ASSOCIATION FOR ADVANCEMENT IN PLANT PROTECTION

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## Looking Back

After spending a year, the toddling AAPP, stood up to the testing times to organize its first Annual General Meeting on 30th May, 2007 while trying to live up to its logo '*Together we will protect our crops*'.

Teething problems for the first year were enormous, a resultant of trying to meet the fund requirement on a shoe-string budget and the variable commitment of its core groups at academic and professional levels. It became obvious that it takes a little time and a lot of energy to grow up and mature into a coherent team. This seems to be true of the more sunburnt teams like the BCCI, in cricketing parlance.

Be that as it may, one can look back to the year 2006-07 with some kind of satisfaction in having achieved the small things. The first english newsletter was collated, printed and kick started in a record time of only two weeks to be launched by the Chief Minister of West Bengal, Sri. Buddhadeb Bhattacharya on 30. 01.06. Since then the Newsletter, scheduled to be produced quarterly, did so almost too regularly to be true. Yet the Newsletter, far from being a routine publicity material of an Organization, became a source of breaking news in the gray margins of crop protection. Our distribution system is still to get over the initial hiccups, be it through internet or post copies. We however keep on inviting the Plant Protection fraternity to give us a feedback, of projecting their thoughts on the character or other peripherals, almost invariably in vain. We have failed as yet to pack enough punches to bring out our fraternity from its subtropical languor. We hardly receive any response, not even calls for hard copies, PDF copies, less said the better about becoming members or filling up our proforma for a National Register for Plant Protection Scientists.

Midway through the first year, the Association, having felt a void in the approach to reach out to our primary target population - the farmers, came up with a regional language version *'Sashya Suraksha'* designed and specifically targeting the former. Sashya Suraksha identified the primary pest problems of coming crops through descriptive and pictorial presentation, albeit briefly, so that the farmers can by themselves identify the major problems and decide on a pest management schedule. We were at a phone calls distance to resolve the more contentious issues and believe me, we were on call repeatedly. The first issue was a brilliant success, both for its sudden appearance in the horizon as a silver lining and its contents and all prints, priced modestly, were used up avidly. Unfortunately, having published 3 issues almost on schedule, the tropical somnolence is perhaps catching up with the team and the 4th issue is inordinately delayed. Hopefully it will be out on the racks soon.

Sashya Suraksha was incidentally launched formally on 28th June 2006 by Dr. G. C. Tewari, the ADG (Education & Planning), ICAR, who appreciated the efforts of the AAPP for mass awareness and participation in plant protection.

The 8th July, was another landmark day for AAPP who, jointly with EI Tel Agro Marvels Pvt. Ltd., organized a *'Nematode Awareness Day'* with the objective of providing both dealers and farmers a ground level, hands-on training on identifying nematode problems and their management, both in the field, in nurseries and greenhouses. Over 80 participants from Nadia, 24-Parganas (N), Maldah, Murshidabad, Bankura, Purulia, Birbhum, Bardhaman, W. Dinajpur and Jalpaiguri districts assembled and benefited from a no-frills training programme. The only frill was a brief inaugural session, wherein Dr. S. K. Laha, Principal Scientist, CRIJAF (ICAR) made a power point presentation on the *'Association of nematodes with man, animal, insect and plants'*. For those participating, it was almost a first visual glimpse of truely plant parasitic nematodes! Unfortunately, the proposed continuation of the programme on the same date each year could not materialize this year for lack of backing from the Industry so indispensible in organizing such programmes. Without the enthusiastic participation of the market managers, such training are likely to become an academic exercise.

The AAPP scientists also participated in several programmes and workshops like State Level Workshop on Exploring Export Potentialities of Mango from West Bengal and its Secretary, Dr. Shantanu Jha remained involved in several programmes of the State Council


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# Genomics and Plant Protection

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The biological process of co-evolution between plants and their enemies such as fungus, bacteria, virus, nematodes etc. might have emerged simultaneously in the domain of biological diversity. More associations of host-pathogen interactions resulted during the domestication of crop plants by human intervention. It is also evident that this co-evolution of host-pathogen occurs in cycles. Initially, natural selection forces the evolution of new resistance character. Later, morphological and chemical diversity result in the process of evolution to acquire the adaptation for the defensive role against the microbial attacks. The current cycle continues as the breeders release new resistant variety and moves on with the breakdown of the resistance and as counter co-evolution continues in the same or modified manner. Disease or pest control is based on the principle of maintaining yield loss below an injury level. In most cases, fungicides/pesticides and biological control including crop rotation, IPM (integrated pest management) is used for plant protection. Conventional breeding for plant protection suffers from a series of limitations that include lack of resistant genotype (e.g. sheath blight of rice caused by *Rhizoctonia solani*), reproductive barriers between plant species preventing transfer of resistant genes, etc. Plant species generally possesses its immune system, which signals a cellular response and leads to the death of the attacking pathogen. Plant recognizes pathogen encoded molecules through probable receptors encoded by disease resistance *R* genes. A signal transduction study provides an excellent understanding of gene for gene resistance, which explains plant pathogen co-evolution in a given environment. The first cloned R gene, *Hm1* was obtained through transposon tagging. Later, chromosome walking (positional cloning) and heterologous transposon tagging made it possible to clone many genes used for plant protection. Developing varieties resistant to natural enemies (virus, fungi, bacteria etc.) would provide a solution for sustainable agriculture. This approach is inexpensive, environmental friendly and management would be easier than before.

Genomics implies DNA sequencing, routine use of DNA microarray and proteomics. Genomics based strategies for gene discovery, coupled with validation of the transgenes by transgenesis have accelerated the identification of functional profile of candidate genes. Genomics indicates the biodiversity in a crop and the inventory of allelic diversity at loci contributing to agronomic traits and ultimately to molecular breeding aiming for crop improvement including plant protection. Since the paradigm of the *Arabidopsis* genome as a genetic roadmap of plant genome, rice emerged as a model cereal food crop for plant gene function of agronomic traits and legume genomics is placed with the diversity and the phylogenetic relationship with distantly related species. It is also important to explore the wild species and characterize the genes for further use rather than only storing them in the gene bank. The recent genome sequence developed by Monsanto, Syngenta, BGI (Beijing Genomic Institute) and the ongoing research at International Rice genome Sequencing Project at Tsukuba, Japan in rice and *Medicago* genome sequencing by NSF and partners in Europe will accelerate gene discovery and help crop improvement.

Databases in Systems Biology studies on genomics are generating enormous knowledge, which requires organized or centralized system of storage of what is referred as databases of modern biology. Bioinformatics allows the dissemination of this information-based well managed databases. The current knowledge allows us to understand the integration of Genomics, Physiological Functioning, Host-pathogen/pest interaction, Genetics and Plant breeding translating into Systems Biology. Considering the tremendous value of genomics research for crop improvement, broad collaborations in genomic research involving private and public sectors with emphasis on the need to provide the best science to serve the farmers' perspective of economic gain of agriculture growth is an urgent need. Improved seeds and germplasm of high value genetic resources remain in the public domain whereas the most of the genomic tools used in modern bioscience including functional genomics are patented under the National and International agreements. The present gene evolution based on genomics study should provide wide scope of its application across the ecosystems and crop barriers.

Farmers require improved seeds/crops. Biotech based packages of improvement as complimentary tools of plant breeding can be incorporated in the seeds which should reach the farmers with further information and confirmation of its safety, practice and management. The availability of various cultivars with different resistance genes could significantly reduce the yield loss. Assuming a minimum yield loss of 1% due to bacterial blight (BB) disease caused by *Xanthomonas oryzae,* around $320 million over 30 million ha with an average yield 5.5 t/ha in China whereas, a yield loss of 0.75% covering 132.5 million ha with an average yield of 3.6 t/ha in Asia translates into $715.5 million. This *ex ante* analysis shows the economic impact of BB protected plants in Asia. Genes pyramiding for broad spectrum plant protection will have much greater economic impact when available. The policy makers should look into its potential use and make necessary access to the Intellectual Property Rights (IPR) irrespective of the nature of ownership. IPR should not be a barrier of moving the technology for the benefit of human welfare.

The editors solicit comments,opinions, for or against the thought muted by the author.They will be published in the next issue.

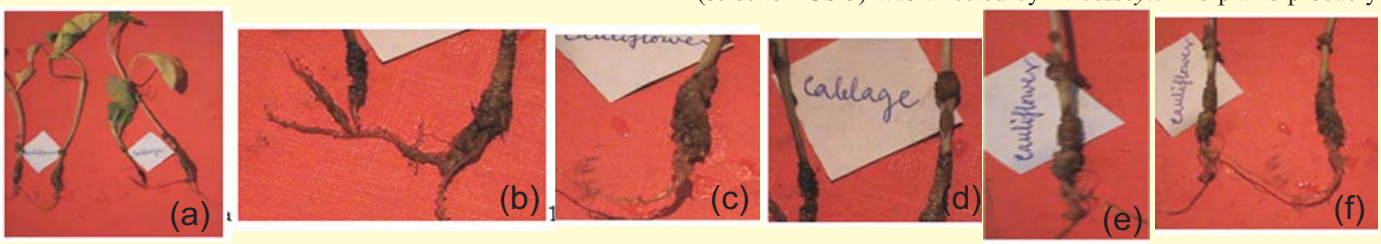
*(Brought from page 1 : Editorial)*

& Technology and Department of Food Processing, Industries & Horticulture. It is to be hoped that both public and private sectors will join hands with the AAPP to make such programmes more farmer friendly.

The initially proposed **National Symposium on 'Plant Protection-Technology Interface'** was delayed but has now been finalized to be held on **28-29th December, 2007**. We have several sessions on plant protection all at the cutting-edge technologies that are breaking into the agricultural arena. We are, fortunately, receiving international participation especially in the more fundamental platforms of the Symposium. We hope all Institutions having an agenda in plant protection will put in their representation and thus help finalizing a future line of action commensurate with the needs of the Nation.

Another breaking interface on agriculture in general and plant protection in particular is the climate change coming on to us onerously like a Nostradamus unplugged and we focused on the various aspects of it briefly in our Jan-March issue of 2007. Finally, the matter of climate change was brought to greater focus with elite discussions on the various issues involved by several stalwarts including Prof. A. N. Bose, Chairman, WBPCB, Ex-Vice-Chancellor of Jadavpur University and Dr. L. S. Rathore, Advisor ,National Centre for Medium-Range Weather Forecasting on the day of our AGM, i.e. 30$^{th}$ May '07 under the garb of a seminar on ***'Global Climate Change: Impacts on Agriculture.'*** Dr. Rathore aptly concluded his presentation saying 'we can keep on warning about the serious consequences of climate change but, as the AAPP says, will the concerned administrative authorities wake up to this stark reality!

**Crown gall of Cabbage and Cauliflower : A new record from West Bengal, India and its significance -**For the first time crown gall has been found on seedlings of cabbage and cauliflower in India. The problem occurred in seedbeds of field soil (collected from a plot with rice-vegetables annual cropping pattern) and farmyard manure mix on platforms raised on and with bamboo sticks. Collapse and decay of 100% seedlings were observed in two to three weeks in around a thousand seedlings of each sub-species. Both seeds had been supplied by a roving vendor.




A number of round, tiny, spongy, soft and whitish girdling outgrowths first appeared in root, stem and crown on each seedling but became evident obviously in the opposite sequence. The minute galls soon turned into large, convoluted, rough-surfaced, knotty, dark brown tumours that seemed to rot in a few weeks. The tumours were discontinuous running into one another but mostly composite, looked as if a number of infection foci was present on a single seedling. Once the Ti plasmid is formed, it translocates and causes tumours to form and develop without any active presence of *Agrobacterium tumefaciens* (At). The At tumours ranged from 3 to 7 mm in diameter with the host axis at the centre. Gall sizes on crowns, stems and roots were the largest to the smallest, respectively. Leaves appeared chlorotic and drooping (Figure 1 a-f).

In India, temperate stone fruits in nurseries grown in the subtropical hills such as peach, pear, plum, and raspberry are affected in Himachal Pradesh, and in the subtropical plains in grape vine in Andhra Pradesh.

At is able to survive as a saprophyte in soil for several years without any host, when the population is diminished. It survives at low levels for less than two years--being best at the optimum temperature of 22$^0$C. Host penetration is possible through any injury to roots, commonly inflicted by the intercultural tools. It spreads with running water and soil drift & agricultural tools & implements. Yet seedlings may remain symptom less for long.

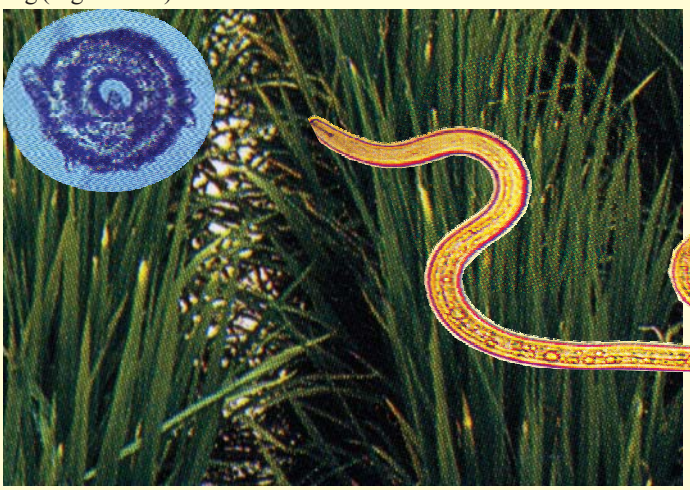
Excellent biological control of crown gall can be achieved by soaking germinated seeds or dipping nursery seedlings in a suspension of a particular strain (K 84) releasing bacteriocin, agrocin of *Agrobacterium radiobacter* or else, *A. radiobacter* var. *radiobacter* Strain K1026 live culture can be used, if available. It is time to make one or both isolates available to farmers across the country in short notice.

We are thankful to **Sri Himangshu Mondal**, District Plant Protection Officer, Paschim Medinipur, and **Sri Ranajit Poddar**, Agricultural Development Officer, Block Binpur 1, who brought the problem to our notice during September, 2006.

**Partha Pratim Ghosh**, Research Scholar, and **M K Dasgupta**, Former Professor & Hony. Professor, Department of Plant Protection, Visva-Bharati, Sriniketan, WB, 731236. **E-mail**: ppghosh_santiniketan@rediffmail.com, oikos_santiniketan@rediffmail.com

(**Ed**.:More evidence of pathogen identity above symptom production is required to justify this first claim report.)

**White tip nematode problem in rice :**The white tip disease of rice is caused by *Aphelenchoides besseyi*.The species also induces floral malady in tuberose. *A. besseyi* is a seed-borne nematode distributed in all rice growing areas of the world. However, in West Bengal, this disease was never seen in serious form in rice. Recent survey in 14 districts of the state revealed occurrence of the nematode in rice field in almost all the districts investigated but no development of typical white tip symptom in growth phases of rice was noticed. In Khatra block of Bankura district of West Bengal, about one acre of rice field (selection GS-3) was affected by *A. besseyi*. The plants probably suffer from multiple infections of nematode sheath blight pathogen and mite problems. The standing crop showed abnormalities in branching, formation and initiation of panicles, twisting of leaf and leaf sheath, corrugated leaf margin, concealed abnormal panicle arrested within the leaf sheath, distorted and shortened flag leaf; a few panicles emerged but bearing mostly chaffy and poor number of grains. Laboratory analysis of plant samples revealed involvement of white tip nematode, *A. besseyi* with the disease symptoms. The impact of this nematode on the standing crop is huge and the growers felt cheated by the seed supplying companies in the areas. It is presumed that seeds used by the growers are infected with *A. besseyi* because the nematode is primarily known to be seed-borne and spreads through infected seeds. The same nematode is a serious threat to rice in other states like Andhra Pradesh, Madhya Pradesh and Gujarat. Unregulated movement of poor quality seeds across the State through seed business companies is an alarming threat to introduce new pests including seed-borne nematode in the pests-free monocrop areas of dry tracts of the State.



**Management approaches**:

The nematode can be effectively managed through seed disinfection and growing resistant varieties. Following options and practices are effective to reduce the problem:

(1)Presoaking of seed for 12 hr followed by hot water treatment at 52-53ºC for 10 min is most effective to denematise the seeds; (2) Sun drying of rice on concrete floor on a bright sunny day for 6 hr for four consecutive days reduces nematode in grains ; (3) Field hygiene with clean cultivation and burying of rice stubbles, straw, debris, weeds and new growths after harvest reduce nematode infection;(4) If required, 2-3 sprayings at 10-15 days interval on the standing crop with monocrotopohos at 1 L ha may give good result.

(**Source**: **M.R.Khan & P. Chattopadhyaya,** BCKV, Kalyani.
**E-mail**: mrkhanbckv@rediffmail.com)

# AAPP celebrates its first AGM:Seminar on 'Impact of Climate Change on Agriculture'

The AAPP having focused on emerging and gray areas of Plant Protection through its *Newsletter*, and more down to earth problems through *Sashya Suraksha*, celebrated its march over a year through its **Annual General Meeting** (AGM) on 30th May, 2007 at the auditorium of the Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya, Kalyani. The highlight of the AGM was the prefixing of a concurrent seminar on *"Global Climate Change: Impact on Agriculture"* where invited speakers presented the awesome future of climate-change interfaced with agriculture in general and plant protection in particular.

The seminar was chaired by the President of AAPP, Dr. D. K. Bagchi, Vice-Chancellor, BCKV, Mohanpur.

At the onset, the Secretary of the Association, **Dr. Santanu Jha,** while welcoming the guests and members outlined the salient achievements of the Association over the year, underscoring it's high and low tides.


The President **Dr. D. K. Bagchi** recalled the pleasant memories he had with AAPP since its inception and pointed out that the two quarterly publications acted as bridge, the English Newsletter meant for the men who matter in piloting the nation's science and technology mission forward and the Bengali *'Sashya Suraksha'* directed solely towards the farmers working at the grass root tier of agriculture. The success of *'Sashya Suraksha'*, he pointed out was indicated by all copies being sold out within months of its publication.

Reverting to the topic of the Seminar, Dr. Bagchi said that the focus of attention in the agricultural scenario has shifted to climate change especially since the release of the Summary Report of the 4th Intergovernmental Panel on Climate Change (IPCC, 2007) at Paris. The overall picture painted was one of gloom and doom on the long run if the direction of the climate change is not reversed or at least halted on its tracks. The primary culprit of this gloom and doom appeared to be the unbridled release of greenhouse gasses (GHGs) primarily by the developed countries, those belonging to the G-8 group, who use fossil fuels both extensively and intensively to meet their energy requirements. These primarily are the countries that refuse to sign the Kyoto protocol while imposing restrictions on the less developed countries outside the G-8, blaming them to be primarily responsible for this impending debacle. If the world is to succeed in its mission to arrest the climate change, it has to impose the Kyoto protocol mandatorily on all countries uniformly or even better, primarily direct it for those countries that have a higher per capita use of fossil fuels.

The answer to the question of alternative biosafe options of energy (like the biofuels) that are emerging today, need careful scrutiny and they may prove tricky and elusive as long term uniform supply source. Thus, a world wide word of protest is needed to prevent the GHGs from engulfing the world by changing the consumption pattern. This is more applicable to the G-8 countries till at least such time as when the disaster management became feasible.

Dr. Bagchi closed his address by wishing good growth of AAPP locally, nationally and internationally.

The first lead speaker of the Seminar, **Dr. A.N.Bose**, Hony. Chairman of the W.B. Pollution Control Board, Retd. Vice-Chancellor of Jadavpur University, Chief Guest of the occasion, stated that climate change as it is interfaced with different facets of agriculture has many views, options and critiques. He said he will attempt to present his views as an individual and in the interest of taking *technology to the people*.

'Let us start with a very brief consideration of the 4th Summary Report of the IPCC', Dr. Bose said. The IPCC based its projections on a scientific basis, based on knowledge available at the time of drafting the report. These views are largely vague because of the X-factors that remain unidentified, lacking clarity.

In fact warming is unequivocal - glaciers will melt; sea board will rise. A 0.2 °C rise in temperature is predicted even if the emissions are held at 2000 AD level.

The GHG emission projections far exceed the earlier estimates of IPCC report (2004). The GHG components, primarily $CO_2$, $CH_4$ and $N_2O$ are the major causes of global warming of which $CO_2$ contributes about 70% of the greenhouse effect. For the major emissions of $CH_4$ and $N_2O$, agricultural sector is identified as primarily culprit, leading to India and China being marked up as major players in the climate change scenario. Natcom imposes a mandatory restriction of $CO_2$ emissions to the environment after 2012 on India. Unfortunately, he said, the extent and database of such emissions from India are lacking, less said the better for West Bengal.

Quoting from IPCC report (2007) the major impacts of climate change appeared to be the rise in the sea level thus affecting not only the huge population of coastal settlements especially in South and South East Asia but also the habitat of marine life. Thus higher ocean acidity was likely to affect the marine biodiversity and the coral reefs due to a depletion of calcium.

He expressed that the effects of global climate change will deplete the GDP over a range of 1.5% to +2.5% globally, 4% for Asia, -2 to 4% in Africa while there will be a net gain of GDP in North America till about a projection period of 2030. West Europe will lose in all areas. Dr. Bose said that in agricultural sector, crops will be faced with severe abiotic stress and the temperature rise will have differential effects on soil health and fertility due to enhanced level of decomposition of organic matter.

Warmer situation also changes pest profile. Thus, such situations may enhance pest populations,and intensify--grasshopper-related pest problems are predicted under global warming scenario; altered wind patterns are likely to intensify wind-damage caused by wind-borne pathogen propagules, and virus vectors and these may change the character of pest profile more importantly in perennial crops.

Under Indian conditions, increase in rainfall, thundershowers and thunderstorms are predicted in almost all the States except few like Punjab, Tamilnadu, Gujrat etc. Acute drought is predicted in Krishna-Kaveri command areas while floods will be more frequent in Mahanadi,Assam, Orissa, West Bengal, and North Eastern States will become more malaria-prone.

Dr. Bose pointed out that: (1) increased storms, drought, floods etc. will affect food production. (2) Developing countries already have food problems. Such problems will become more acute. (3) Habitat changes are already visible bringing about indigenous changes in biodiversity. (4) Developing countries will have ca 30% reduction in food production. (5) Higher ocean acidity will affect the coral reefs and shelled organisms.

The impact of climate change needs to be investigated at both biophysical and social level, he said. At the biophysical level are the increased weed and pest problems, altered land contours due to sea level rise; rise in sea temperature may alter the fish movement routes and ocean salinity affect coral reefs and shell fishes. On the other hand, initially rice production in NE India may be higher.

Availability of potable water due to shifts in rainfall patterns and evaporation may emerge as a constraint of most aggravating proportions. Crop pest interactions may shift and may require changes in the art of management approaches. In conclusion Dr. Bose highlighted the thrust areas of agricultural research under the regime of global climate change: (i) Need to develop the ability to predict the crop calendar. (ii) Developing of cultivars tolerant to drought, high moisture and salinity. (iii) Water-saving crop varieties, flood resistant seed. (iv) Livelihood security, and (v) replacing soil carbon loss.

At the social level major population shifts from coastal areas (very densely populated in S. & S.E. Asia) due to sea level rise will cause severe sociological problems that need to be addressed at gigantic proportions.

'The whole scientific community needs to gear up along with support systems from legitimate administrative groups if we are serious in trying and circumventing the impending scenario',Dr. Bose concluded.

Finally the keynote address of the seminar was delivered by **Dr. L. S. Rathore** Advisor, National Centre for Medium Range Weather Forecasting New Delhi who highlighted that climate change is something which we have to accept as reality in the present day situation and its impact is visible in different sectors.

He said that eleven of the last 12 years were the hottest ever while diurnal change in temperature did not show any major shifts from 1979 to 2004. He further emphasized that even now 40% of the population faces acute shortage of potable water, half of the world's grasslands are overgrazed, 1/5$^{th}$ of the 10,000 fresh water species are becoming extinct in contaminated water and air pollution kills 5.2 million people every year globally. What is

then, climate change? *Climate change is a shift in climatic conditions relative to a given reference time period.* He pointed out that natural factors (solar variability, volcanic dust level, geological changes), and human factors (GHGs, aerosols, ozone depletion and land use changes) are mainly responsible for global climate change.

Dr.Rathore identified the reasons for global warming and explained that variable gases ($CO_2$, $CH_4$, $N_2O$) are the main causes contributing 70, 23 and 7% respectively of the climate change. Energy requirements and industrial sectors are the major contributors of $CO_2$ emissions while agricultural sector largely contributes to $CH_4$ and $N_2O$ emissions.

Natural systems, Dr.Rathore said, are the most vulnerable because of their sensitivity to climate and limited capacity to adopt. Global warming affects agriculture in various ways. Damage due to insect pests and diseases will be more under increased precipitation and high temperature and temperature flux situations and weed flora are likely to benefit under elevated $CO_2$ concentration level. He pointed out that a rise of temperature by $2^0$ C is likely to reduce rice yields by 0.75 t/ha and rise in $0.5^0$ C may reduce wheat yield by 0.45 t/ha.

In conclusion, Dr. Rathore identified some key areas towards which agricultural research needs to be channelised to evaluate and mitigate the impact of climate changes:

(I) Development of crop simulation models for impact assessment under changed climate situation.

(Ii) Development of abiotic (drought, flood, salinity etc.) stress tolerant varieties.

(Iii) Change in land use pattern.

(Iv) Watershed management practices.

(V) Development of improved disease, pest and weed management strategies.

(vi) Development of region specific crop calendar.

Finally, **Dr. S. K. Sanyal**, Director of Research, BCKV congratulated the Society for successful sustenance of its Newsletter and quarterly *Sashya Suraksha* and for organizing the Nematode Awareness Day. He expressed that the Association is filling a much needed void between the stakeholders in the Plant Protection discipline. He expressed hope that the Association will continue to perform in functioning as the much required link that is often found lacking in our R & D modules. Dr. Sanyal finally, conveyed the vote of thanks saying that the concurrent Seminar and its carefully selected speakers, Dr. A. N. Bose and Dr.L. S. Rathore added a dimension to the AGM of the Association and showed the level of their commitment. Dr. Sanyal declared the Seminar closed.


**AGM Minutes -Highlights :** Having done with the Seminar the AGM agenda was discussed. The Secretary's report was presented by Dr. Santanu Jha, was appreciated and accepted. The Audited Report of accounts, presented by the Treasurer, was adopted. The plan for organizing the National Symposium on '*Plant Protection-Technology Interface*' was presented in detail by Jt. Secretary, Dr. Matiyar-Rahman Khan and the plan was adopted. Other comments by members on the format of publications were recorded and the members assured that they will receive due attention. The AGB approved the continuance of existing Executive Body for the year 2007-08. The AGM was chaired by Profs. Chitreshwar Sen, Nilangshu Mukherjee and Manoj Ranjan Ghosh. The vote of thanks was expressed by the Secretary.

**(Source** : AAPP, 30.05.2007 )

(**AAPP Alerts** brought forward from p.3)

**Rust Disease of Groundnut: Alarming scenario for Groundnut growers---**Rust disease of groundnut (c.o. *Puccinia arachidis* Speg) was introduced in India in early seventies and has posed most serious problems in the cultivation of groundnut principally because the crop is grown continuously through out the year in different States of this country. Pod yield declined 10.2 g to 15.1g/4m$^2$ in different seasons for every 1% increase in disease severity. Orange coloured pustules appear on the lower surface of the leaves. Original pustules are often surrounded by colonies of secondary pustules. Corresponding to the sori, on the upper surface of leaves, small brown necrotic spots appear. Under severe epiphytotic conditions, lower leaves wither and drop prematurely. Kernels formed in the affected plants are shriveled and small in size. Disease appears in plant when the crop is six weeks old.

Movement of uredospores in air was highest in April. $T_{max}$ 35$^0$ to 38$^0$C, $T_{min}$ 23$^0$ to 25$^0$C $Rh_{max}$ 79- 80% and $Rh_{min}$ 42-46% and wind velocity 4.5 km/hr increase the disease severity. Early sowing 1$^{st}$ to 15$^{th}$ February in summer, 1$^{st}$ Nov. 1$^{st}$ Dec in winter and 1$^{st}$ to 15$^{th}$ July in rainy season reduces the disease severity. Application of carboxin-0.1% and also tridemorph (0.2%) gave significant reduction in disease severity. Growing of resistant varieties ICGS (FDRS) no. 4 and ICGS (FDRS) 23 for minimum disease and maximum yield is recommended.

**Source: Srikanta Das,** Professor of Plant Pathlogy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, W.B.-741252. **E-mail**: sridas_bckv@rediffmail.com

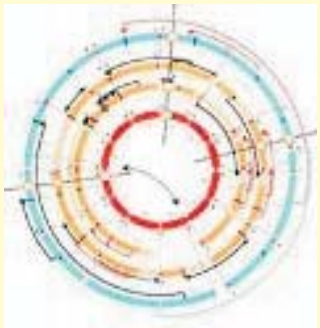
● **Recipe unveiled for 'Green Super Rice** – Writing in the *Proceedings of the National Academy of Sciences*, scientists from Huazhong Agricultural University report that most desirable traits necessary for the rice have already been isolated. The new review, by Qifa Zhang, highlights the potential of transgenic 'Green Super Rice' (GSR), which would also require less fertiliser. Development of GSR, with improved insect and disease resistances, N- and P-use efficiency, drought resistance, high grain yield, and superior quality, is critical for a more sustainable rice production. Such a super rice can be achieved in two stages with research firstly necessary to create elite lines carrying the single genes. Such work is partly realised, and thorough evaluation already performed. The second stage focuses on combining and introducing the genes into cultivars that could be considered to display the desired traits for the GSR. Utilisation of these cultivars will result in increased rice productivity with much reduced inputs to ensure a greater sustainability of rice production and agriculture in general. A big challenge is the assembling process to combine all of the favourable alleles into a single cultivar and ensure their proper functioning. In this regard, it may be more advantageous to breed for hybrids than conventional pure line cultivars, because it may take less effort to have two complementary sets of genes in two parental lines than stacking all the genes in a single genetic background.

(**Source**: *Proceedings of the National Academy of Sciences* Article #07-08013: Published on-line. Author: S. Zhang. 03.10.07).

● **Engineering papaya for pathogen resistance --** Because of inadequate genetic resistance, commercially produced papaya crops are heavily sprayed with a broad range of pesticides to control the fungal diseases such as *Phytophthora* root and fruit rot (*Phytophthora palmivora*), anthracnose (*Colletotricum gloeosporioides*), powdery mildew (*Oidium caricae*), and black spot (*Asperisporium caricae*). Collaborative research in Hawaii between the ARS and the Hawaii Agriculture Research Centre reported results of research to genetically engineered papaya with several heterologous genes encoding the production of antifungal proteins. Over 50 independent papaya lines, containing transgenes for expressing chitinase, stilbene synthase, or antifungal peptides were produced, molecularly confirmed for genomic integration of the transgenes, and evaluated in greenhouse and field trials for increased fungal resistance. Genetic transformation for resistance to fungal diseases has the potential for decreasing the use of pesticides and significantly improving fruit quality and yield.

(**Source**: www.ars.usda.gov.main, Aug. 15, 2007)

● **New rice DNA map-** Researchers at the University of Delaware and Ohio State University, USA, have used new technology to construct a comprehensive "expression atlas" of the rice genome. As well as identifying individual genes, the new map indicates regions of nongene DNA that are "expressed" that is, transcribed into RNA and may therefore play a regulatory role in the cell (genes are transcribed into RNA, which is then translated by the cell into proteins; some RNA is not translated but instead plays a role in the regulation of cellular processes). The study, discussed by Antoni Rafalski, in the April 2007 issue of *Nature Biotechnology* (Tagging the rice transcriptome), increases researchers' knowledge about the functionally active regions of DNA between genes and will thus help crop biotechnologists develop improved rice varieties.



(**Source:** *Rice Today*, July-Sept. 2007).

● **New Plant-Insect Interaction Discovered --** A new class of compounds has been discovered that should help shed more light on how plants respond to insect attacks. Plants, and the insects that feed on them, engage in a relationship involving many resultant hormonal and chemical changes in the plant, including induced production and emission of volatile organic compounds, or VOCs. These physiological changes, brought about by a group of compounds known as elicitors, vary--not only for different plants, but also with the insect species feeding on a plant. Understanding the plant-insect interaction is important in crop science and insect pest management. Agricultural Research Service (ARS) scientists isolated the compounds from oral secretions of *Schistocerca americana* grasshoppers fed corn seedlings. They named them caeliferins because preliminary analyses of oral secretions collected from several species of Orthoptera (grasshoppers, katydids and crickets) indicated that the compounds may be present in most, if not all, grasshoppers--members of the suborder Caelifera--but not in crickets or katydids in the suborder Ensifera.

The caeliferins have some unique properties, so they should provide new biological tools and directions for exploring the physiological ecology of, and interactions between, insects and plants.

Scientists study elicitors of plant volatile releases to find ways to induce defensive responses to help crop plants under insect attack remain healthy and vigorous. It is well known that insect chewing may induce release of plant VOCs that summon natural enemies of the attacking insects. But insects' oral secretions may also provoke direct plant defenses that impair the pests' performance.

(**Source**: www.usda_ARS, *Plant Health Progress*, Aug.18, 2007)

● **Fungal Control for Root-Eating Insects--**Root-eating insects could soon be eating themselves sick--if their favorite food has been treated with a fungal biocontrol agent. Agricultural Research Service (ARS) scientists in Corvallis, Oregon, are discovering new ways to use fungal spores for controlling the black vine weevil and other root-eating nursery pests.

Current control methods involve applying large amounts of entomopathogenic fungi to the soil in which at-risk plants grow. This approach is both costly and inefficient. ARS entomologist Denny Bruck discovered that using plant roots as an underground "delivery system" for the fungi is cheaper and more effective than broad distribution. He and his colleagues tested several fungal strains and found that some of them thrived in the area immediately surrounding a plant's roots. In fact, some fungal

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populations were 10 times denser there than in the surrounding bulk soil.

When plant roots were dipped in solutions containing spores of *Metarhizium anisopliae*, a fungus that occurs naturally in fields but not in container-grown plants they observed that black vine weevil larvae died after eating the fungus-treated roots.

Dipping roots in entomopathogenic fungal solutions may prove to be economical and efficient, because growers would only need to treat that specific area. Another study demonstrated that black vine weevil larvae actually prefer the colonized roots, so they are more likely to snack on roots that will harm them. Perfecting a fungal solution to root-eating pests could potentially save the nursery industry millions every year.

(**Source**: www.usda.ars.com, *Plant Health Progress*, Aug. 15, 2007).

● **Gene flow in transgenics --**While permitting the field trials on transgenic crops, the GOI has prescribed two types of containment measures to be adopted for restricting the possibility of gene flow to the neighboring crops. These are: a) isolation distances as prescribed in the Indian Minimum Seeds Certification Standards (as physical containment measure) and b) planting non transgenic plants of the same crop up to 2-5 meters width (as pollen trapper rows, depending on the type of crop) all round the experimental plot with in the isolation distance to trap the pollen coming from the transgenic plants (as biological containment measures). The combination of physical and biological containment measures are prescribed to ensure the restriction of cross pollination to the highest possible levels.

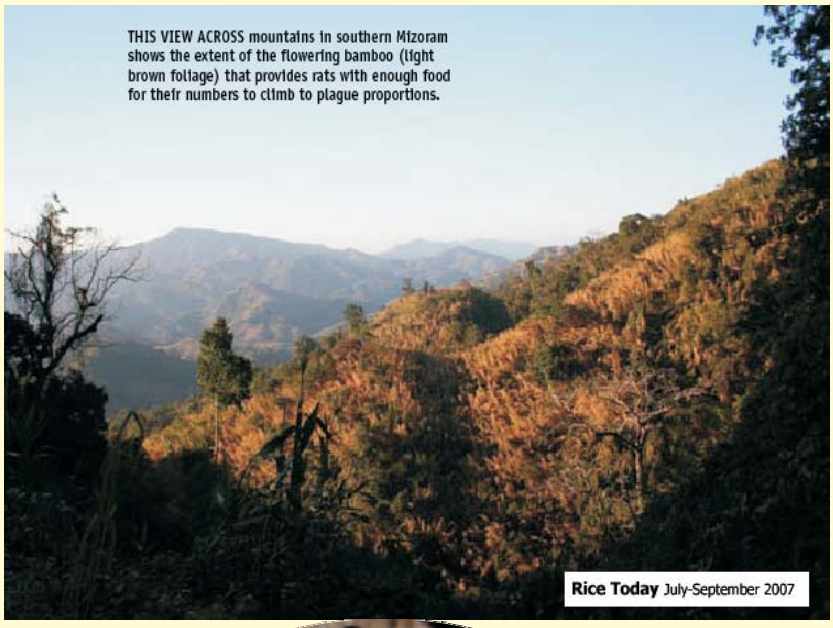
These adequate biosafety during the conduct of field trials for GM crops has been prescribed for cotton, rice, okra, groundnut, potato, tomato, brinjal, castor, cauliflower & cabbage and oilseed brassicas, crops that are in various stages of testing in India.

GEAC informed that the RCGM in its meetings held on 28.6.2007 and 24.7.2007 has recommended one proposal for MLRT with transgenic brinjal, 5 proposals for pollen flow/biosafety studies with Bt brinjal, transgenic cotton, Bt okra, Bt rice and Bt tomato and 4 proposals for Strip trials with transgenic rice, transgenic groundnut, Bt cotton and Bt brinjal expressing new gene event. RCGM has also recommended 52 proposals for MLRT and SAU trials, 8 proposals for strip trials and 31 proposals for experimental seed production with Bt cotton expressing approved gene events.

Incidentally, the SC had directed the Govt. to increase the isolation distance up to 200m between fields in which GM crops have been planted and other fields, in order to prevent gene contamination. On May7, it lifted the curb on field trials of GM crops adding that tests be conducted under stringent conditions to prevent contamination. **It also added that in so allowing the release of 4 vars. of Bt cotton it is to be seen that no new varieties were evolved in the process of field trials.** *On May 1 last year it also said that GEAC and not RCGM should be responsible for field trials and approval of GM crops*.

(**Source**: www.expressindia.com, May 9, 2007).

● **Talking about about rat menace --** An unusual species of bamboo blankets Mizoram, a remote state with an ethnically distinct tribal population. *Melocanna baccifera* flowers only once every 50 years or so; their seeds turn the local rats into incredibly prolific breeders. But, when the seasonal rains arrive and cause the seeds to germinate, the rodents suddenly lose this source of food. Now present in huge numbers, the rats invade the rice paddies in their quest for food, destroying the crops the villagers depend on for their survival. In a single night, the legion of rodents can clip the ears from every rice stalk in a field. Local villagers call the once-in-50-years phenomenon '*mautam*', or "bamboo death." The last time it hit in 1959, it was indeed deadly. The state government dismissed local forecasts at the time as superstitious raving, and was unprepared to fight off the rodents or provide adequate relief for the massive food shortages that followed. The famine was estimated to have caused more than 10,000 deaths, and the conflict itself took more than 3,000 lives. Now, one of the movement's leaders, Pu Zoramthanga Mizoram's Chief Minister has released more than Rs.50 crore to fight the problem. The State paid villagers 100 rupees for every 50 traps they set and distributed more than 15,000 kg of rodenticide. A local government reward of kg.one rupee per rat has already led to more than 400,000 rats killed by early May 2007.




(***Source**:**Jason Overdorf**, Toronto Globe and Mail* on 30 March 2007; *Rice Today,* July-September 2007).

## Announcement

The Association for Advancement in Plant Protection is organizing a

**National Symposium on 'Plant Protection: Technology Interface'**

December 28-29, 2007

**Interested persons may contact:**

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