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INDEX

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FIRE- MAJOR THREAT TO INDIAN FOREST

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Every year the world faces extreme wild fires, which affecting millions of hectares of forest leading to adverse effects on biodiversity, ecosystem functioning and landscape stability. "Forest fire may be defined as an unclosed and freely spreading combustion that consumes the natural fuels. When a fire burns out of control it is known as Wild Fire (NIDM, 2014). The forest ecosystems are prone to the wildfire because of anthropogenic activities, natural fire, dry spell winter and uncontrolled burning etc. Every year India witnesses many incidents of forest fire in a vast geographical area. In India, forest fires are most commonly reported during March to April because of dry forest floor with litter, weeds trigger the forest fire. Fire may be beneficial for one ecosystem and may be dreadful for the other, depending upon the climatic conditions and type of vegetation. In natural forest ecosystem, forest fire plays significant role for natural recycling of nutrients and often helps to regenerate many tree species. However, the rampant forest fire is one of the biggest threats to our biodiversity. Every year many animals and human lost their life in wild fire (Pant, 2019).

Major Cause of Forest Fire

Forest fires are mostly classified as crown fires, surface fires and ground fires on the basis of intensity (Narendran 2001). The changing climatic abnormalities are going to make forest ecosystem more susceptible and increase the risk of burning. Like anthropogenic activities, natural factors, climate change etc. Almost every country has witnesses the unprecedented impact of wild fire in many ways.

Table 1: Causes of Forest Fire

Sl.	Natural	Anthropogenic	
		Deliberate causes	**Accidental causes**
1.	Lighting	Shifting cultivation	Collection of NTFPs
2.	Friction of rolling stone	To flush growth of *Tendu* leaves	Burning farm residues
3.	Rubbing of dry bamboo clumps	To have good growth of grass and fodder	Driving away wild animals
4.	Volcanic eruption	To settle score with forest department or personal rivalry	Throwing burning bidi/cigarettes
5.		To clear path by villagers	Camp fire by picnickers
6.		To encroach upon the forest land	Sparks from vehicle-exhaust/transformers
7.		Tribal traditions/customs	Uncontrolled prescribed burning
8.			Resin tapping
9.			Making charcoal in forests
10.			Extracting wine in forest
11.			Heating coal tar for road construction in forest

Damges caused by Forest Fire

Forest fire spreading over a large forest area in the country causes immense loss to the environment and the property. Ecological, economic and social impacts of the forest fire in India in brief may be enlisted as: loss of timber, loss of bio-diversity, loss of the wild life habitat, global warming, soil erosion and depletion of soil quality, loss of fuel wood and fodder, damage to water and the other natural resources, loss of natural regeneration, loss of Non Timber Forest Products, Ozone layer depletion. Apart from that smoke, soil erosion and floods, loss of livelihood also drastically changes micro and macro climatic condition. According to India State of Forest Report 2019, over 30,000 incidents of forest fires were reported.

Table 2. Recent Forest Fire in India

Area	Year	State	Damage
Similipal National Park	2021	Orrisa	Not Known
Bandipur forest fires	2019	Karnataka	The estimated burnt area about 10,920 acres
Uttarakhand forest fires	2016	Uttarakhand	The estimated burnt area about 11,210 acre

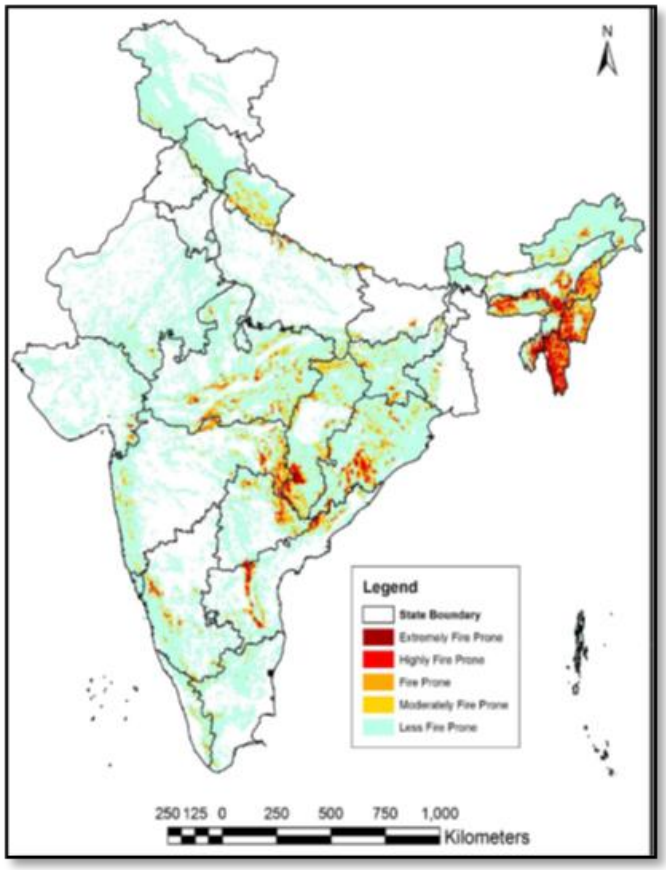

Fig. 1: India map showing fire prone forest areas (Source; FSI, 2019)

Control measures

Indirect preventive measures

- Organize seminars and workshops for local people.
- Prevention of human-caused fires through education and environmental modification.

- Forbidding collections of certain items of minor forest produce during summer.
- Prohibiting keeping and carrying of fire in forest areas in fire season.
- Legislative measures

Direct preventive measures

- Fire alert Forecasting systems
- Organisation, training and detailing of staff for fire control activity
- Hazard reduction
- Raising fire-breaking green belts
- Clearance of Fire line
- Implimentation of new fire fighting tools and techniques with enough man power

Conclusion

In present era of climate change, the forest fire became a serious threat to forest ecosystem, endagnered flora and fauna, human settlements, hydrological cycle etc. About 95% forest fires is caused due to the antropogenic activities. Therefore, all individual, need to understand their responisiblites to save forest ecosystem. Hence, persistant scientific research is need to carried out in forest fire prone area to create modern technique to check forest fire.

Reference

Satendra and Kaushik, A.D. (2014). Forest Fire Diaster Management. National Institute of Disaster Management, Ministry of Home Affairs, New Delhi.

Narendram, K. (2001). *Forest fires: Origin and Ecological Paradoxes***.** General article. Resonance, November 2001.

Pant, M. (2019). Forest Fire- A case study on the four national park of Uttarakhand. International Journal of Engineering Research & Technology, 8(5): 347-354.

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BENEFITS OF INTEGRATED PEST MANAGEMENT PRACTICES

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Integrated Pest Management (IPM) is a recent concept that is an environmental friendly and sensitive approach to pest management. IPM practices are based upon the relationship between information on the life cycles of pests and their interaction with the environment. The practice involves techniques for plant diseases and pest-control. Many pest-control methods are used in an ecologically harmonious manner in order to keep the infestation within manageable limits. IPM practices are gaining important and popularity during current situation as it addresses the serious ecological problems caused due to excessive use of chemical pesticides and the hazardous effects caused by them. IPM practices minimizes the use of these harmful chemicals and combines the these chemicals with biological methods of pest control, for example use of pest-resistant crop varieties, development of crop culture methods, use of mechanical methods like placement of traps baited with the pest's pheromones etc. There are many organisms that are economically significant, example locusts has been found infected with bunt and ergot diseases. Most species that became pests was because of the various environmental changes sometimes due to human activities.

There are many biological and physical reasons behind the high infestation of the insects on the plant population. One of the major reasons is the availability of uniform food source which leads plant-eating species increase to large populations. Crops growing under the concept of monoculture easily get attacked by the insects. Sometimes the introduction of new crops over large areas results in the transfer of harmful insects from the native place to the new area rich and abundant in food. Many cultural practices like fertilization, irrigation, and the use of modern harvesting equipment enhance the ability of pest species to increase rapidly. Due to advances in transport system across the world there is an ease, with which people and goods can be transported around the world. This sometimes results in transfer of pests from one place to another, in case the quarantine methods are not take into consideration appropriately.

Microorganisms like fungi, bacteria, and viruses can also be considered as pests, they are the carrier agents of many disease in the plant kingdom. Pest is anything that cause damage to the plants. Animal pests are mostly invertebrates, some example of animal pests are protozoa, flatworms, nematodes, snails, slugs, insects, and mites. Few vertebrates, plant pests include rabbits, elk, deer, and rodents. Insects are major pests because they play an essential role in the transmission of disease.

Pest management received major attention around eighteenth century. Many chemical and biological management programs were developed to regulate tormentor infestation. Mechanical ways like sticky barriers, heat killing, and flooding were conjointly developed to minimize tormentor attack. Mechanical ways of tormentor management were terribly restricted and since of their restricted utility and short-run effectiveness, they need been outdated mostly by chemical and biological ways.

The first use chemical was with the utilization of plant life compounds. The primary compound used was ground tobacco, in France to kill aphids in year 1763. Alternative natural merchandise

like alkaloid, rotenone, petroleum, kerosene, creosote, and turpentine were utilized in the nineteenth century. Inorganic compounds like Paris inexperienced, lime sulfur, Bordeaux mixture, compound, and insect powder were conjointly introduced within the 1800s.

The artificial organic compounds throughout war II, which result in the dramatic modification in tormentor management. It absolutely was the invention of the insecticidal properties of DDT (dichloro-diphenyl-trichloroethane) and of BHC (benzene hexachloride) that created the idea of pest-free crops potential. Analysis within the Thirties on plant hormones diode to the event of the selective weed killer a pair of, 4-D (2, 4-dichlorophenoxyacetic acid), and this became commercially offered concerning a similar time as DDT. Look of those new artificial organic compounds, a full new series of pesticides insecticides, fungicides, herbicides, and plant growth regulators was introduced. Within the year 1900, associate attempt tries were created to regulate the poisonous plant woody plant in Hawaii by introducing an insect. This was the 1st arrange to management weeds biologically. The utilization of microorganisms to destroy insect pests began within the late 1800s and early decennary.

The intensive use of powerful chemical agents shortly resulted during a range of great ecological issues. Consequently, current tormentor management apply minimizes the utilization of pesticides associated combines them with biological ways in an approach known as integrated management. Alternative necessary tools of recent tormentor management or importation and quarantine laws, that are designed to stop the introduction of exotic pests.

Some of the benefits of an Integrated approach

- Promotes healthy plants, with minimal use of chemical compounds.
- Promotes sustainable bio-based pest management alternatives that are cost effective and environmental friendly.
- Reduces environmental risk associated with pest management by encouraging the adoption of more ecologically benign control tactics
- Reduces the potential for air and ground water contamination
- Reduces the need and importance of pesticides by combination of pest management methods.
- Reduces issues related to pesticide residue.
- It reduces the dependence of crops on chemical pesticides.
- The practice alleviates the public interest on pest control.
- IPM is a very cost-effective practice of pest management.

Role of IPM practices

With increasing Indian population, India will face a major challenge of feeding the rapidly growing human population during this century. It is very important for the Agricultural growth rate and productivity to improve enormously to sustain the green revolution. Pests of crops if not handled properly can lead to huge economic crop losses. Unwise use of chemical insecticides can also result in control failure, polluting the environment, disturbing the ecological balance. Therefore In order to minimize the harmful effects of chemical pesticides, integrated pest management involving is required to reduce the losses caused by pests.

Success Story

Name of the Farmers: Md. Siddique
Address: Village – Naulakha, Block – Kahra, District – Saharsa, State – Bihar, Pin – 85220

Md. Siddique started vegetable farming in the Naulakha village of Kahra block with small land holding. His vegetables field gave good income but did not generate a handsome amount. There was a major damage to his crops because of the insect infestation. He was very upset to use the chemical pesticides, because of their cost and health side effect. In 2014, he then came in contact with Krishi Vigyan Kendra, Agwanpur, Saharsa where the Scientists of the Krishi Vigyan Kendra help him to learn scientific cultivation of vegetables as well as best possible Integrated Pest and disease Management practices to control the insect pest and diseases of vegetable crops with minimization of cost of pesticide application that led to less health hazardous effects. He started using Trichoderma harzianum formulations in vegetable crops to get rid of the problem such as damping off, wilt and fruit rot disease of many vegetables such as Tomato, Brinjal, chilli, Potato, Cauliflower, Cabbage, cucurbitaceous vegetables etc. He tried to treat the seeds with Trichoderma as well as apply Trichoderma through soil application. Trichoderma formulations were used in seed treatment @ 5 gram per kilogram of the seed, in seedling dip in solutions of 10 gram Trichoderma formulation per litre of water and through soil application mixed and incubated in vermicompost @ 1kilogram per 10 quintal of vermicompost for 7 days in moist conditions. When the soil is in water logged condition chances of attack of soil and root pathogen may increase which can be successfully managed by using the Trichoderma formulations through various delivery methods such as soil and root drenching of the vegetable crops. Major inference that can be drawn from his success story is that the use of Trichoderma Solutions right from seed treatment, seedling dip to soil treatment with vermicompost, foliar spray of neem oil, plant extract and planting of trap crops around the farm area may effectively reduce insects pest attack on the vegetable crops.

Conclusion

IPM practices can be of major importance if used judiciously. There should be judicious use of combination of the practices that includes chemical as well as biological methods. There has been many recent research with respect to the topic as this integrated method of pest control has shown a greater role in protection of the crops, from insect pest damage. For sustainable development IPM practices can be of major importance as it protects the crop from the use of injurious pesticides that may cause many harmful diseases, and many hazardous phenomenon like biomagnification. Therefore the use of IPM practices can be of great benefit in terms of environment protection and also with respect to profit orientation.

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IMPORTANCE AND ROLE OF PREDATORS IN AGRO- ECOSYSTEM IN BIOLOGICAL CONTROL OF INSECTS' PEST

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Abstract

Insect predators preying on agriculture insects' pest are found in all crop plants including the parts below ground as well as in nearby shrubs and trees. Insect predators include beetles, bugs, lacewings, flies, midges, spiders, wasps, and predatory mites. Some are specific in their choice of prey while others are generalists attacking diversity of insects. Predators can be found in almost all agricultural and natural habitats. Each group may have a different habits and life cycle. Although the life cycle of some common predators is well defined earlier, information on the augmentation and conservation of many predatory species is missing (Hoffmann, M.P. and Frodsham, A.C., 1993)

Key words : Predators, Insects' pest, Bio-control.

There are many insects known to feed on other insects and are described as insect predators in agro ecosystem. They generally check the insect pest of crops from reaching out break levels and usually kept the pest population below ETL. These insects are known as bio agents or bio control agents and such phenomenon of insect pests controlled by them is known as bio control or biological control. Bio control is one of the key components in IPM practices, which stands as the most excellent, effectively successful and eco friendly alternative option for controlling the introduced and indigenous insects' pest in current agricultural practices. Development of pest resistance to insecticides and other environmental hazards due to insecticidal residues continues to be a great threat and problem for environment as well as human beings by using insecticides alone in pest management. Insect predators are those insects that naturally kill and eat other insect pests in agro ecosystem. Those predators generally look for pests in the fields to get their prey. Predators are usually larger than their prey and can kill and consume the pest. They can attack the pest at any stage as they are often generalists rather than specialists to prey.

Insect predators are reported in nearly 167 insect families belonging to 14 orders of insecta class (Sathe & Bhosale, 2001) and some of them are long horned grasshoppers, earwigs, lacewigs (*Mallada basalis* and *Chrysoperla carnea*), praying mantids, lady bird beetles (*Coccinella septempunctata, Cheilomenes sexmaculata* and *Coccinella transversalis*) hover flies, coccinellids (*Stethorus punctillum, Cryptolaemus montrouzieri*), staphylinid beetle (*Oligota* spp.), cecidomyiid flies (*Anthrocnodax occidentalis*), gall midge (*Feltiella minuta*), anthocorid bugs (*Orius* spp.) etc. Apart from class insecta predators are also observed in mites (*Amblyseius alstoniae*, *A. womersleyi, A. fallacies* and *Phytoseiulus persimilis*) and spiders which are considered to be effective in prey attack.

Predators stood as the principal agents in bio control as they can survive even when there are no insect pests to prey. When more number of insects is obtained for predators to prey, their population multiplies quickly by laying more eggs due to abundant availability of food. Both adults and larvae/nymphs can be predators. They can feed on various different species of insects. Hence

they are commonly considered to be the first crop defenders against insect pests in agro eco system. With no predators in the fields, insects can easily multiply their number and attack the crops at all stages due to lack of natural suppression. Current studies specify that insects' populations in agriculture are naturally declining due to a range of their natural enemies. By creating habitat, foraging and overwintering sites to predators, they can be conserved that helps and supports potential predators to keep the pest below ETL. For effective using of predators in pest management, they should be well identified and mass multiplied in the laboratories for releasing in the fields. Farmers also must be aware with respect to the stage of crop and the time at which insect predators has to be released in the fields for effective pest control.

Conclusion

Nearly more than 10% of the world's insects are found in India with high diversity. In spite of this, brief systematic studies on the role of beneficial insects in agro-ecosystem is much lacking in India due to keen shortage of taxonomic knowledge for efficient groups of beneficial insects. There are several predators that live in fields, actively hunting down various sucking pests in agricultural. They often form the first line of defense against pest attack, helping to check pest outbreaks and reducing the need for insecticides. Many number of insects' predators are playing a significant role in controlling the pest in the fields. In spite of their major role in managing the pest, not many of them are utilizing in applied biological control programmes due to lake of mass production in large scale in India. If considerable amount of work has been done on the predators' behavioral aspects and host range, it would gather the information about the level of management obtained from the predators as there is lot of scope for biological control in IPM. As they are necessary in agriculture, keeping the fact in mind, the predators should be protected, conserved and promoted for achieving the target of suppressing the insect pest in the fields in a safer and economic manner.

References

Hoffmann, M.P. and Frodsham, A.C. (1993) Natural Enemies of Vegetable Insect Pests. Cooperative Extension, Cornell University, Ithaca, NY. 63 pp.

T. V. Sathe and Y. A. Bhosale, (2001) Insect Pest Predators, Daya Publishing House.

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EFFECT OF DIFFERENT NUTRIENT SOURCES ON GROWTH AND YIELD OF MUSTARD (*BRASSICA JUNCEA* L.)

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A field experiment entitled "Effect of different nutrient sources on growth and yield of mustard (*Brassica juncea* L.)" was conducted during *rabi* 2020-2021 at Experimental Farm, Agronomy, Oilseeds Research Station, Latur. The objectives of the present study was to study the effect of different nutrient sources on growth and yield of mustard and to study the economics of different treatments.

The soil was clayey in texture, low in available nitrogen, very low in available phosphorus, very high in available potassium and alkaline in reaction. The experiment was laid out in Randomized Block Design with 8 treatments each with three replications. The treatments were **T_1** – Control, **T_2** - RDF + FYM @ 5 t ha^{-1}, **T_3** - RDF + Vermicompost @ 2.5 t ha^{-1}, **T_4** - RDF + Poultry manure @ 5 t ha^{-1}, **T_5**- RDF + Elemental sulphur @ 20 kg ha^{-1}, **T_6** - RDF + $ZnSO_4$ @ 20 kg ha^{-1}, **T_7**- RDF + $FeSO_4$ @ 20 kg ha^{-1} and **T_8** - RDF + Gypsum @ 500 kg ha^{-1}. The gross and net plot size was 5.4 m x 4.5 m and 4.5 m x 3.9 m, respectively. Sowing was done on 12th November, 2020. The recommended dose of fertilizer was applied as per treatments through Urea, DAP and MOP. The crop was harvested on 23rd February, 2021.

The results of the experiment indicated that combined application of RDF + Vermicompost @ 2.5 t ha^{-1} (T_3) observed significantly maximum growth parameters *viz*., plant height, number of branches, number of leaves, leaf area and dry matter and yield and yield attributes *viz.*, number of silique $plant^{-1}$, length of silique (cm), number of seeds $silique^{-1}$, seed yield $plant^{-1}$ (g), straw yield $plant^{-1}$ (g), test weight (g), seed yield (kg ha^{-1}), straw yield (kg ha^{-1}) and biological yield (kg ha^{-1}), but statistically remained at par with RDF + FYM @ 5 t ha^{-1} (T_2) and RDF + Gypsum @ 500 kg ha^{-1} (T_8). The application of RDF + Vermicompost @ 2.5 t ha^{-1} (T_3) recorded the significantly highest oil content. The application of RDF + Vermicompost @ 2.5 t ha^{-1} (T_3) obtained maximum net returns. Highest B:C ratio was obtained with the application of RDF + Vermicompost @ 2.5 t ha^{-1} (T_3).

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INSECTS' PEST DYNAMICS OF TOMATO IN RELATION WITH WEATHER FACTORS AND POPULATION ESTIMATIONS

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Tomato (*Lycopersicon esculentum* Mill.) belongs to the family Solanaceae and is considered as one of the most important vegetables grown in the world. It is a warm season crop widely grown in both tropical and sub tropical regions of the world (Govindappa *et al*., 2013). It has its origin in Central and South America and extends all over the world after the Spanish occupied the Americas. It is grown extensively for both fresh marketing and processing industries. It is rich in vitamin C and adds variety of colours and flavors to the foods. Tomatoes in large quantities are using in preparing soups, juices, ketchups, purees, pickles, pastes and powders (Choudhary, 2002). The chief tomato producing countries are China, USA, Italy, Turkey, India and Egypt etc. among which China occupied the first place followed by India. In India, productivity of tomato is very when compared to its production potential of the developed countries.

Even if the total cultivated area of tomato in India is steadily increasing over years, yields continue to be low due to several production constraints such as insects, diseases and other abiotic factors. Among them, the problem posed by insects is very critical and if imperative measures are not taken in time, the entire yield may turn down. Mostly tomato crop is more prone to insect pests and diseases due to their tenderness and softness compared to other crops (Sajjad et al. 2011). All parts of the tomato plants offers food, shelter and reproduction site for insects, which are able to cause unthrifty growth or death of the plants and damage of fruits in the form of scarring, tissue destruction and abreaction of shape and colour fade (Lange, and Bronson 1981). The incidence of insects may vary according to season and different stages of growth. The population fluctuation of the insects is mostly governed by various weather factors prevail during the crop growing period. Nearly 16 insect species are reported in India feeding on tomato starting from germination to harvesting stage which reduces the yield and also degrades the fruit quality (Butani DK, 1997).

The major insects of tomato which can cause immense economic damage include Aphid (*Aphis gossypii*), Jassid (*Amrasca devastans*), White fly (*Bemisia tabaci*), Cutworm (*Agrotis segetum*), Leaf miner (*Liriomyza trifolii*), Thrips (*Scirtothrips dorsalis*) Pinworm (*Tuta absoluta)* and Fruit borer (*Helicoverpa armigera*) (Sam *et al*., 2014) among which sucking pest complex viz., aphid, whiteflies and thrips acts as vectors causing severe damage to crop by transmitting viruses rather than direct feeding.

Population dynamics and pest estimation

The abiotic parameters are identified as direct impact on population dynamics of insects. The estimation of pest population is a basic necessity for measuring the intensity of pest population for assessing the crop losses, monitoring the appearance of the pest and making decisions on the methods of control to be used. Existing relationships between time of appearance of insects and the duration for which they are likely to cause damage to the crop at an important crop growing stage and the subsequent losses in yield by them are critical in estimation of the economic threshold. Population fluctuation of the crop pest largely depends on whether parameters. Pest

management programme requires the use of monitoring practices for effective control. Before developing insect pest management programme it is necessary to have basic information on abundance and distribution of pest in relation to weather parameters, as it helps in shaping proper time of action and appropriate successful control methods. According to Mathur *et al*. (2012) pest appearance and their distribution varies with abiotic factors, hence meteorological parameters plays an essential role in the abundance of any insects species. Relative humidity, rainfall, wind speed and temperature are the chief weather parameters that largely influence the activity of insect. The interaction between activity of insects and abiotic factors helps in deriving at foretelling models that helps in predicting incidence of insects' activity**.** As abiotic factors play important roles in population development of the insect species, studies on correlation of the weather parameters with pest incidence is also gaining importance.

Conclusion

Farmers should follow crop protecting actions in time when the pest appeared as controlling the insect pests has become a major problem. Therefore, development of IMP techniques to manage the pests becomes very important. Pest control mostly relies on chemical control only, which leads to problems like resistance of pests towards pesticides, resurgence and environmental hazards (Dhaliwal GS, 2010). Pest control approach should be holistic using alternative strategies of integrated pest management (IPM). As the meteorological parameters play a vital role in the biology of any pest, the interaction between pest activity and abiotic factors will help in deriving at predictive models that aids in forecast of pest incidence. Currently available cultivars lack sufficient plant resistance to provide protection against insects. So, resistance technology occupies an important place in the present day rational pest management strategies. Mixed or inter cropping of crops or cultivation of other plant species (non-crops) along with main crops is a common cultural practice in many countries.

References

Butani DK. Insect pest of vegetables-tomato. Pesticides. 1977; 11:33-36.

Choudary BR. Important of tomato vegetable crop. P. B. 2002; 121(4):292-296.

Dhaliwal GS, Koul O. Quest for Pest Management: From Green Revolution to Gene Revolution. Kalyani Publishers, New Delhi. 2010.

Govindappa, M.R., Bhemanna, M., Arun kumar, Hosmani and Ghante, V.N. (2013). Bio-efficacy of newer insecticides against tomato leaf curl virus disease and its vector whitefly (*Bemisia tabaci*) in tomato. *Internat. J. Appl. Bio. Pharm.Tech*., 4(3) : 226-231.

Lange WH, Bronson L. Insect pests of tomatoes. Ann. Rev. Entomol., 1981; 26:345-371.

Mathur Anjali, Singh N. P., Meena Mahesh1 and Singh Swaroop 2012. Seasonal incidence and effect of abiotic factors on population dynamics of major insect pests on brinjal crop *J. Environ. Res. Develop* vol. 7 no.

Sajjad, M. M., Ashfaq, A. S., & Akhtar, S. (2011). Screening of tomato genotypes for resistance to tomato fruit borer, Helicoverpa armigera in Pakistan. *Pak. J. Agric. Sci. 48*, 49–52.

Sam GA, Osekre EA, Mochiah MB, Kwoseh C. Evaluation of insecticides for the management of insect pests of tomato, *Solanum lycopersicon* L. Journal of Biology, Agriculture and Healthcare. 2014; 4(5):49-57.

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EFFECT OF DIFFERENT FERTILIZER LEVELS AND HUMIC ACID APPLICATION ON GROWTH, YIELD AND ECONOMICS OF CHICKPEA (*CICER ARIETINUM* L.)

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An agronomic investigation entitled as "Effect of different fertilizer levels and humic acid application on growth, yield and economics of Chickpea (*Cicer arietinum* L.)" was conducted during *rabi* 2020-21 at Experimental Farm, Department of Agronomy, College of Agriculture, Latur. The objective of present study was to find out the effect of fertilizer levels and humic acid on growth and yield of chickpea and to find out the economics of chickpea treatments.

The experimental site was clayey in texture, slightly alkaline in reaction, soil was low in available nitrogen, medium in available phosphorous and high in available potassium. Soil was well drained, with good moisture retention capacity. The experiment was laid out in Factorial Randomized Block Design (FRBD) with nine treatment combinations, consisting of two factors i.e. different fertilizer levels and humic acid application through soil, which included three levels each of different fertilizer levels and humic acid application. The different fertilizer levels were 75% RDF (F_1), 100% RDF (F_2) and 125 % RDF (F_3) whereas, humic acid levels were 1 kg humic acid ha^{-1} (H_1), 2 kg humic acid ha^{-1} (H_2) and 3 kg humic acid ha^{-1} (H_3). The gross plot size of each experimental unit was 5.4 m × 4.5 m and net plot size was 4.8 m × 3.9 m. Sowing was done on 08th November, 2020 by dibbling method at spacing 30 cm x 10 cm. The crop was harvested on 23rd February, 2021.

The result of the experiment revealed that higher growth and yield attributes, seed yield (3051 kg ha^{-1}), straw yield (5819 kg ha^{-1}), GMR (₹ 149499 ha^{-1}), NMR (₹ 102424 ha^{-1}) and B:C ratio (3.18) was observed with the application of 125% RDF (F_3). Higher growth and yield attributes, seed yield (3025 kg ha^{-1}), straw yield (5768 kg ha^{-1}), GMR (₹ 148225 ha^{-1}), NMR (₹ 100427 ha^{-1}) and B:C ratio (3.10) was observed with the application of 3 kg ha^{-1} humic acid (H_3). In case of seed yield and net monetary returns (₹ ha^{-1}), application of 125 % RDF and 3 kg ha^{-1} humic acid performed better.

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STATUS AND TREND OF TOMATO PROCESSING IN INDIA: AN OVERVIEW

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Abstract

India scores second position in the World tomato production. Various Indian food processors processes tomato either into primary or secondary processed products or instant use products. In the present paper, details about the current trend of increased demand for tomato processing in India is highlighted with some details about key tomato product manufacturers.

Introduction

With 10.52% contribution in the World tomato production, India stands at second position globally in 2019. In 2016-17, tomato production in India was about 20,000,000 MT (Fig. 1). Various food processors in India processes tomato either into primary processed products like tomato paste, tomato pulp, tomato juice or into secondary processed products like tomato ketchup, tomato sauce, tomato-based culinary sauce and chutney or instant use tomato soups, dehydrated curries and powders. The major players in tomato processing are Nestle India, Hindustan Unilever, Kraft Heinz, Conagra Brands, Field Fresh Foods, Cremica Food Industries Ltd., Global Green, Reliance retail Limited, Mother Dairy, Godrej Beverages & Foods, NAFED and ITC. On one hand, only 1 % of India's tomato production is reported to be processed into different tomato products in comparison to the global average of 25 % while on other hand, huge losses of about 25-30% are incurred in the supply chain due to lack of proper processing facility at the farmer's end.

Value-added Tomato Products and Applications

According to World Processing Tomato Council (2015), 130,000 tonnes of tomato were processed in India. Value-added products produced from tomatoes include tomato juice, paste, flavoured paste, diced/peeled tomatoes, strained tomato pulp, ketchup, pasta, pickles and pizza sauces, salsa, gravies, ready-to-eat (RTE) curries and tomato-based powder products.

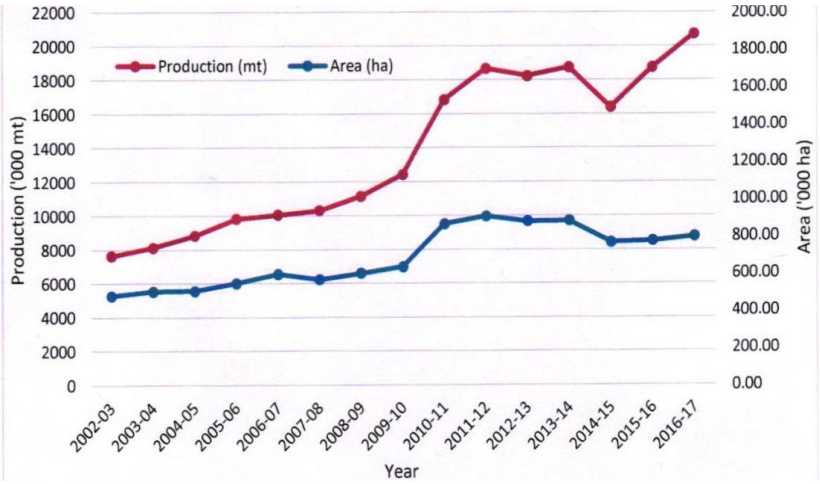

Fig. 1 Year-wise All India Tomato Production (2002-17)
Government of Consumer Affair, GOI (Price Monitoring Cell), 2017-18

Various food processors like GD Foods (Brand name 'Tops'), Future Consumer Enterprises Ltd. (Brand name 'Tasty Treat'), Mother Dairy, NAFED, Griffith Lab, Patanjali Ayurved Limited, GRG Foods and many Farmers Producers Organizations (FPO) are processing tomato into tomato paste/pulp/juice or into various value-added tomato products either at their own processing unit or in Food Parks on payment basis.

Processed tomato products are gaining wide usage not only in snacks food industry/ hotels/quick serving restaurants but also in the individual household kitchen. Over the past few years, more than 12% annual growth rate in India's tomato production has pushed high the interest amongst farmers to grow tomato as a major commercial crop. (National Horticultural Research & Development Foundation, 2017-18). Also, the annual growth rate of tomato-based processed food consumption is over 30% which is creating a massive demand for the processed tomato products. Due to the unexpected rise in the market price of fresh tomato during late-off season in 2014 and 2016, many Indian consumers are buying the affordable and relatively price-stable processed and packaged tomato purees and pastes to prepare curries at home. Further, during the lockdown period imposed due to Covid-19, consumers find it easier to purchase in bulk and use the hygienically packed long shelf-life food products including tomato products over daily buying of fresh tomato. The Indian market for soup has been showing an annual growth rate of 26%. Due to the changing eating habits and lifestyles of younger and wealthier consumers, the demand for processed tomato products like tomato paste and tomato soup is expected to go up in India as well as in abroad.

Leading Indian Tomato Processors

Preservation of tomato by processing it into various high-value products with extended shelf-life can help the country to address the problem of tomato spoilage to a great extent. It can also help address the problem of sudden drop in the tomato price during glut season because of which farmers fail to get the right price for their commodity. Nestle India is the leader in the tomato ketchup manufacturing segment in India with 37% market share. It also produces tomato soup mixes. Both ketchup and soup mixes come in the market under the brand name 'Maggi'. It procures raw tomatoes grown locally in India as well as import from other countries through its global supply chain. Hindustan Unilever (HUL) is the second largest manufacturer of tomato ketchup (with brand name 'Kissan') in India with a market share of 25%. It procures tomatoes locally in India in partnership with Varun Agro and works closely with farmers to help them to adopt sustainable agriculture practices based on improving soil fertility, water management and pest control. Zydus Wellness Kraft Heinz holds about 10% market share in the tomato ketchup manufacturing segment and its brand "Heinz' is gaining popularity among consumers. Field Fresh Foods/Del Monte is another big tomato products manufacturer. It manufactures ketchup, pasta and pizza sauce under the brand 'Del Monte'. Contract farming has been looked up as a solution to reduce the losses of tomato during glut season and to overcome a sharp drop in the prices. Global Green Company is India's largest hybrid tomato contract farming company. Based on high colour value, it processes more than 20,000 tonnes of tomato of UG-37, UG-157, UG-52 varieties into value-added products (ketchup, pasta sauce, tomato blend, pizza sauce etc.) (https://globalgreengroup.com/tomatoes/) under the brand 'Tify'. Cremica Group produces tomato ketchup, puree, pasta sauce, dips and Indian gravies. Apart from its retail products, the company caters to various QSR like McDonald's, Barista, Café Coffee Day, Pizza Hut and Domino's and as well as to airlines like Jet Airways and Air India. Dabur India is also a leading producer of tomato puree, tomato juice, soups and chutneys under its retail brand 'Homemade'. Other tomato processors like Conagra Brands, Annie's Homegrown, Bolton Group, Campbell Soup,

General Mills, Kagome, Kensington and Sons, etc. are developing their niche into the budding market for new and innovative tomato products. Tomato has huge export potential in the international market. As per APEDA (Agricultural and Processed Food Products Export Development Authority), beside fresh tomato, India exports many value-added products like tomato ketchup, tomato sauce, tomato juice and preserved/ prepared tomato on large scale (Table 1).

Table 1: Year-wise exported quantities of fresh and value-added products of tomato

Commodity	2014-15		2015-16		2016-17	
	Qty. (MT)	Rs. lakh	Qty. (MT)	Rs. lakh	Qty. (MT)	Rs. lakh
Fresh tomato	217999.33	44461.34	158504.59	37772.91	267198.49	54806.04
Tomato ketchup & other tomato sauces	2729.05	3320.62	2907.46	3339.86	3576.14	4168.92
Tomatoes, prepared/ preserved	775.02	346.63	190.14	101.16	234.73	136.65
Tomato juice	199.32	95.05	321.21	129.3	255.82	100.46
Total	**221702.72**	**48223.64**	**161923.4**	**41343.23**	**271265.18**	**59212.07**

Conclusion

In India, both tomato production as well as processing is growing with the growth in demand for value-added, affordable tomato products. The new entrants have to create their niche while competing with the well-established and popular brands. There is a scope in the international market for the export of both fresh as well as processed tomato products. There is an increasing acceptability for tomato pastes/purees at home-use level along with flavoured tomato paste and tomato soups.

References:

1. http://agricoop.nic.in/statistics/horticulture
2. http://apeda.gov.in/apedawebsite/
3. http://midh.gov.in/PDF/MIDH_GL(E).pdf
4. http://sfacindia.com/UploadFile/Statistics/Farmer%20Producer%20Organizations%20Scheme.pdf
5. http://www.fao.org/faostat/en/#data
6. https://avrdc.org/download/publications/technical-reports/reports/GIZ_India-Processed-Tomato-Study_16Sept2016.pdf
7. National Horticulture Board (nhb.gov.in)

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