 values for 24,48,72,96 and 120 Hr and its 95% confidence limit were determined by graphic method in *Channa punctatus* given by Litehfield and Wilcoxon (1949).The results of the present study indicates that detergent Tide has highly toxic effects on the fish *Channa punctatus.*

EFFECT OF IRON ON GROWTH, YIELD AND YIELD ATTRIBUTING PARAMETERS OF GROUNDNUT (*ARACHIS HYPOGAEA* L.) UNDER HYPER ARID PARTIALLY IRRIGATED ZONE OF RAJASTHAN

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ABSTRACT

Oilseeds crops have major role in Indian economy next to cereals. Among the oilseed crops, groundnut is an important edible oilseed crop of India. It is a major oil seed crop which ranks 12th position among the oil crops of the world. The district productivity is higher than the state average productivity, But the potential yield of groundnut varieties recorded on the research station was ranges between 2800 to 3500 Kg ha^{-1}. This means that the groundnut crop has still potentiality to increase the productivity. One of the major constraints for low yield of groundnut relates to deficiency of micronutrients. The Krishi Vigyan Kendra (KVK)-Bikaner-II has conducted a on farm trail on Effect of iron on growth, yield and yield attributing parameters of Groundnut (*Arachis hypogaea* L.) under Hyper Arid Partially Irrigated Zone of Rajasthan" to maximize the yield of groundnut. Groundnut yield and yield components viz. pods/plant, kernel/pod and yield/ha was influenced significantly by iron application. Data revels that average maximum number of pods/plant (45.0), no of kernel/pod (1.96) and yield (27.13 q/ha) was recorded with two foliar application of ferrous sulphate @ 0.5% + 0.1% citric acid at 45 and 60 days after sowing along with recommended dose of fertilizers. The application of iron gave average yield enhancement to the tune of 18.73 %, over farmers practice. The average highest gross return (119642 ₹/ha), net return (88569 ₹/ha) and B:C ratio (3.83) was also observed in treatment T_2.

KeyWords: Groundnut, Micronutrients (iron), pod yield, yield and Economics

IMPACT ASSESSMENT OF FRONT LINE DEMONSTRATION ON THE YIELD OF ONION (*ALLIUM CEPA* L.) UNDER HYPER ARID PARTIALLY IRRIGATED ZONE OF RAJASTHAN

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ABSTRACT

Front line demonstration is one of the key extension tool for transfer of technology at Grass root level that directly impact the horizontal spread of technology. Onion is extremely important vegetable crop not only for internal consumption but also as highest foreign exchange earner among the fruits and vegetables. Krishi Vigyan Kendra, Bikaner-II has conducted 30 demonstrations in farmers' field at Chhatargarh villages of Bikaner district during Rabi 2018-19 and 2019-20 to enhance the yield of onion through improved production technology. From the conducted demonstrations, it was revealed that, the improved variety (NHRDF Red-4) of onion recorded average higher yield of 285.0 q/ha as compared to average local check (238.5 q/ha). The average per cent increase in yield over farmer practices was 19.49%. The average technological gap (65.0 q/ha), extension gap (46.5 q/ha) and technology index (18.57%) was recorded. The economics of data indicated that an average gross return of (2,28,000 ₹/ha), net returns (1,72,500 ₹/ha) and benefit cost ratio (4.11) was recorded in demonstrations as compared to local check where, gross return (1,90,800 ₹/ha), net returns (1,30,685 ₹/ha) and benefit cost ratio (3.17) recorded.

Keywords: Onion, technology gap, technology index, extension gap, economics.

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ABSTRACT

Oilseeds crops have major role in Indian economy next to cereals. Among the oilseed crops, groundnut is an important edible oilseed crop of India. It is a major oil seed crop which ranks 12th position among the oil crops of the world. The district productivity is higher than the state average productivity, But the potential yield of groundnut varieties recorded on the research station was ranges between 2800 to 3500 Kg ha^{-1}. This means that the groundnut crop has still potentiality to increase the productivity. One of the major constraints for low yield of groundnut relates to deficiency of micronutrients. The Krishi Vigyan Kendra (KVK)-Bikaner-II has conducted a on farm trail on Effect of iron on growth, yield and yield attributing parameters of Groundnut (*Arachis hypogaea* L.) under Hyper Arid Partially Irrigated Zone of Rajasthan" to maximize the yield of groundnut. Groundnut yield and yield components viz. pods/plant, kernel/pod and yield/ha was influenced significantly by iron application. Data revels that average maximum number of pods/plant (45.0), no of kernel/pod (1.96) and yield (27.13 q/ha) was recorded with two foliar application of ferrous sulphate @ 0.5% + 0.1% citric acid at 45 and 60 days after sowing along with recommended dose of fertilizers. The application of iron gave average yield enhancement to the tune of 18.73 %, over farmers practice. The average highest gross return (119642 ₹/ha), net return (88569 ₹/ha) and B:C ratio (3.83) was also observed in treatment T_2.

KeyWords: Groundnut, Micronutrients (iron), pod yield, yield and Economics

VARIOUS WEED MANAGEMENT PRACTICES ON YIELD AND YIELD ATTRIBUTING CHARACTERS IN TRANSPLANTED RICE.

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ABSTRACT

Rice belongs to the genus Oryza in grass family Gramineae and origin – Indo-Burma Region. Oryza sativa is distributed all over the world with a high concentration in Asia. Rice is the staple food for over half of the world's population. It holds the key to our country's ability to produce enough food for our people. It is primarily a high energy or high calorific food. Weed vegetation in crops is the result of cropping, cropping season, topography of land and management practices like time and degree of land preparation, plant spacing, time of planting date, fertilizer management, weeding method and intensities. Sustainable agricultural productivity might be achieved through a wise and balanced use of herbicides. Weed management is the botanical component of pest control, which attempts to stop weeds especially noxious weeds from competing with desired flora and fauna including domesticated plants and livestock and in natural settings preventing non-native species competing with native species. Weeds compete with productive crops or pasture, they can be poisonous, distasteful, produce burrs, thorns or otherwise interfere with the use and management of desirable plants by contaminating harvests. Thus weed is one of the limiting factors for successful rice production. Among various weed management and cultural practices, plant spacing play a vital role in the production and yield of rice through controlling the weeds as well as making the environment favourable for rice production.

INTEGRATED PEST MANAGEMENT AND ITS APPLICATION IN RICE

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Rice is the staple food crop for more than half of the world's population though it's cultivation is done in only 11% of the world's cultivable land. Several pests attack rice in different ways at different stages. Increased reliance on pesticides for pest control is found to be unsustainable and cost-ineffective. So, Integrated Pest Management (IPM) has been introduced as the best alternative for pest management in rice. IPM in rice helps to minimize risks to the environment and human health. Rice IPM uses the combination of cultural, use of resistant varieties, biological, physical, and chemical practices for pest control. Farmers Field School has been the most effective way to increase IPM knowledge among rice farmers. Such training helps to facilitate the farmers to apply ecologically informed farming practices. There are several challenges regarding the implementation of rice IPM. To increase IPM implementation in rice emphasis should be given on farmers' training and education. The role of government is also vital for the successful implementation of IPM.

ROLE OF MASS MEDIA IN GENDER SENSITIZATION

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ABSTRACT

Media's role in a democracy is to bring mass awareness on political, social and economic issues. However, media channels tend to give preference to political and economic news items over social issues, especially the issue of women. This has lead to the issues on women take a backseat Media can play a significant role in sensitizing the society about gender issues. There is growing global awareness that gender equality is the cornerstone of inclusive growth. Providing equal access to public and economic opportunities to both men and women is vital to accomplishing a more sustainable economy and improving national well-being. Failing to do so means losing the human capital of approximately half the citizenry, thus heavily compromising countries' full potential for growth and national development. Gender is a construct that owes its creation to a number of social institutions. Some of these include family, educational institutions, judiciary, religion, etc.

The very aim of gender sensitization programmes is to bring a definite orientation in the attitude, feelings, practices and approach of individuals concerning gender. Gender sensitization process generally involves four stages; change in perception, recognition, accommodation and action.

All forms of media must promote positive gender role models and equitable gender norms through movies, shows, documentaries, articles, advertisement, etc. They can communicate to the masses and have an impact due to the depth of messaging and the reach.

CLIMATE SMART AGRICULTURE: AN ALTERNATIVE OPTION FOR SUSTAINABLE AGRICULTURE

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ABSTRACT

Change is nature's law, it's inevitable, if it is by the virtue of the nature is welcome. World climate is changing day by day, it affects the life cycles on the earth. Agriculture is also prone to the climate change which is directly and indirectly affecting the farming practices and crop yield. Agriculture field faces many problems due to climate change as well as population; it will be 9.1 billion on 2050.To feed this population we need to take sustainable approach. As, food and agriculture could be game changers in 2030. Climate Smart Agriculture is agriculture that sustainably increase productivity, resilience, reduces Greenhouse Gases, enhances the achievement of national food security and development goals. Climate Smart Agriculture adopts many practices and technologies to make agriculture production system most efficient and resilience. Climate smart agriculture is effective but difficult to adapt immediately. It requires special skill, knowledge, collaboration of people and requires several years for proper implementation.

KEYWORDS: Climate smart agriculture, Climate change, Production, Resilience.

INTEGRATED USE OF ORGANIC-CARBON SOURCES, CHEMICAL AND BIOFERTILIZERS IS KEY FOR SUSTAINABLE SOIL AND CROP MANAGEMENT

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ABSTRACT

Stable and productive soils having sufficient amount of organic matter affect the resilience of farms to cope with the effects of climate change. Long-term field experiments on field crops e.g. cereals crops (rice, wheat & maize), oilseed crops (canola, sunflower & soybean) and grain legumes/pulses (chickpea, Mungbean & mash bean) confirmed a significant increase in yield per unit area with integrated nutrients management under arid and semiarid climates. The combined application of plant nutrients especially major nutrients (nitrogen, phosphorus and potash) along with different organic carbon sources (farmyard manure; animal manures: poultry manure, cattle manure, sheep manure, goat manure etc.; plant residues: onion residues, garlic residues, wheat residues, rice residues, chickpea residues, fababean residues, canola residues etc.) into the soil had significantly improved crop growth and increased productivity and smallholder's income. Under arid and semiarid conditions, the application of beneficial microbes (Biofertilizers) was found beneficial in terms of higher nutrients use efficiencies, yield and profitability.

KEYWORDS: Organic, FYM, Productivity, Residues,Profitability.

RESOURCE CONSERVATION TECHNOLOGY- BENEFICIAL FOR PROGRESSIVE FARMING COMMUNITY

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ABSTRACT

Zero till is very valuable and widely acceptable technology. These technologies save the fuel, time saving, seed, water, fertilizer and manpower. To increase the productivity of wheat range for 2-5 quintal/ha, saving of fuel consumption is 2.65 to 3.75 litre/ha also up to reduce the cost of seed 33% and 10-40% less irrigation of water requirement over to conventional practices up to 2-5 quantal/ha increase the yield over to conventional tillage. Zero till method promotes to save input cost in rice wheat cropping pattern before sowing of wheat field preparation is essential in rice-wheat cropping system. The cost of field preparation varies for Rs 1500-2500 per hectare. These technologies provide the opportunity to save input, time, irrigation etc. There is no risk in the adoption of Zero Tillage Technology.

KEYWORDS: Zero till,Technology,productivity,input cost.

SUSTAINABLE AGRICULTURE: A HEALTHY VISION TOWARDS FOOD AND SOIL SECURITY

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ABSTRACT

Food security is a tiresome process, subject to risks of different natures. The risks can affect directly the various dimensions such as production of farming, food access usage, and stability. According to the United Nations, still more than 836 million people in the globe are living in utmost poverty. Progress is being continued combat against hunger, yet an unacceptably large number of people still, lack the food, and they need an active, healthy, and wealthy life. The recent and latest available estimates indicate that about 795 million people in the world just over one in nine were undernourished in 2014–2016. The share of undernourished people in the population or the prevalence of undernourishment has decreased from 18.6% in 1990–1992 to 10.9% in 2014–2016, reflecting fewer undernourished people in a growing world population. Changes in large populous countries, notably China and India, play a large part in explaining the overall hunger reduction trends in the developing regions. To meet the global population demand, sustainable agriculture is the immediate solution to produce increasing productivity.

KEYWORDS: Availability, Stability, Access, and utilization.

EFFECT OF PLANT NUTRIENTS WITH THEIR DIFFERENT DOSES AND MODE OF APPLICATION ON THE INCIDENCE OF MAJOR INSECT PESTS AND THEIR IMPACT ON YIELD OF RICE

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ABSTRACT

Rice (*Oryza sativa* L.) is staple food of Jharkhand, which is grown in different agro-ecological conditions. About a half of a dozen of indirect pest are found responsible for causing loss in yield, ranging from 30 to 35 percent in the state of Jharkhand. Use of chemical insecticides, though highly effective against insect pest species, their usage have several ill effects as well. So use of balanced dose of N,P,K with more emphasis on use of K (Potassium) in three splits can play important role in suppressing the incidence of major insect pest species for sustainable cultivation of rice. Hence, the present field studies was taken to meet the objectives.

A field experiment was conducted to study the effect of plant nutrients (N,P,K) with their different doses and mode of application on the incidence of major prevailing insect pest species and their ultimate impact on yield of rice grains (var. IR-64 Drt-1). It was found that N and K applied both @ 80,40,30 and 120, 60 and 45 Kg/ha in 2 to 3 splits significantly reduced the incidence of maor insect pests viz, YSB, hispa, leaf folder and ear bug which, in turn, could be responsible for more realization of yield of grains of rice as compared to those of basal application of N and K. Application of K @30 and 45 kg/ha applied in soil in 2 to 3 splits resulted to the substantially lesser incidence of all the insect pest species as compared to that with the basal application of K. Basal application of FYM @ 5 t/ha alongwith application of N and K applied @120 and 45 Kg/ha, respectively in their three split doses resulted in almost lower incidence of the pest species with realization of the highest grains yield of 53.5q/ha. Application of 150 percent RDF i.e N,P,K @120, 60 and 45 Kg/ha with N& K applied in 3 splits gave rise to the lowest incidence of all the species with significantly lower yield

(30.40 q/ha). It is interesting to note that the rice plants receiving zero quantity of N,P,K from outside source received the minimum incidence of the pest species probably on account of very poor growth of rice plants with minimum yield of rice (18.20q/ha).

Keywords: Rice, insect pest, pest suppression, judicious use of N,P,K, yield.

CROP RESIDUE MANAGEMENT AND SOIL HEALTH-A SYSTEM ANALYSIS

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ABSRACT

Present- scenario agriculture evolved as we controlled nature to meet our food and fiber needs and to support the increasing population and urbanization of society. In India, 2/3rd of total cultivated land is rainfed which contributes about 44% of the country's food requirement. In such areas crop production becomes relatively difficult due to irregular weather conditions, degraded soil having low inherent fertility and low water holding capacity (WHC). Burning of crop residues has a serious negative impact on human health as well as environmental consequences. It was reported that in - situ crop residue burning in Asian countries accounted for more than one-third of total biomass burning. The particulates (PM) released from such burning, like PM10, PM2.5, and greenhouse gases (GHGs) are also responsible for environmental pollution.

Residues turn as the pool of plant nutrients, prevention of nutrients leaching, increased cation exchange capacity (CEC), provision of amicable environment for biological N-fixation, increase in microbial biomass, and enhanced enzymes activities such as dehydrogenase and alkaline phosphatase. Moreover, residue retention on the soil surface helps in soil moisture conservation by reducing evaporation losses up to 45 mm and increasing water holding capacity by 5- 10% during the wheat growing season. Residue retention also decreases soil temperature due to the shading effect of residues in summer season. It also increases infiltration, reduces the formation of soil crust and runoff.

Some traditional uses for crop stubble are animal fodder, fuel materials, cattle shed bedding, and mulching in soil. A few other options, such as its use as fuel in power plants, utilization in mushroom farming, for the removal of bio-lubricants, in paper and pulp industry, and for biogas generation. Alternate utilizations i.e. gasification as a fuel for boilers, conversion into briquettes, composting in situ, fodder, mushroom

cultivation.etc. The mile stone step to check this stubble burning is to set up alcohol refineries to create sustainable bio-energy from this farm yield residue by employing various models. Sustainable approach i.e., in situ biogas plants can also be employed for the disposal of crop residues, such as straw or stubble, meet the energy and fuel demands of cultivators.

Successful integration of crop residue management strategies into cropping systems requires understanding of how crop residues influence cycling of nutrients from soil and fertilizers, as well as their effects on soil chemical, physical and biological properties, and crop production. Information is needed as to whether crop residues can be removed from cropping systems for alternative uses without detrimental impact on soil properties, productivity and the environment.

RESPONSE OF LENTIL (*LENS CULINARIS*) DEMONSTRATED TECHNOLOGY UNDER CLUSTER FRONT LINE DEMONSTRATION IN SAMASTIPUR, BIHAR

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ABSRACT

The cluster front Line demonstration programme on lentil were carried out 2018-19 and 2019-20 in operational area of Krishi Vigyan Kendra, Birauli, Samastipur with the objective to demonstrate the improved technologies of pulse production potential on farmers field under different farming situations. The plots were selected from different villages/ cluster, each of 0.2-0.4 ha from the district. The variety HUL-57 was used in both the years in the area of 30 ha and 10 ha, respectively. Seed treatment, fertilizers, herbicides, irrigation application and plant protection measures were taken as per improved packages of practices. During the demonstration programme, it was found that the seed yield of lentil was 12.80 q/ha during 2018-19 and 15.85 q/ha during 2019-20 in demonstration field as compared to seed obtained from farmers field 9.97q/ha in 2018-19 and 8.57q/ha in 2019-20 respectively. The technology gap was found to be 7.20 q/ha & 4.15 q/ha and 4.23q/ha & 5.88 q/ha extension gap were found during both the years. The technology index 36% and 20.75% in 2018-19 and 2019-20 respectively. Higher gross return (Rs. 38400/ha and Rs 60230/ha), net return (Rs.13000/ha and Rs 34910/ha) and benefit cost ratio of (1.51 and 2.38) were found in demonstrated field as compared to benefit cost ratio of 1.27 and 1.40 in case of local, check in both the years, respectively. The significant yield is attributed due to introduction of HUL-57, an unexplored and most suited variety for this region in cluster mode with improved packages of practices which facilitated better crop management and enhanced productivity of lentil.

STUDY ON PLANT GROWTH PARAMETERS OF TOMATO AFFECTED BY *RHIZOCTONIA SOLANI*

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ABSTRACT

India is an agriculture based country where two third of its population is directly related to agriculture and its allied science aims at maximum production of plants for food, fiber, building materials, fuels and some essential drugs etc. The impact of plant disease in crop losses and well being of man has been recognized for a long time. Soil-borne diseases are most difficult to control. Elimination of an established soil pathogen by chemicals is costly and sometimes hazardous. . These natural protectants neither affect germination nor organoleptic properties of the produce. The use of higher plants and their extracts to treat infections is an age-old practice. This study was done to investigate the effect of different plant extracts against *Rhizoctonia solani* causing damping-off of tomato. In pot experiment each leaf extract was tested at two concentrations at 40% and 60% as seed treatment along with carbendazim 0.2% against damping-off of tomato under pot condition, the most effective plant extracts was *Lantana camara* against *Rhizoctonia solani.* The extracts of *Lantana camara* showed maximum shoot length (91.70 cm), shoot weight (30.95 g), root length (43.35 cm) and root weight (22.45 g) of tomato plant at 30 DAS and similarly the extracts of *Lantana camara* showed maximum shoot length (112.00 cm), shoot weight (81.95 g), root length (70.50 cm) and root weight (50.00 g) of tomato plant at 45 DAS respectively with increasing concentration like 40% and 60%.

Key words: Plant extracts, *Rhizoctonia solani,* Different concentration and tomato plant growth.

EMPHASIS ON ESSENTIAL PHYSIOLOGICAL TRAITS TO INTEGRATE WITH CONVENTIONAL BREEDING APPROACH AS SELECTION CRITERIA FOR ENHANCEMENT OF YIELD IN WHEAT *(T. AESTIVUM L.)*.

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ABSTRACT

All over the world "Wheat Revolution" was witnessed in mid sixties with introduction of semi dwarf fertilizer responsive high yielding wheat varieties. For almost 3 decades (1971-2000), a turning point has realized in total wheat production and productivity of wheat per unit area. But thereafter, ceiling in wheat productivity of semi dwarf varieties has again surfaced. Since conventional breeding approaches have failed to achieve any breakthrough in productivity of semi dwarf wheat varieties. The most important reason behind ceiling in wheat yield is selection based on yield, while yield itself has no genes, yield is a dependent character & dependent characters are not inherited by genes; basically yield is a conserved form of solar energy. Therefore it has been decided to give emphasis on essential physiological traits to integrate with conventional breeding approach as selection criteria for enhancement in wheat yield per sec. However for physiological traits to integrate with conventional breeding methods, the traits under consideration must meet three conditions which are- (i) the trait under consideration must have genetic variability,(ii) the trait must be highly heritable, (iii) the trait must have positive correlation with yield and yield components.

For this, a field experiment was conducted with 24 semi dwarf varieties during 2 cropping rabi seasons (2009-10 & 2010-2011) at experimental field of department of genetic and plant breeding, SHUATS, Prayagraj to determine genetic variances, heritability and correlation of chlorophyll a, b, grain filling period and leaf nitrogen. Our research investigation confirms that- (i) significant genetic variance exists among chlorophyll a,b, leaf nitrogen, (ii)- physiological traits were found highly heritable, (iii) the physiological traits have significant correlation with yield & yield components. Above said findings indicate that there is great need to give emphasis on physiological traits to integrate with conventional breeding approach as selection criteria for enhancement of yield in wheat *(T.aestivum L.)*.

Key words: *Triticum aestivum L*., physiological traits, conventional breeding and enhancement of yield.

EFFECTIVE UTILIZATION OF FARM PONDS THROUGH INTEGRATION OF FISH CULTURE–POULTRY-HORTICULTURE FOR DOUBLING THE FAMERS INCOME IN SRIKAKULAM DISTRICT OF ANDHRAPRADESH

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ABSTRACT

The fish production from the farm ponds was lower owing to lower technological interventions, the productivity can be improved through integrated fish farming systems (IFFS) with other existing farm components. The study was conducted by Krishi vigyan Kendra, Amadalavalsa, Srikakulam District of Andhra Pradesh. The objective is to evaluate the production and economic parameters of integration of fisheries- poultry- Horticulture in farm ponds (n=3). Fish species were Indian major carps, poultry breeds of Raja Sri, which was dual purpose for meat and egg production and different varieties of horticulture crops Viz. Banana, marigold, vegetables were studied. The production data was collected after 7 months of culture period, and found higher in the integrated system compared to the non-integrated system, farmers practice component wise. Moreover, the integrated system produced, higher plankton availability, and fish biomass than those from the non-integrated farm ponds due to the presence of poultry litter and wastes that as fertilizer. The results of fisheries component, demonstrated increased growth rate of fish (90.22±0.69 g $month^{-1}$), total harvested biomass (988.43±45.10 kg $acre^{-1}$), and net returns (Rs 47784.94 ±4736.02) in IFFS system compared to farmers practice i.e 63.11±7.50 g $month^{-1}$, 677.04±92.30 kg $acre^{-1}$, and Rs 23489±9691.55 respectively. Moreover, the additional income of Rs 11500 was realized from the other components of IFFS i.e poultry birds and horticulture crops. Concluding the economic performance of the system was better than the farmers practice. The diversified products produced in limited area at lower cost are making this system as an sustainable farming system for doubling the farmers income.

Key words: Integrated fish faring systems, biomass, net returns, Sustainability.

STUDY ON EFFECT OF BASIN ENRICHMENT THROUGH DIFFERENT TREATMENT ON THE MICROBIAL POPULATION UNDER ALLEY CROPPING SYSTEM

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ABSTRACT

The potential of nutrient-rich *Leucaena leucocephala* – *Tephrosia* pruned fresh leaves as manure has role in sustaining microbial diversity and crop productivity due to rich nutrient content and biological nitrogen fixation in soils. Alley cropping allows the farmer to effectively use available resources and yield more benefits. Choosing suitable associated crop and mitigating the competition between trees and crops are crucial for designing the alley cropping systems.

With this background, an attempt was made at ICAR-RCER, FSRCHPR, Ranchi (Capital districts of Jharkhand) with the aim of developing agroforestry technologies for the eastern plateau and hills during the year 2018-2019.The study was laid out in Randomized Block Design(RBD) with 11 treatments and 4 replications. Basin enrichment with leafy biomass can be an effective tool for improving soil microbial activity. Before planting crops, the hedges are pruned,and the leaves are added to soil as mulch. Result revealed that the microbial population was significantly affected under different treatments under Alley cropping system. The maximum number of bacterial count was found in soil incorporation of in basin area in all treatment as respect to the alley area. Among the different treatment under basin area maximum bacterial count was observed under soil incorporation of subabul (4.70 x 10^9 cfu / gm soil) with respect to other alley crops *Tephrosia,* Rice bean and Soybean. and least bacterial population was found in the treatment mulching of weeds (2.31 x 10^9 cfu / gm soil). Similarly among the different treatment under basin area maximum fungal colony was observed maximum under soil incorporation of subabul (204 x 10^3 cfu / gm soil) with respect to other alley crops *Tephrosia,* Rice bean and Soybean. and least fungal colony was found in the control (146 x 10^3 cfu / gm soil). It seems that the rate of decomposition and growth of microbial count synchronized best in a treatment which received prunings incorporated under soil basin area as compared to pruning of crops

and used as mulch. Therefore soil enrichment can be done by incorporating pruned leguminous crop for basin enrichment under Alley Cropping System

Keywords: Alley cropping, microbial popuation, soil incorporation, fungal colony**,** Mulching, prunings, Basin enrichment.

IDENTIFICATION OF LINKED SSR MARKER REGULATING THE SEED-SIZE TRAIT IN LENTIL (*LENS CULINARIS* MEDIK.) USING BSA

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ABSTRACT

The market class, cooking time, quality, and milled grain yield are largely influenced by the seed size and shape of the lentil (*Lens culinaris* Medik.); thus, are considered the important quality traits. Large-scale identification and validation of DNA markers linked with seed size QTL(s) across diverse lentil genotypes is still lacking in lentil. In this backdrop, our objective to identify marker(s) linked with seed size trait in RIL ($F_{5:6}$) population using bulked segregant analysis (BSA) approach. The RIL population was developed by crossing two contrasting parents L830 (19.7 g/1000 seeds) and L4602 (43.4 g/1000 seeds) and is consisting of 190 (15.0 to 40.5 g/1000 seeds) lines. The F_2 population showed seed size being regulated as complementary gene action (9:7; χ^2=0.04). A total of 10 extreme phenotype each for seed size (Small seed size vs large seed size) was taken for bulked segregant analysis (BSA) from the RIL. Then nearly 600 SSRs were used for parental polymorphism survey and 25 were found polymorphic. The polymorphic SSRs were used for BSA and PBALC449 was found differentiating the bulks and the parents differing for seed size. Incidentally this marker differentiated the small bulk and the small seeded genotypes only while large seeded genotypes and bulks could not be differentiated when used for the amplification of individual RILs. Then the amplified products (149bp from L4602 and 131bp from L830) of PBALC449 was cloned using pJET1.2 vector and sequenced. The sequences were then BLAST searched with the reference genome and was found amplified from chromosome number 03. Afterwards, nearby region on the chromosome 3 was searched and a few putative genes related with the seed size regulation were identified include ubiquitin carboxyl-terminal hydrolase, E3 ubiquitin ligase, TIFY-like protein, and hexosyltransferase.

STABLE GENOTYPES OF SOYBEAN (*GLYCINE MAX* (L.) MERRILL) FOR JHARKHAND

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ABSTRACT

Twenty genotypes of Soybean were sown at three sowing dates in randomized block design with three replications during Kharif 2018-19. For all the ten characters pooled analysis of variance showed substantial amount of variability for yield and most of the yield contributing characters for each environment except plant height in Environment-II as well as in pooled environment. Genotypes x environment interaction were found significant for pod per plant, seed yield per plant and 100 seed weight (g). The genotypes - environment (linear) mean sum of squares were found significant for all the traits except number of primary branches. Genotypes BSS-2, JS 97-52, RAUS-5 and PS-1347 showed stable performance for yield as well as all the yield related components which could be recommended for commercial cultivation in Jharkhand.

Keywords: Soybean, Genotypes x environment interaction, stable genotype

CONSERVATIONAL TILLAGE AND WEED MANAGEMENT PRACTICES ENHANCE FARMERS INCOME AND SYSTEM PRODUCTIVITY OF RICE–WHEAT CROPPING SYSTEM

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ABSTRACT

An increasing cost of production, declining factor productivity and sustainability in rice-wheat cropping system is forcing the Indian farmers to shift from conventional tillage (CT) practice to conservational tillage (CA) practice for crop cultivation. With all the numerous advantage of CA practice, weed is a major concern restricting the farm productivity and profitability. An integrated approach of weed management with Sesbania co-culture with rice followed by tank-mix application of bispyribac-Na + 2, 4-D effectively reduced the total weed density and dry biomass accumulation and simultaneously increased the rice grain yield and farmers income, whereas, in case of wheat, as compared to CT practice, CA gave ~ 11 % higher grain yield by restricting the growth of weeds. The weed density and dry weight were effectively diminished with pre-mix application of mesosulfuron + idosulfuron in wheat and this pre-mix combination has also significantly increased the wheat grain yield over farmers practice. As compared to sole application, tank-mix or pre-mix application of different herbicides with varied target group of weeds controlled various weed species in a single application. The total system yield of rice-wheat cropping system with CA practice (6.27 t/ha) was higher as compared to CT practice (5.97 t/ha). The sustainable yield index, farmers profit and B: C ratio of the rice-wheat cropping system was in upper side by adopting the CA practice as compared to existing farmers (CT) practice.

Key words: Conservation tillage, Weed Management, Rice-Wheat Cropping System, Sustainable Yield Index

INCOME SUPPORT SCHEMES IN AGRICULTURE: AN OVERVIEW

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ABSTRACT

Income support schemes in Agriculture were introduced in India to augment the income of the farmers and to provide financial assistance to farmers for their initial investment needs. Along with the central government, several states implemented these schemes in order to bring out farmers from farm distress, boost the production and growth of the agriculture sector and to develop the farm economy by providing timely investment support for the purchase of inputs like seeds, fertilizers and for other farm activities. In this paper, an analysis was made on the schemes implemented by both central and seven state governments in India. Telangana was the first state to introduce an investment support scheme (Rythu Bandhu) in 2018 that provides assistance of Rs. 5,000 per acre per season. It covers all the agricultural land holding farmers and tenants are excluded from the scheme. The PM-KISAN a central government scheme introduced on December 2018 also covers all land holding farmers with an incentive of Rs. 6000 in three equal installments per year to procure inputs and other household needs. KALIA scheme implemented by Odisha government covers the small and marginal farmers, tenants and landless labourers providing cash incentive of Rs. 10,000 per annum per farmer family (including PM KISAN) in two installments. The Rythu Bharosa covers all landowners and tenant farmers with an assistance of Rs. 13,500 per annum per farmer family. Similarly Chhattisgarh, Jharkhand, West Bengal and Haryana started RGKNY, Mukhyamantri Krishi Aashirwad Yojana, Krishak Bandhu and Mukhyamantri Parivar Samman Nidhi Yojana respectively. RGKNY covers landowners supporting with an income of Rs. 10, 000 and Rs. 13,000 per acre per annum for paddy and sugarcane farmers, respectively. The number of beneficiaries under each of the income support schemes were presented. The study revealed that the income support schemes implemented both at the central and state levels help the farmers in initial investment on critical inputs in agriculture and augment the income of the beneficiary farmers.

TREND ANALYSIS FOR YIELD OF WHEAT IN DIFFERENT AGRO-CLIMATIC ZONES AND COMPLETE BIHAR.

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ABSTRACT

A Trend analysis was done for wheat yield in three agro-climatic zones *viz.* zone-I, zone-II & zone-III along with the effect of weather parameters ofBihar state was studied in the Department of Stats, Math. & Computer Application, Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar, India in the year 2017-18. The time series data pertaining to yield of wheat in three agro-climatic zones and in whole Bihar collected from the directorate of economics and evaluation department, govt. of Bihar, Patna. Data were collected for the period of 1964-65 to 2015-16.

After study it is noticed that in zone-I the trend value of yield in 1964 is 0.76 t/ ha which is gradually increases and goes upto 2.38 t/ha in 2014. Minimum actual yield in 1996 is 0.5 t/ha whereas maximum actual yield in 2011 is 3.37 t/ha. Overall trend is in increasing order and seems to be almost linear.

For zone-II the trend value of yield in 1964 is 0.71 t/ ha which is gradually increases and goes upto 1.98 t/ha in 2014. Minimum actual yield in 1965 is 0.25 t/ha whereas maximum actual yield in 2013 is 2.78 t/ha. Trend is seems to be linear. In zone-III the minimum trend value of yield in 1964 is 0.51 t/ ha which is gradually increases and goes upto 2.29 t/ha in 2014. Minimum actual yield in 1965 is 0.14 t/ha whereas maximum actual yield in 2012 is 2.89 t/ha. Overall trend is linear.

The trend value of yield in 1964 is 0.65 t/ ha for complete Bihar which is gradually increases and goes upto 2.32 t/ha in 2014. Minimum actual yield in 1966 is 0.45 t/ha whereas maximum actual yield in 2011 is 3.05 t/ha. Overall trend is linear. Also correlation between Year vs. Trend value was tested by Kendall, Spearman& Pearson test. In these cases it has been found that highly significant.

Key Words: Trend analysis, Wheat, Correlation,Yield.

GENETIC VARIABILITY STUDIES FOR TERMINAL HEAT STRESS IN BREAD WHEAT (*TRITICUM AESTIVUM* L.)

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ABSTRACT

An experiment was conducted with 29 bread wheat genotypes in two conditions (i.e. timely and late sown) during rabi 2020-21 at experimental field of PB&G, RPCAU, Pusa to study the genotypic and phenotypic variance, genotypic and phenotypic coefficient of variability, heritability and genetic advance as per cent of mean. Observations were documented for twelve characters. The analysis of variance showed extremely considerable variation across genotypes for all the characters under investigation across both the environments. An estimate of GCV and PCV for all characters studied revealed that the phenotypic coefficient of variation (PCV) was higher than their corresponding genotypic coefficient of variation (GCV) in both the conditions and significant amounts of variation was observed for Characters like plant height, grains per spike and harvest index exhibited high phenotypic and genotypic variance. High heritability coupled with high genetic advance as a percentage of mean was observed for traits like tillers per plant, grains per spike, harvest index and grain yield. The traits with high heritability and high genetic advance as percent of mean may be subjected to mass or progeny or family selection or any selection scheme, aimed at exploiting additive (fixable) genetic variance, a widely adapted genotype can be developed, possessing good quality and high productivity.

Keywords: Heritability, Genetic advance, Terminal heat, wheat.

AEDES AEGYPTI LARVAL INDICES AND RISK FOR DENGUE EPIDEMICS

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ABSTRACT

There are varying ranges of habitats that have different characteristics of water for breeding of mosquito.Dengue is a major global public health problem then and now. Dengue fever and Dengue hemorrhagic fever are disease that is caused by four dengue virus stereotypes called DEN-1,DEN-2,DEN-3 and DEN4.About 50 to 100 million individuals are infected every year ,and in some years as many as 500,000 people have been admitted to hospital .An entomological survey can be carried out at peridomestic area to detect larval breeding sites.Aedes albopictus is prominent species in the container – breeding habitats .In this study ,we can assess the usefulness of larval indices for identifying high- risk areas for dengue virus transmission. We can examine the influence of measurements at different geographic levels ,establish a threshold for epidemics outbreaks, and discuss their utility for community based Aedes control programs.

ANTIFUNGAL, ANTIAFLATOXIGENIC AND ANTIOXIDANT ACTIVITY OF CHEMICALLY CHARACTERIZED *HEDYCHIUM SPICATUM* HAM EX. SM. ESSENTIAL OIL AS A SAFE PRESERVATIVE OF STORED FUNCTIONAL FOOD.

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ABSTRACT

The present study investigates the efficacy of *Hedychium spicatum* Ham ex. Sm. (HSEO) against the growth of the toxigenic strain of *Aspergillus flavus* and aflatoxin B_1 secretion in stored functional foods. Chemical profiling of HSEO through GC-MS analysis exhibited HSEO was identified as Eucalyptol followed by Linalool L, Beta-Eudesmol, Linalyl propionate , Alpha –selinene, Hinesol and Terpinen-4 -ol . HSEO caused complete inhibition of growth and aflatoxin B_1 secretion at 2.6 and 5.04 µL/mL, respectively. Significant inhibition in ergosterol content, leakage of vital cellular ions and disintergration of membrane permeability in HSEO fumigated toxigenic strain of *Aspergillus flavus* cells suggested the fungal plasma membrane as a prime target site for antifungal action. HSEO showed promising free radical quenching activity with IC_{50} value 23.16 µL/mL and remarkable inhibition in lipid peroxidation of stored functional food samples. Moreover, strong *in situ* antiaflatoxigenic efficacy in stored functional foods, non-phytotoxic nature, acceptable sensory characteristics and favorable safety profile (median lethal dose (LD_{50}) value: 5783 .59 µL/Kg) recommends the practical utilization of HSEO as a green preservative to improve the shelf life of stored functional foods from fungal infestation and aflatoxin B_1 contamination including that resistance to synthetic antimicrobials.

Keywords: *Hedychium spicatum* essential oil; Aflatoxin B_1; Antioxidant; Functional food; Safety profile

CAN MANGO AGRO-ECO-TOURISM DOUBLES FARMERS' INCOME???

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ABSTRACT

The study was undertaken to know the economics of mango agro-eco-tourism in Eastern Dry Zone of Karnataka. Data was collected from 15 farmers practising tourism (FPT), 20 farmers not practising tourism (FNPT), 30 consumers and 25 market intermediaries. The results revealed that, growth in area (2.58 %) and production (1.56 %) of mango increased while, productivity decreased at one per cent in Karnataka from 2007-08 to 2018-19. The total establishment cost and annual maintenance cost per acre of mango orchard was Rs. 2,21,119 and Rs. 70,613, respectively in FPT whereas, Rs. 2,02,065 and Rs. 58,971 per acre, respectively in FNPT. The net return was more in FPT (Rs. 70,157) compared to FNPT (Rs. 14,116). Returns per rupee of expenditure was 1.85 and 1.21 in FPT and FNPT, respectively highlighting the profitability of mango tourism. Of the six mango marketing channels identified, higher producer's share in consumer's rupee (96.24 %) and marketing efficiency (25.56) was found in Channel VI (mango tourism). Lack of irrigation facility and wide price fluctuation were the major production and marketing constraint faced by both the categories of farmers. The average willingness to pay for the mango tourism by the consumers was Rs. 134 per visit per person. There is a need to promote further mango tourism which not only helps producers in realizing higher price through direct sale but also helps consumers by way of providing fresh fruit in the natural environment.

Keywords: Agro-eco-tourism, Marketing channels, Returns per rupee of expenditure, Producer's share in consumer's rupee

PERFORMANCE OF HERBICIDES TO CONTROL WEEDS IN CHICKPEA + LINSEED (2:1) INTERCROPPING

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ABSTRACT

A field experiment was conducted at University of Agricultural Sciences, Dharwad during *rabi* 2019 to know the performance of herbicides on weed control in chickpea + linseed (2:1) intercropping and it was replicated thrice in split plot design with three cropping system *viz.,* sole chickpea, sole linseed and chickpea + linseed (2:1) intercropping as main plots and five weed control treatments *viz.,* pendimethalin 30 EC at 1 kg ha^{-1} (PE), imazethapyr 10 SL at 50 g ha^{-1} (EPoE) at 20 DAS, pendimethalin 30 EC at 1 kg ha^{-1} (PE) *fb* imazethapyr 10 SL at 50 g ha^{-1} (EPoE) at 20 DAS, weed free check and weedy check as sub plots. Among cropping systems, at 60 DAS, sole chickpea recorded significantly lower weed density (4.76 m^{-2}) and lower weed dry weight (3.79 g m^{-2}) with sole linseed (5.54 m^{-2} and 4.06 g m^{-2}) and onpar observation with chickpea + linseed (2:1) intercropping (4.80 m^{-2} and 3.94 g m^{-2}). Chickpea + linseed (2:1) intercropping (1126 kg ha^{-1}) recorded significantly higher chickpea equivalent yield than sole chickpea (1072 kg ha^{-1}) and sole linseed (1043 kg ha^{-1}). Among weed management treatments, sequential application of pendimethalin at 1 kg ha^{-1} *fb* imazethapyr at 50 g ha^{-1} at 20 DAS recorded significantly lower weed density (4.46 m^{-2}), lower weed dry weight (2.83 g m^{-2}) and higher chickpea equivalent yield (1254 kg ha^{-1}) than pendimethalin at 1 kg ha^{-1} (4.67 m^{-2}, 4.03 g m^{-2} and 1091 kg ha^{-1} respectively), imazethapyr at 50 g ha^{-1} at 20 DAS (5.11 m^{-2}, 4.26 g m^{-2} and 991 kg ha^{-1} respectively) and weedy check (7.67 m^{-2}, 5.87 g m^{-2} and 605 kg ha^{-1} respectively).

Keywords: weed control, pendimethalin, imazethapyr, weed dry weight, chickpea equivalent yield

AN EMPIRICAL ASSESSMENT OF CONSTRAINTS FACED BY DAIRY FARMERS IN SHIVAMOGGA DISTRICT

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ABSTRACT

The present study was conducted to know constraints faced by farmers in dairy activities in. Dairy farming is a family enterprise involves both the gender. Thirteen independent constraints were taken for the study based on personal interview technique using schedule. Later, they were categorized into six broad constraints viz., Marketing, Financial, Technical, Physical, Institutional and Personal constraints. Friedman rank test was performed to validate whether sample dairy farmers do differ in their opinion about six broad constraints in dairy farming. The test was found statistically significant with chi-square statistic 186.57 at five percent level of significance and five degrees of freedom. The significance indicates that sample farmers do differ in their opinion about constraints. Marketing constraints appeared as most severe with highest Friedman Mean Rank Value Score of 5.21 while Personal constraint as least severe with score of 1.79. Further identified 13 constraints were ranked considering means score assigned by sample dairy farmers. 'Non-availability of quality semen' ranked first was considered as most severe. The effectiveness of artificial insemination depends on quality of semen used. The success of dairy farming depends on regularity in parturition. 'Price of milk is not satisfactory' appeared as second major constraint due to failure of milk price to keep the pace of rise in input prices having negative bearing on production costs. Delay in payment of price incentives appeared as third major constraint due to the institutional rigidities & deficit budget. The study concluded that timely availability of quality semen should be made available in the veterinary hospitals located in the vicinity of dairy farmers. Incentive prices to be paid by government should have to cover rising input prices to retain status quo position of farmers.

Key words: Dairy farming, constraints, Friedman rank test, Incentive prices

CHARACTERIZATION OF THE *AZOTOBACTER* SPECIES FOR ITS ANTIFUNGAL EFFICACY

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ABSTRACT

Every year, enormous amounts of food are lost or wasted around the world. They can be found throughout the supply chain, from production to processing. Food loss is caused by a variety of circumstances, including the use of old equipment, a lack of economic investment in the food business, and so on. The most important and leading cause is microbial deterioration, with fungi being the most destructive to consumers and the environment since it increases greenhouse gas emissions caused by food waste. Traditional chemicals can minimise wasting caused by fungus development, but they have long-term negative impacts on the environment and human health owing to chemical accumulation. As a result of these factors, we can use bio-protectants, which can be a terrific answer for both individuals and the environment. The goal of this study was to isolate and identify the antifungal component or metabolite produced by Azotobacter, which might be employed as a bio-preservative in the food industry instead of standard chemicals. *Azotobacter* species were isolated. Solvent extraction was used to extract the molecule or metabolite that has antifungal activity. As a result, these molecules can be further researched and tested on food samples, with the potential to eventually replace chemical preservatives and chemical fungicides that are commonly employed in the food industry.

Keywords: Food loss, spoilage, bio-protectants, antifungal, *Azotobacter*, solvent extraction, chemical fungicides.

INFLUENCE OF NOCTURNAL AND DIURNAL TRANSPIRATION ON WATER USE EFFICIENCY (WUE) OF RICE (*ORYZA SATIVA* L.)

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ABSTRACT

Global climate change, especially in view of severe changes in precipitation pattern, is posing a great threat for the agricultural sector, mainly for semi aquatic crops like rice. Therefore reducing water requirement of rice has paramount significance. This approach is all the more important to harness the water saving advantage of aerobic cultivation. But significant yield reduction is often noticed when rice is cultivated under "aerobic" condition. Decreasing water requirement without decreasing yield potential is an extremely important strategy which can be achieved by improving WUE. Understanding the influence of unproductive water loss which occurs during night time is therefore most crucial. Based on extensive phenotyping at the drought stimulator platform, four contrasting genotypes differing in total transpiration were selected to understand the influence of nocturnal transpiration on WUE. Interestingly, two genotypes showed high WUE despite high night transpiration. Diurnal and nocturnal gas exchange measurement were made at hourly interval revealed that genotypes that show a predawn raise in transpiration recorded higher WUE and had higher growth rates. In contrast, genotypes with lower nocturnal transpiration though had higher WUE were not associated with better growth rates. This study forms a basis to examine the benefits of nocturnal transpiration on carbon gain.

Keywords: Rice, Water use efficiency, Night transpiration, Phonemics facility, Diurnal and nocturnal gas exchange, Stomatal conductance.

COMPARISON OF FREQUENCY AND INTERVENTION OF DIFFERENT INSECTIDES AGAINST PINK BOLLWORM, *Pectinophora gossypiella* IN *Bt* COTTON

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ABSTRACT

The lowest pink bollworm larval incidence, green boll damage, bad boll opening, locule damage and highest good boll opening was recorded in the treatment, T_1 with four sprays *viz*., profenofos 50 EC, chlorantraniliprole 18.50 SC, emamectin benzoate 5 SG and bifenthrin 10 EC at 65, 80, 95 and 110 DAS, respectively which showed on par with the treatment, T_5 with four sprays *viz*., profenofos 50 EC, chlorantraniliprole 18.50 SC, spinetoram 11.70 SC and fenpropathrin 10.00 EC at 65, 80, 95 and 110 DAS, respectively and the treatment, T_9 with ETL based spray (chlorantraniliprole 9.3+lambda-cyhalothrin 4.6 ZC) schedule. Similarly, highest seed cotton was obtained from the treatment, T_1 (18.10 q ha^{-1}) which was on par with the treatment, T_5 (18.12 q ha^{-1}) and T_9 (18.10 q ha^{-1}). Whereas, the highest benefit cost ratio was obtained in treatment, T_1 (1.55) followed by the treatment, T_9 (1.46) and treatment, T_5 (1.44).

Keywords: Economic threshold level (ETL), Frequency, Time intervention, Pink bollworm and Damage

EFFECT OF MULBERRY IRRIGATED WITH TREATED SEWAGE WATER ON SILKWORMS AND COCOON PRODUCTION.

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ABSTRACT

A field experiment was conducted in a V1 mulberry garden established under paired row system to study the influence of raw and treated sewage water irrigation on growth of mulberry and subsequent effect on silkworm (PM × CSR_2) growth and cocoon parameters. The raw and treated sewage water were collected from GKVK sewage treatment plant and irrigated to mulberry garden. Silkworms fed with mulberry leaves raised on recommended dose of NPK kg/ha/year + FYM along with raw and treated sewage water irrigation showed positive influence on late age silkworms. Observations recorded on silkworm growth and cocoon parameters revealed that significant higher fifth instar larval weight (32.02 g/10 larvae), ERR (99.0 %), single cocoon weight (1.706 g), pupal weight (1.385 g), shell weight (0.321 g), shell ratio (18.65%) and shorter fifth instar larval duration (181.91 hrs). Similarly, reeling parameters of cocoons showed significantly longer filament length (853.00 m) and higher filament weight (0.28 g) in silkworms fed with mulberry leaves from the plots irrigated with raw sewage water.

Key words: Silkworm growth, cocoon parameters, raw sewage water, treated sewage water.

EVALUATION OF CREDIT FLOW FROM KARNATAKA VIKAS GRAMEEN BANK

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ABSTRACT

Credit plays a pivotal role in overall development of agriculture and allied activities. Growth in agriculture sector is directly influenced by flow of credit to the rural beneficiaries. The main objective of regional rural banks in India is to advance credit and other facilities, especially to small and marginal farmers, agricultural labourers, artisans and small entrepreneurs in order to develop agriculture, trade, commerce, industry and other usual productive activities in different rural areas of the country. In order to identify the pattern of the flow of finance in Karnataka Vikas Grameena Bank, both beneficiary wise and purpose wise, the techniques of Kendall's coefficient of concordance (W) was used. The data on the flow of credit, beneficiary wise and purpose wise related to the period of 2005-06 to 2013-14. In a favorable crop year more number of farmers borrowed the funds and make investments in land development and crop production and vice-versa in a bad season. As a result the variation was relatively less. In case of beneficiary wise flow of credit, the variation in MSME was higher due to the fact, advances under government sponsored programmes as loans for MSME increased due to participation of the bank in these programmes led to higher variation. The least variation was observed in the case of SF/MF/AL because it is mandatory to meet certain fixed per cent of advances under priority sector. In degree of concentration of credit, the inequality values were found to be lower, both in purpose wise and beneficiary wise in the individual years as well as in the overall period, yet the degree of inequality was found to be relatively lower in the case of flow of purpose wise credit than beneficiary wise flow of credit. It is advocated that the bank has to pay little more attention in the beneficiary wise flow of credit so as to attain greater equality in the distribution of credit.

Keywords: Regional Rural banks, Credit flow, Kendall's coefficient of concordance (W), Gini coefficients

DRAGON FRUIT: A BOON FOR DOUBLING FARMERS INCOME

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ABSTRACT

Dragon fruit demand in India is very high and many people are showing interest in dragon fruit cultivation.The dragon fruit farming profit depend on many factors so it is necessary to analyse the approximate cost and income from dragaon fruit cultivation.Many farmers and entrepreneurs are looking towards Dragaon fruit farming as it is giving lot of income returns to the growers

The demand for dragon fruits is increasing rapidly nowdays. There are lots of health benefits of eating dragon fruit.Almost every age personality can consume dragon fruit from child to senior citizens The dragon fruit (*Hylocereus* sp.), a new introduction in India, is highly valued for its reported neutraceutical properties. It is a climbing vine cactus species with most beautiful fruit in the family Cactaceae that has beautiful flowers and is nicknamed as 'Noble woman' or 'Queen of the Night'. The juicy flesh of the fruit is delicious in taste As dragon fruit is climbing cacti, support is essential for their growth and development.

Farmers used concrete poles as trellises for durability of the plant as the life of the vines is as long as 20 years. The concrete pillars are supported by a square structure in the top to train the vine for bearing purpose. Alternatively farmers *initiated cost effective structures using iron poles and used tyres as base structure*. The structures are made at a spacing of 3 m ×3 m. The media consisted of the soil enriched with organic inputs like farmyard manure, coir compost and vermin-compost along with biofertilizers.

The initial establishment cost is little high in the dragon fruit especially for the construction of trellis but once the plants are established, the fruits can be harvested continuously upto 20 years. After establishment of the crop, only minimum expenses are required for maintenance of the dragon fruit plantation. This dragon fruit is packed with excellent health benefits and has good demand in local as well as international markets. The fruits have good demand and imported fruits are marketed presently at the rate of Rs 200 to 250 / kg. Dragon fruit cultivation in the India could be a viable option for farmers and entrepreneurs of medium to large scale plantations. It is a fast return potential fruit crop with production in the second year of planting.

ABSTRACTS PROCEEDINGS BOOK

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