AAPP NATIONAL SYMPOSIUM PROCEEDINGS –DECEMBER 22-23, 2016, AT KALYANI, WEST BENGAL, INDIA

Together, we will protect our crops.

Summary and Recommendations of the National Symposium on "Impact of Climate Change, Biodiversity and Good Plant Protection Practices on Crop Productivity" December 22-23, 2016 at Kalyani, West Bengal, India

The Association for Advancement in Plant Protection organized its 3rd National Symposium on 22-23rd December 2016 on the **Impact of Climate Change, Biodiversity and Good Plant Protection Practices on Crop Productivity at Farmers' Academy and Convention Centre (Lake Hall), Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia, West Bengal.** The symposium was organized with the twin objectives of understanding the present scenario in **plant protection** and encouraging young scientists to participate and compete to encourage them to higher levels of **understanding** and **research**.

Symposium was formally inaugurated by Hon'ble Vice-Chancellor of Ramakrishna Mission Vivekananda University, Swami AtmapriyanandaJi Maharaj and the inaugural session chaired by the President of AAPP, Professor Chitreshwar Sen. Hon'ble Vice-Chancellor of Uttar Banga Krishi Viswavidyalaya Dr. Chirantan Chattopadhyay and the Hon'ble Vice-Chancellor University of Burdwan, Prof. Nimai Chandra Saha graced the chair as Special Guest. Prof. K. Sengupta, Dean, Faculty of Agriculture, BCKV, Prof. T.K. Maity, Dean, Faculty of Horticulture, BCKV and Prof. R.K. Biswas, Dean, Post Graduate Studies, graced the occasion as the Guests of Honour. All the dignitaries present in the Inaugural Session emphasized the need for such a Symposium in the context of good plant protection practices under globalization and changing climate scenarios.

Post inaugural session the series of technical sessions followed-

Technical Session I: Profile of pests and beneficial biotic organisms associated with field and horticultural crops

There were three lead papers and five numbers of oral presentations in this technical session. Fourteen posters were presented by researchers in the poster session from different institutes. The **first lead lecture** was delivered lucidly by Dr. Suresh Deka on the topic "Rhamnolipid biosurfactant for controlling plant pathogenic fungi". To overcome the residual

hazards of chemicals in plant disease management biosurfactants produced by certain microbes as metabolites are suitable alternatives to chemicals. He highlighted isolation, identification, characterisation, screening, mass-production, purification and delivery systems of Rhamnolipid biosurfactant from soil-borne bacteria. Such biosurfactant produced by the bacterium *Pseudomonas aeruginosa* strain JS29 @ 1.5g/litre could effectively control *Alternaria solani* and *Collectotrichum capsici*.

Prof. C. Chattopadhyay, VC of UBKV, in his presentation, projected the possible impacts of climate change on the pests and disease scenario in 2050. He has highlighted those sucking pests in cotton is taking over Helicoverpa armigera, the risk of invasive pests, change in jasmonic acid and salicylic acid

pathway, increase in blast disease in cereal crops and aggressiveness of Stemphylium disease occurance of chickpea etc.

Third lead lecture was delivered by Dr Abraham Verghese from GPS Institute of Bangalore through the topic "Need to conserve insectivorous birds in the agro-horti ecosystem: a case study perspective" brought to the surface the role of insectivorous birds in pests management of crops. A detailed list of endangered birds has also been presented by him. He suggested going for habitat management and conservation of birds for the well-being of the agrarian community as well as to protect the biodiversity of birds.

The **first oral presentation** was made by Dr. Surajit Khalko from UBKV on the topic "Assessment of pest scenario in black pepper in West Bengal and Andaman Nicobar Islands" documented the pests and diseases of black pepper from Andaman and Nicobar Islands and also from West Bengal through an extensive roving survey. He documented leaf gall thrips, Top shoot borer, Pollu beetle, Whitefly, mealy bugs and root-knot nematode as pests while *Phytophthora* leaf blight and anthracnose disease as major diseases of black pepper.

N. Kasar from BCKV made the **second oral presentation** on "Incidence of hoppers, their species composition and biology of *Idioscpus clypealis* (Lethierry) on mango". In her presentation, it was cited that during 2012-2014 maximum production of mango leaf hoppers was encountered from April to May while no populations were recovered from December to January. In her observation, *Amritodus atkinsoni* was dominant on the trunk while *Ideoscopus clypealis* was dominant on the shoot, leaves and inflorescences. *Ideoscopus niveosparsus* was though present but not dominant in the state.

The **third oral presentation** on "Differentiation of weevil species belonging to genus *Strenochetus* Pierce (Coleoptera: Curculionidae)", was made by Salam Rita Devi from IARI. The speaker elaborately described the identification technique of the genus *Sternochetus* (Coleoptera: Curculionidae). She documented the occurrence of *S.mangiferae*, *S. gravis*, *S. olivieri* from India; of which *S. olivieri* was a quarantined pest of mango in many countries and was reported for the first time in Manipur, India.

Dr. S. K. Gunri from BCKV spoke on "Survey work of pest and disease situation in farmer's field of major groundnut growing areas in Hooghly and Nadia district in West Bengal" in the **fourth oral presentation**. He enlisted several pests and diseases of groundnut from the Nadia and Hooghly districts of West Bengal after conducting an extensive roving survey from 2015 to 2016. In his findings, Spodoptera, Helicoverpa, leaf minor and Jassids were major pests whereas late leaf spot, collar rot, stem rot and rust were predominant diseases of groundnut irrespective of growing seasons.

The **fifth oral presentation** was made by Prof. B. K. Das of BCKV on the topic "Insect and mite pests associated with ashwagandha, *Withania somnifera* (L.) Dunal, in the Gangetic plains of West Bengal". They recorded altogether 17 insects and mite pests of Ashwagandha (*Withania somnifera*) from the Gangetic plains of West Bengal. He reported, *Spilosanthes hospes*, Nysius seed bug and red cotton bug, *Dysdercus koenigii* and red spider mite, *Tetranychus neocaledonicus* as new pests of Ashwagandha (*Withania somnifera*).

In this session, the recommendations came out as -
Consider both pests and diseases while addressing IPM packages for any crops.
Be careful about the presence of traces of *Pseudomonas aeruginosa* crude extract while spraying on plants as they are human pathogens.

The session ended with a thanks from the chair.

Technical Session II: GAP vis-à-vis

The session was moderated by chairman Prof. S. K. Sanyal and rapporteur Dr. Hirak Banerjee. There were five lead lectures and three oral presentations presented in this session as follows.

The **first lead lecture** was delivered by Prof. S. K. Sanyal, Ex. VC, BCKV on "Soil Science Research: a relook in the current context". The important thrust areas of research relevant to the Indian conditions were discussed in brief. He opined that improper and imbalanced use of chemical fertilizer coupled with less organic manure has resulted in the deterioration of soil health with widespread nutrient deficiencies. He highlighted the environmental burden of fertilizer like there is a distinct possibility of nitrate contamination in groundwater due to excessive and indiscriminate use of nitrogenous fertilizer. INM could be a viable option. Productivity-driven production goal is the need of the hours, where only organic manure plays a significant role. According to him, water management strategies should also be in place because heavy metal pollution is the major concern of the present day. Conclusively the importance of nutrient-water interactions has got to receive major priority.

Prof Pranab Hazra, Department of Vegetable Crops, BCKV gave the **second lead lecture** of the session on the topic "*Good Agricultural Practiced for Sustainable Agriculture and Rural Development*". Slow agricultural growth is a concern of policymakers. Going forward, it will be essential for India to build a productive, competitive, and diversified agricultural sector and

facilitate rural employment. Therefore, good agricultural practices (GAP) is the need of the hour which refers to the practices that address environmental, economic and social sustainability for on-farm processes and result in safe and quality food and non-food agricultural products.

The **third lead lecture** on the topic "Good Agricultural Practices (GAP) for Quality Assurance of Raw Drugs from Medicinal Plants" was delivered by Prof. Satyabrata Maity, Former Director, DMAPR, Anand. He narrated the Indian systems of quality assurance in medicinal plants.

The **sixth lead speaker was Jayanta Chakraborty of Indofil Pvt. Ltd. Who spoke on the topic "Role of agrochemical industry in developing sustainable agriculture".** Increasing demand for food as the population is growing day by day, challenged posed by shrinking land availability, and increasing nutritional and energy requirements, the share of agriculture in national GDP has declined. So, sustainability issues should be addressed. Technology makes a difference and plays a key role in meeting food requirements. The set gain on account of technology in agricultural export shot up preventing food losses and contributing to food security and agriculture sustainability. The use of agrochemicals can reduce crop loss with a good cost-benefit ratio. Agrochemical used in India is highly regulated and green chemistry-based chemicals with low doses used which is good for the environment.

Second oral presentation on *"Azolla* Lam. as bio-fertilizer for sustainable rice production: an experimental study using one of the commercial rice varieties (MTU 1010) of West Bengal, India" was delivered by Subhendu Dey, Department of Botany, Kalyani University. He discussed the importance of Azolla as a biofertilizer for sustainable rice production. He concluded that the application of Azolla and cow dung along with chemical fertilizer may increase the yield and more importantly soil productivity as they ultimately lead to sustainable agriculture.

Third oral speaker was Pragun Pal, Department of Plant Physiology, BCKV. The topic was "Impact of paclobutrazol (PBZ) on alternatively bearing mango (*Mangiferaindica* L.) cultivar Himsagar under West Bengal situation". The results indicated that the September application of paclobutrazol (2.5 ml i.e. PBZ/tree) induced profuse flowering in the off-year of the alternative bearer cultivar, Himsagar and thus regularized its bearing habit and enhanced its yield.

Technical Session III: Impact of climate change on biodiversity and Plant Health

The Technical Session III was chaired by Dr. D. B. Ahuja and the rapporteur was Prof. A. Saha, wherein three lead papers and three oral presentations were presented.

First lead paper was presented by PunyaslokeBhadury, Department of Biological Sciences, Indian Institute of Science Education and Research on the topic "Climate change along the land-ocean boundary and implications for coastal agriculture". Anthropogenic climate change will affect food security in the global, national and local food systems. Global temperature will rise, melting of ice glaciers, rise in the sea level, impact in coastal agriculture. Climate refugees

in the urban areas are increasing HadGM2 model was used to show that Bengal coastlines are becoming more vulnerable. The calcium content of the soil is increasing because of less freshwater flow towards the sea in the Sundarbans. 30% of added CO2 is absorbed by oceans increasing acidification of ocean water and affecting ocean fauna. Ocean acidification surely affects agriculture in the boundary areas of land and oceans.

The **second lead lecture** on the topic "Emerging threats of insect pests and diseases in vegetable ecosystem under changing climatic scenario: an appraisal" was delivered by Dr. J. Halder, ICAR-Indian Institute of Vegetable Research, Varanasi, Uttar Pradesh. The pests of tomato, brinjal, chilli, and okra have been studied. Intensive mono-cropping, off-season cultivation, wider pest activity over time and space, loss of efficacy, and impact on natural enemies are some of the reasons for increasing the incidence. Mealy bug and fruit borer changed their host. There are emerging and reemerging pests. Tomato pinworm is an emerging pest. The yellow sticky trap has been successful against such pests. Sponge and ridge gourd were screened against melon weevil. Chilli gall midge is another emerging pest. Two parasitoids, Eurytoma, have been found effective against spotted pod borer. Mealybugs damaging tomato, brinjal and chillies are due to quarantine failure.

Third lead paper was presented by Dr. D. B. Ahuja, NCIPM, New Delhi on "E-pest surveillance for large-scale implementation of IPM". Due to intensive cultivation food production is increasing, but the area is not increasing in the same manner. Input consumption is also largely also increasing. IPM modules were developed. However rapid surveys were done using manual methods. Inefficient implementation of IPM due to traditional methods of technology dissemination. There is a time lag between pest occurrence and IPM implementation. Better detection and rapid validation are required. Thus, a crop-based e-pest surveillance system and advisory were developed. The system involves a Pest scout, Pest monitor, data approver and specialist giving advisory based on many data loaded at a time in a server. ETL-based recommendations were developed and disseminated through SMS. Mango, pigeonpea, groundnut, tomato and mango were the crops for which this programme was undertaken. Because of efficient surveillance through this mechanism, pest-related damage was reduced over time.

The fourth lead paper was presented by Prof. **Lalu Das and he critically analyzed the past and present climate scenario of West Bengal and their effect on agriculture using** a crop simulation model. District-wise monthly data from 1901-2000 are obtained from both historical and future GCM data obtained. 21 GCMs were used. SD and CV% were used to analyse data. Trend analysis was done for the decadal period. North Dinajpur recorded minimum rainfall and Jalpaiguri received the highest rainfall over historical periods. For annual rainfall, South Dinajpur, Nadia, and East Medinipur showed a decreasing trend, others increasing trend over 100 years. During 1991-2000, South Bengal showed a decreasing trend over previous decades. GCM shows variations in trend because of cloud factor assessment which is different among models as cloud has both negative and positive effects. Only those models were highlighted where the d-index was >=0.86, nRMSE<53, Correlation=0.91. Taylor

plot is also suitable for model evaluation, which was used to screen 11 and 9 models for South and North Bengal respectively. To avoid errors in GCM output over smaller regions, downscaling is recommended. Simulation models show actual rice production is half of its potential. Due to an increase in temperature by 2 deg C rice production may be reduced by 30%. Some models are suitable foe North and south Bengal, respectively.

The **first oral presentation** was made by S. K. Sahoo, Pulses and Oilseeds Research Station, Berhampore, Murshidabad, West Bengal on the topic "Incidence pattern of alate mustard aphid about meteorological parameters in New Alluvial Zone of West Bengal". The effect of weather parameters on mustard aphids has been presented. Late sown mustard sometimes recorded 30-90% loss of crop yield. Yellow sticky trap was used to monitor alate insects. Alate form was observed during 1st SMW then it gradually decreased with slight fluctuation and declined after March. The temperature had some positive effects and RH had some negative effects on the number of insects trapped. Tmax<30 and Tmin<15 have been found to encourage aphids. With the maturity of the mustard crop, insect population gradually decreased. Timely sowing, by 15 October is recommended.

The second oral presentation on "Impact of abiotic stresses and organic fertilizer on the population of sheath mite, *Steneotarsonemusspinki* Smiley infesting rice and its management in the plains of West Bengal" was made by Suvash Chandra Bala. Rice sheath mite has been destructive in West Bengal in recent years. Infestations cause chaffy grain and brownish patches in the plot. Various organic nutrients were tested for pest control. The pest population was maximum in the booting and reproductive stages. Chemical nutrient-treated plots showed greater infestations as compared to fields treated with organic amendments. Minimum temperature and high RH were positively correlated with the mite population.

The third presentation was made by Tasvina R. Borah on "Emerging diseases of *Sclerotinia sclerotiorum* in India with special reference to the eastern and northeastern region". *S. sclerotiorum*, a soil-borne fungi is causing emerging diseases of agricultural and horticultural crop species. The variability of isolates was screened from various regions of eastern and northeastern India. 47 hosts have been reported in India. In West Bengal, maximum hosts were recorded in Hooghly and Nadia districts in the south and the Jalpaiguri district in the north. The morphological variations of various isolates collected over various agroecological regions were studied. The pathogen gradually increases the host ranges over time with the changing climate scenario.

Poster Presentations were organized on both days in the afternoon post-lunch break. Posters of technical sessions 1, 2 and 3 were clubbed together on the first day and evaluated by a panel of judges. A total of 13 posters were presented including emerging plant diseases, occurrence and distribution of plant diseases, insect pests and nematodes, etiology, epidemiology and management. Three posters were adjudged for the prize as follows: TS-1/PP-14 Saswati Roy (BCKV, West Bengal) Pest and beneficial birds in crop fields of West Bengal. TS-1/PP-02 Shrinwanti Dutta (West Bengal State University) Diversity of *Phytophthora melonis* populations from a pointed gourd in West Bengal. TS-1/PP-07 Sandip Mondal (Indian Statistical Institute, Jharkhand) Spatial distribution of rice white tip nematode (*Aphelenchoides besseyi*) infestation in Giridih district of Jharkhand, India

The Technical Session-IV entitled **Competition Papers** for '**Shashya Suraksha Yuva Pratibha Award**' was held wherein 16 participants selected from different Institutes contested. The session on the Award Contest was moderated by Dr. M.R. Khan, IARI, New Delhi and Dr. S.K. Ray, Associate Professor, Dept. of Plant Pathology, B.C.K.V, Mohanpur, West Bengal. The candidates who contested for the medal were Aditi Kundu, (IARI, New Delhi), Shubham Dey, (B.C.K.V, West Bengal), Satyajit Hembram, (U.B.K.V, West Bengal), Sitesh Chatterjee, (Rice Research Station, Dept. of Agriculture, Govt. of West Bengal), Subhash Handsa, (KVK, Badakumari, Odisha), Kanishendranath Sarker, (B.C.K.V, West Bengal), Siddhartha Das, (B.C.K.V, West Bengal), Debashish Roy, (B.C.K.V, West Bengal), Ayasha Ahmed, (IARI, New Delhi), Gayatri Padhi, (B.C.K.V, West Bengal), Abhijit Ghoshal, (RKMVU, Kolkata), Adam Kamei, (B.C.K.V, West Bengal), Amrita Sengupta, (B.C.K.V, West Bengal), P. Bhumita, (B.C.K.V, West Bengal), Palash Sidhya, (B.C.K.V, West Bengal), Rama Devi, (B.C.K.V, West Bengal),. Diverse research findings which includes topics Synthesis, molecular docking and antifungal activity of furoic acid and nicotinic acid hydrazones as succinate dehydrogenase inhibitors against *S. sclerotiourm,* Late blight of potato in West Bengal: spore biology, prediction and management, CucuMil: a promising downy mildew forecast model for cucurbits in India, Management of rice insects by granular formulation of chlorantraniliprole along with foliar sprays of some molecules, Variability of different isolates of *S. sclerotiorum,* and its management, Native Flourescent Pseudomonas: Diversity and role inplant health management under different agro-ecological regions of West Bengal, Studies on variability, epidemiology and management of twig blight of chilli caused by *Coanephora cucurbitarum,* First record of *Megaseli ascalaris* (Loew) as a potential facultative parasitoid of *Aphis mellifera* in India, Characterization of two important important genera of coccids (Coccoidea: Monophlebidae) infesting mango through integrative taxonomy, Studies on co-inhabitation effect of sucking insects and root knot nematode (*Meloidogyne incognita*) accompanied with different nutrients regimesin tomato, Studies on seasonal abundance, molecular characterization and insecticidal management of whitefly in Brinjal, Influenceof weather variables on foliage diseases of tomato under Gangetic Alluvial region of West Bengal, Enhancement of groundnut (*Arachis hypogaeaL*.) productivity through isolated *Rhizobia* and phosphate solubilizing bacteria (PSB), Bioecology of Erythrina Gall wasp, *Quadrastichusery thrinae* Kim, a new aggressive and invasive gall inducing pest in India, applied mutagenesis by gamma rays in snake gourd (*Trichosanthes anguina* L.), Preference for and performance of oriental fruit fly, *Bactrocera dorsalis* on some guava varieties and identification of fruit phenotypic markers for tolerance were presented respectively. All the contestants observed the time limit of 15min.The presentation came to an end with the remarks by Dr. M. R. Khan who complimented all the students for their scientific merit. The quality of presentations was evaluated by a panel of judges and out of the 16 presentations four presentations were selected for cash prize awards: SSYPA/2016-06 1st award was rendered to Mr. Kanishendranath Sarker, (B.C.K.V, West Bengal) Native Fluorescent Pseudomonads: Diversity And Role In Plant Health Management Under Different Agro-Ecological Regions Of West Bengal. SSYPA/2016-14 2nd award was rendered to Dr. P. Bhumita (B.C.K.V, West Bengal) Bioecology of *Erythrina* Gall Wasp, *Quadrastichuserythrinae* Kim (Hymenoptera: Eulophidae), a new aggressive and invasive gall-inducing pest in India. SSYPA/2016-16 3rd award was rendered to Rama Devi (B.C.K.V, West Bengal) Preference for and performance of oriental fruit fly, *Bactrocera dorsalis* (Hendel) on some guava varieties and identification of fruit phenotypic markers for tolerance. SSYPA/2016-01 commendation award was rendered to Dr.

Aditi Kundu, (IARI, New Delhi) Studies on seasonal abundance, molecular characterization and insecticidal management of whitefly in Brinjal.

Technical Session V: Biotechnological interventions in biotic & abiotic stress management

This technical session was moderated by Dr. Niranjan Chakraborty as the chairman and rapporteur were Dr. Bikash Mandal, wherein four lead papers and three oral presentations were presented. The first lead paper was presented by Dr. Niranjan Chakraborty, National Institute of Plant Genome Research, JNU, New Delhi on the topic "Understanding plant response to stress: a strategy for turning knowledge into application" wherein he described the structure, expression and stress-responsive function of the chickpea ferritin, CaFer1. He opined that the findings would not only provide new insights into the underlying mechanism of adaptive response but may also facilitate the targeted manipulation in crop plants for better adaptation to environmental challenges.

The second lead talk was presented by Dr. Dilip K. Gosh, ICAR- Central Citrus Research Institute, Nagpur on the topic "Developing biotechnological tools for diagnosis, characterization and management of systemic diseases of citrus in India". He gave an account of the diseases affecting the citrus in the country and discussed at length the molecular tools used for the diagnosis of viral, viroid and greening diseases. He also mentioned the procedure followed to produce certified budwood production of citrus and other novel disease management approaches.

Dr. P. K. Mandal, ICAR-NRCPB, New Delhi, presented the third lead paper on the topic "Approaches to understanding the genetic basis of efficient nitrogen utilization for grain yield". He elaborated on the ways of identifying the N-utilization efficient genotypes to combine the uptake and utilization of N in a genotype to derive a good Nitrogen Use Efficiency trait.

Dr. Bikash Mandal, Division of Plant Pathology, IARI, New Delhi, presented the fourth lead talk on "Application of genome sequence information in diagnosis of plant viruses in India". He gave an account of the historical background of the recent advances in the diagnosis and detection methods of plant viruses. He primarily focused on the breakthrough achieved in virus detection in India with the development of diagnostic kit prototypes.

The first oral presentation was made by Sourav Sarkar, Division of Entomology, IARI, New Delhi, on the topic "Characterization of native *Bacillus thuringiensis* strains against *Spodoptera litura* and *Spodoptera exigua"*. Forty native Bt strains from various habitats were screened for insecticidal activity against neonates of *Spodoptera litura* and *Spodoptera exigua*. Out of 22 strains, the Lep1 gene was identified in 10 strains and in six strains no cry gene was found.

Second oral presentation was made by V. D. Shende, BCKV on the topic "Development of brinjal hybrid for export promotion from West Bengal". The study identified three outstanding brinjal hybrids as Gujrat Brinjal Round X BCB-10, Gujrat Brinjal Round X 10 BRR Var-2, and BCB-10 X BRR Var-2 having all desirable traits for export from the Gangetic plains of West Bengal. These hybrids, being highly tolerant, are promising to do away with the indiscriminate use of pesticides against fruit borer infestation.

The third oral presentation was made by U.B. Oraon on the topic "Molecular diversity of begomoviruses infecting chilli in West Bengal". He reported the incidence of chilli leaf curl disease up to 90% at farmers' fields in different locations. The Joydebpur, Bangladesh isolate is predominantly infecting chilli in the northern and southern parts of the state which is the most limiting factor for chilli production. The initial data on recombination analysis of the isolates of ToLCV and pepper leaf curl virus shows the evolutionary potential of this group of virus infecting chilli.

Technical Session VI: IPM including agro-ecological approaches for management of plant pests and disease

The Technical Session VI was chaired by Prof A. Chowdhury and rapporteur Dr. M. R. Khan wherein three lead papers and three oral presentations were made.

Dr. P. Basu, Prof. Dept. of Zoology, Calcutta University made the **first lead presentation** on "Pollination crises in Indian agriculture and way ahead" where he focused on the declining yield of pollinator-dependent crops concerning vegetables and other horticultural crops due to the application of pesticides. He also mentioned pesticides that disturbed the physiology of honey bees and suggested a pollination service index >1.0 for the use of pesticides.

The **second lead presentation** was made by **Dr. K. K. Biswas**, **Division of Plant Pathology IARI,** on the topic "Biotechnological approach for management of cotton leaf curl begomovirus disease in northwest India". He presented the status of the cotton leaf curl virus in north India, its distribution, molecular characterization and management of this virus. He suggested a protocol for molecular screening and some progeny of cotton varieties obtained by inplanta transformation.

Third lead lecture was delivered by **Dr. M. R. Khan, Division of Nematology, IARI** on the topic "Root nematode infestation in guava: an emergent nematode problem in India". He presented that the infection of root-knot nematode in guava is an emerging problem in T.N., U.P., Bihar and W. B.

Dr. S. Pal, Department of Agronomy, BCKV, made the **first oral presentation** on the topic "Evaluation of different weed-control methods on diverse weed flora and yield of transplanted **The** second lead lecture **was presented by Dr. A. Banerjee, Asst. Prof., B.C.K.V., presented field results to control the rice blast disease by using Tricyclazole through the topic** "**Evaluation of front line demonstrations on summer rice through management of blast disease".**

Dr. K. Roy, Asst. Prof., Dept. of Agril. Entomology, BCKV made the **third oral presentation** on the topic "Morpho-anatomical changes of rice root induced by *Meloidogyne graminicola* Golden & Birchfield". Through the study, he showed anatomical changes in resistant rice varieties due to the infection of *M. graminicola*.

In this session, there are no specific recommendations that came out of the above presentations. The session ended with a thanks from the chair.

Shashya Suraksha Best M.Sc. Dissertation Competition

Thereafter ShashyaSuraksha Best M.Sc. Dissertation Competition was held wherein participants selected from different Institutes contested. The candidates who contested for the merit medal were Subhramalya Dutta, (B.C.K.V, West Bengal), Shreyasi Mallik, (B.C.K.V, West Bengal), Prasun Karmakar, (B.C.K.V, West Bengal), Soumita Pal, (B.C.K.V, West Bengal), Darsana Dilip K. C., (B.C.K.V, West Bengal), Ankit Kumar Ghorai, (PAU, Punjab), Debashis Roy, (B.C.K.V, West Bengal), Yashi Umbrey, (CAU, Barapani), Krishna Ray, (B.C.K.V, West Bengal), Rakesh Pashi, (B.C.K.V, West Bengal), Uday Bikash Oraon, (B.C.K.V, West Bengal). All contestants presented their work in poster form. Diverse research findings which includes Manifestation of yield and disease tolerance in the hybrids of tomato (*Solanum lycopersicum*),Growth, yield and quality attributes of garlic as influenced by herbicidal and manual options in managing weeds, Host-parasitoid relationship between *Phenacoccus solenopsis* Tinsley and *Aenasius bambawalei* Hayat on cotton, Evaluation of Gerbera varieties against yellow mite *Polyphagotar sonemuslatus* (Banks) (Acari: Tarsonemidae) emphasizing its population dynamics and acaricidal management under greenhouse condition, Studies on cultural behavior of some biocontrol yeasts and their bioactivity, Occurrence, variability and transmission of *cucumber mosaic virus* (CMV) and *Zucchini yellow mosaic virus* (ZYMV) infecting potato and cucurbits in Punjab, An attempt to develop different package of practices to mitigate insect pests of okra in a sustainable way with special reference to positioning cluster bean as a trap crop of leaf roller, Identification and characterization of yellow mosaic virus(s) associated with yellow mosaic disease of legumes in mid-hills of Meghalaya,

Mr. Mahitosh Biswas received the award for innovative technology - green fungi management in mushrooms and growing different types of mushroom. More than 90% management of the green fungi in mushrooms use Sodium benzoate @ 5 g/ kg of dry straw.

Mr. Kutub Uddin Biswas also bagged the award for innovative technology - Ber is a heavy-bearing crop and when the fruit matures the brunches breaks due to the heavy load of the fruits and on the other hand, due to profuse branching the orchard becomes very dense and so intercultural operations as well as the harvesting of the fruits become very difficult even due to insufficient light and aeration production also hamper.
To avoid this problem, he started the high-density cultivation of Ber on the scaffold.
In this method the width of the scaffold is 6 ft., the distance between two scaffolds is 4 ft and the seedlings are planted on both sides of a scaffold in a 4.5 ft gap.

In this method, production is 80-90 q/ 0.133 ha in the first year and it remains the same in the coming year.
The main advantage is due to the gap between the scaffolds intercultural operation as well as harvesting become easier. Enough aeration and sunlight penetration are there in the orchard which reduces the pest disease problem. Fruit shape and size also improve in this method. But initial investment is quite higher in this process.

RECOMMENDATIONS OF THE SYMPOSIUM:

I. IPM based on specific pests or diseases do not give overall protection to the crops. Hence, IPM should be developed for the major pests and diseases of the crops to harness maximum benefits.
II. The technologies developed or the innovations of the progressive farmers should be well spread from lab to land and from one area to another area through an effective Extension mechanism.
III. Models developed for disease and pest forecasting to be evaluated in different regions for validation.
IV. Taxonomic papers are very few in different symposiums, so basic taxonomic research should be carried out.
V. National level Plant protection (Entomology, Plant Pathology, Nematology, Weed Science, Agril. Chemicals) M.Sc. Dissertation award competition may be organised by ICAR to encourage young talents for innovative research.
VI. Manual for GAP for different crops should be prepared in consultation with ICAR, SAUs, KVKs and Private sectors.
VII. Field-level research on the application of biocontrol and nanotechnology for plant biotic stress management on a large scale.
VIII. Fine tuning of farmers' identified innovative technologies for large-scale commercial use.
IX. Application of ICT for e-advisories to farmers for biotic/abiotic stress forecast and management.
X. More research emphasis should be given to non-conventional plant biotic stress management.