ASSOCIATION FOR ADVANCEMENT IN PLANT PROTECTION

Newsletter

2006

Volume 3, No. 2 Apr. - Jun. 2008 Together we will protect our crops

Inside This Issue

From the Editors' Desk :

The Politics of Fuel, Food & Hunger is Praxis: The Basics

A TRAINED agriculturist and specially professional plant protection scientist feels responsible for providing the crops to grow in a relatively pest-free environment, to cut down losses of produce during production, storage and transit and thus assure a uniform supply of edibles, be it from plant, animal or fish sources. The losses, especially post harvest, speculated at 30-40% bugs and constantly challenges the performance of a plant protection scientist.

Today in the midst of global inflationary trends of agricultural produce leading to inordinate rise in prices in agricultural food products, resulting in hunger and famine-like conditions in parts of the 3rd world, one wonders, is there a major catastrophe that has reduced the basic output of edible agricultural produce other than just post harvest losses? Are there disturbances in normal food chains leading to a disruption in food supply in isolated pockets? Or, are there, as is most likely, some other more sinister reasons for this unending dilemma? The critical factor would appear to be the price of fuel oil which has gone beyond the limits of tolerance to its dependent industries. The result is seen in the collapse of air transport, tourism and food industry including agriculture.

Let us try and analyse the basic causes of food crises that today are globally affecting the production and distribution, the rich and the poor, even if unequally. The basic interfaces, to our mind, are:

- Transfer of food and feed crops like corn for production of biofuel.
- Transfer of large chunks of agricultural lands to production of non-edible biomass production, primarily biofuel.
- Providing supply of water drawn from underground and rivers.
- Climate change (CC).

Mile upon mile of tall maize waving to the horizon around Kansas or Nebraska in USA look perfect to farmers there, specially in a scenario where maize price offered has recently doubled after placement of a $200 million Californian money for setting up a biofuel factory (that is also providing full time well paid work for 50 people.) Fifty such factories are already operative and 300 more proposed for the next decade. While these fields bring unforeseen money to growers in rural America, they are helping to push up the price of bread in Manchester, tortillas in Mexico City or beer in Madrid. As a result of what is happening in places of maize cultivation in USA, food aid for southern Africa, pork in China and beef in Britain and poultry in India are significantly more expensive.

In USA alone there is an extra million acre planted with maize. Nebraska alone boasts it will produce one billion gallons of ethanol. In fact the President of the USA, Mr. George Bush has challenged its farmers to produce 35 billion gallons of non-fossil transport fuels. The result is that 20% of maize crop in US went for ethanol production last year. The corn belt of America is being turned from being a bread basket of the World into an enormous fuel tank of its automobile lovers!

Which are the crops that are being planned for use in biofuel production? These include, among others: edible crops-- cereals, corn (maize), oil palm, potato, rapeseed, rice, sorghum, soybean, sugar beet, sugarcane, sunflower, wheat, and non-edibles like hemp, Jatropha, switch grass, poplar and willow.

The era of biofuel has obviously arrived in USA and elsewhere like Europe, China, India, Japan, Brazil, Argentina, Ghana to name a few. The first four commit themselves to using 10% or more alternative automobile fuel as ethanol. The scale of impact is mind boggling. The Indian Government says it wants to plant 35 M acres (1, 40,000 sq km) of biofuel crops; Brazil 300 M acres, S. Africa as much as 1.0 bil acres to Jatropha (Physic nut). Indonesia and Malaysia are aggressively boosting their palm oil production from 16M acres to 65 M acres by 2025 for contributing to ethanol production instead of the edible oil for the poor.

The UN World Food Programme, which feeds 90 M people mostly with US maize reckon that 850 M people are malnourished already. The rise in food prices by ca 20% all round in an year, 12% in India and 17% in S.Africa and rising trends are everywhere there to see and feel the pinch. China in fact, was forced to halt all new planting of corn for ethanol after price of staple foods such as pork soared by 42% last year! The result is a global price increase in food crops. *'The competition for grains between the world's 800 M motorists who want to maintain there mobility in order to earn their purchasing power units (money) and its two billion undernourished people, who are simply trying to survive, is emerging as an epic issue'* - ***Lester Brown*** (President, World Watch Institute and author of the book, W*ho Will Feed China)*.UN World Food Organisation predicts that demand for biofuel will increase by 17% in the next three years. OECD predicts rise in World food prices by 20-50% within the next decade.

To cap it, the World Bank data shows that 15% of the World's present foods on which 150 M people

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Utility of Proteomic Tools for Assessing Protein Expression in Soybeans– Soybean is the second most important cash crop in the U.S. with an estimated value of $19.8 billion in 2006. Genetically modified (GM) crops are commonly grown globally to enhance quality, productivity, and disease resistance. Some of the examples are herbicide resistance (Roundup Ready soybeans), insect resistance (Bt cotton and Bt corn) and virus resistance (potato). Therefore, it is important to determine if any unintended changes occur in the GM crops as a result of genetic modification to ensure the safety of the crop for consumers. In recent years, proteomic technologies have been used as an effective analytical tool for examining modifications of protein profiles to access the bio-safety of GM crops. We have standardized and applied these technologies to determine and quantify the spectrum of proteins present in soybean seed. For a better understanding of the unintended effects in GM soybeans, it is important to determine the natural variation of protein composition both in wild and cultivated soybeans that have been or may be used in conventional soybean breeding programs. We used two-dimensional polyacrylamide gel electrophoresis (2D-PAGE), matrix-assisted laser desorption/ionization time of flight (MALDI-TOF), and liquid chromatography mass spectrometry (LC-MS) for the separation, quantification, and identification of different classes of soybean seed proteins. We have observed significant variations of different classes of proteins, allergen and anti-nutritional protein profiles between cultivated and wild soybean varieties. These results can be used to determine if the amounts of allergen and anti-nutritional proteins accumulated in GM soybeans exceed the level of these same proteins that naturally occur in non-GM soybean varieties. This research is important to maintain consumer confidence and acceptability of GM products.

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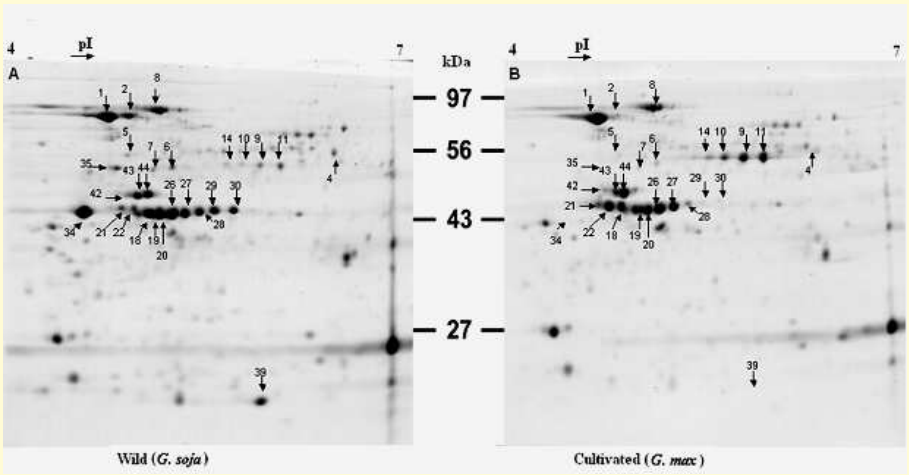

2D-Protein gel picture: Proteomic comparison of wild (*Glycine soja*) and cultivated (*Glycine max*) soybean genotypes. The separation of proteins visualized using Colloidal Coomassie Blue stain G-250. Arrows with numbers indicate the spots that are abundant/non-abundant storage proteins.

Proteomic Investigation of Rhizoctonia solani to Understand its Biology and Pathogenicity– Proteomic technologies are powerful tools for examining alterations in protein profiles. We used these tools to characterize fungal proteins. Root rot diseases account for the largest percentage of loss in commercial production worldwide and the fungus *Rhizoctonia solani* (*R. solani*) is a major cause of root diseases. In addition to being important plant pathogens of agricultural crops, isolates of this fungus are beneficially associated with orchids, may serve as biocontrol agents and play a role as saprophytes in decaying and recycling soil organic matter. The pathogen was once successfully controlled by methyl bromide (pesticide) recently banned due to environmental concerns. However, control of the pathogen is difficult using conventional pesticides, mostly due to lack of sufficient knowledge of its biology and pathology. Even though there are reports on the physiological and histological basis of Rhizoctonia-host interactions, very little is known about the molecular biology and control of gene expression during infection by this pathogen. Increased understanding of the disease interaction will aid in protection of plants against the pathogen. To our knowledge, there is limited investigation of the pathogenic mechanism of *R. solani* protein expression level. In this vein, we investigated and optimized two protein extraction protocols namely, TCA-Acetone (TA) and Phosphate-TCA-Acetone (PTA). Extracted *R. solani* proteins were resolved by two-dimensional (2-D) gel electrophoresis covering pH 4-7 and 6.5 205 kDa. Using either method, more than 500 protein spots could be counted from the 2-D gels. However, unique protein spots were observed in the gels of each of the two protein extraction methods. Also, some protein spots were found to be more intense in the TA gels than in the PTA gels and *vice versa*. Obviously, our findings emphasize the importance of using more than one protein extraction protocol to capture the largest protein profile in 2-D gels. The separated protein spots were digested with trypsin and analyzed using matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF-MS). We have identified six protein spots. We are in the process of identifying more *R. solani* proteins by using combined technologies of MALDI-TOF-MS and liquid chromatography followed by tandem mass spectrometry (LC-MS/MS). In the continuation of this project, we plan to compare and identify differentially regulated proteins among virulent and chemically induced or double-stranded-RNA-mediated hypovirulent (avirulent) *R. solani* isolates to decipher possible mechanisms of virulence of the pathogen. Proteomic information would help us to have a greater ability to identify the pathogen, understand its biology, host-pathogen interactions, mechanism of fungicidal actions and ultimately, to formulate improved disease management practices.

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depend are being grown with irrigation drawn from rapidly depleting underground sources or from rivers that are drying up. In large areas in China and India, the water table has fallen catastrophically.

Climate change, in the meanwhile is leading to more intense rains, unpredictable storms, longer lasting droughts and interrupted seasons. The IPCC predicts rain dependent agriculture could be cut by half by 2020 as a result of CC. Lesotho has already declared a food emergency after the worst drought in 30 years pushing prices well beyond the reach of most of the population.

While some, like the President of Brazil, do not want to paint such a gloomy picture, technologists pin there faith on GM and drought resistant crops. So does Mr. George Bush, for different reasons. Is there an alternative in developing technologies that require less food raw materials or use non-edible parts of food for producing biofuels? This might delay the impending disaster that is looming over a major part of the Earth. Think about it. React to it!

In the last issue(NL3-1) the short research communication was printed erroneously.This may be considered as deleted.Corrected version is printed in this issue.

Chitreshwar Sen
Editor-in-Chief
On behalf of the Editorial Board

We Need a Moratorium on Bt Cotton and New GM Testing-- SINCE April 2 this year, there has been a palpable air of tension at the meetings of the GEAC in Delhi. That's when **Pushpa Mitter Bhargava**, began attending the meetings of the apex regulatory body on genetic engineering as a special nominee of the Supreme Court. Known for his role in setting up the country's premiere research institution, the Centre for Cellular and Molecular Biology in Hyderabad, Bhargava is taken aback by the lax ways of the GEAC and going purely on the documentation provided to it, is surprised that no one has pointed out the serious lapses in the testing of GM crops. In a detailed interview to Latha Jishnu, he explained why there should be a five-year moratorium on Bt cotton and field trials of other GM crops till the system is cleaned up. Dr Bhargava's views were made available to eight GEAC members for their comments but none chose to respond. An interview with Dr Bhargava outlines his views and an abridged version of it is presented below.

Why should there be a moratorium on Bt cotton? - A great deal of work has been done in the last few years which call for a total recall of Bt cotton. For instance, gene flow studies have shown that we need to be cautious about the risks posed by GM crops to other plants. That's why on May 16, the UN Conference on Biodiversity concluded that genetically modified organisms (GMOs) were responsible for damage to other crops. In India, the reported cases of Bt allergy in the north have not been investigated. In AP, there have been reported cases of a large number of sheep dying after feeding on the Bt cotton plants. GEAC claims that the AP government had blamed these sheep deaths on the residue of pesticides used. The letter from the Directorate of Animal Husbandry, Hyderabad clearly says none of the pesticide residues mentioned by the GEAC were found in the samples. In fact, the department says biosafety trials must be conducted on the effect of continuous grazing on harvested or intact Bt cotton plants and has warned shepherds to not allow their animals to graze on Bt cotton fields in the interim.

What do you make of this?- At every stage there is a bias if not deceit all the way. I am only looking at the data provided by the GEAC itself.

Now that we are going in for GM food such as Bt brinjal and 24 other crops, how safe are these for human consumption given that vegetables and fruits will carry Bt toxin?- The GEAC website had the same result on the presence of Bt protein in the uncooked varieties, for both the non-GM and GM brinjals! Whatever data is available for Bt brinjal is partial and even suspicious.

The GEAC says its data is available on the website for anyone to check - The website carries conclusions and not the data, and there is an extremely important distinction between these.

With Bt cotton accounting for 60 per cent of the crop (both legal and illegal seeds), is a ban feasible?- Yes, of course. After all, drugs are withdrawn from the market when new information comes to light. Switzerland has just announced a moratorium on GMOs till 2012 and has found tremendous support from the people.

What will a moratorium achieve?- We can clean the regulatory process. Most important, we should set up a national facility for doing all the necessary tests on GMOs and training skilled and objective inspectors. This institution should be run jointly by government and civil society. So far there has been no supervision at all of field trials and only now is the GEAC preparing a draft document on this.

Can you elaborate on this?- The trials being conducted in West Bengal on Bt okra, for instance, were started on the basis of approval granted by the local panchayat, surely the least knowledgeable about the risks of GMOs. The state and district committees on biotechnology gave conditional approval only six months later in February 2008. Worse, the agricultural university monitoring the field trials has given a damning report on the way it is being conducted.

What is your primary concern?- No comprehensive risk assessment has been done. Some of the significant tests that have not been done are chronic toxicity, DNA fingerprinting, proteomics analysis, studies on reproductive interference. The most worrying issue is that whatever test data has been given to GEAC is provided by the applicant company itself, such as on the toxicity and allergenicity of the GMO. There is no proof that the company actually did these tests, and as far as I am concerned, no valid data exists.

What is a sane policy on GM?- We should first determine if there is an alternative. The ICAR has done a lot of work on around 85 crops, to prove the efficacy of the IPM and bio-pesticide protocol. This is a far cheaper and better way to increase farm production but has been ignored. Remember, only 11 countries in the world have gone in for GM crops and of these, just four, the US, Canada, Brazil and Argentina account for the bulk.

Are worries on GM food being exaggerated by the anti-GM lobby?- Just look at the recent study published in the proceedings of the National Academy of Sciences in the US, one of the most cited journals in the world. It says that dietary DNA can find its way into blood, opening up the possibility of GMO DNA transforming somatic cells. Such transformations can have a major deleterious effect on the host.

(**Source**: Q&A/ P. M. Bhargava--***Latha Jishnu***,ND., Business Standard, July12, 2008)

Countering Insect Resistance with Designer Bt Toxins– TOXINS from the bacterium *Bacillus thuringiensis* (Bt) kill some key agricultural pests, but cause little or no harm to people, wildlife, and even most other insects, including the natural enemies of pests. For decades, Bt toxins were used successfully in organic and mainstream agriculture. Widespread exposure to Bt toxins, however, increases the chances that pests will adapt and evolve resistance - just as pests have evolved resistance to conventional insecticides. Researchers in Arizona and Mexico have collaborated to design, create and test genetically-modified Bt toxins that kill insects resistant to standard Bt toxins.


Pectinophora gossypiella

Since 1996, cotton and corn crops have been genetically engineered to produce their own Bt toxins. These crops have grown on more than 490 M acres worldwide, with most of that acreage in the US. With Bt toxin's increasing importance for pest control and the threat of resistance also mounting, the modified toxins could help to protect food supply and promote sustainable, environmentally friendly agriculture.

The Bt toxins used most widely in sprays and Bt-modified crops are insecticidal crystal proteins in the Cry1A family, which are effective against some of the most damaging crop-munching caterpillars. After Cry1A toxins are ingested by caterpillars, they are activated by enzymes in the alkaline caterpillar gut. These activated Cry1A toxins bind to specific receptors on the insects' midgut membrane. This creates holes in the membrane, eventually causing the caterpillar's death.

The binding to a caterpillar's midgut receptor by a Cry1A toxin is like the fit between a lock and key. Each Bt toxin is like a key that fits only certain receptors, which are like locks. The best-known mechanism of insect resistance to Bt toxins involves changes in the receptors. In effect, the lock is altered so the key won't fit. This allows resistant insects to survive exposure to the toxin.

Bruce Tabashnik and his colleagues at the University of Arizona determined that lab-selected resistance to Cry1A toxins in pink bollworm (*Pectinophora gossypiella*), a major cotton pest in the SW United States, is tightly linked with specific genetic mutations. These mutations occur in a gene that carries instructions for making a

receptor protein called cadherin that binds Cry1A toxins. The researchers determined that resistance to Bt toxin occurs when mutations inhibit the cadherin gene from properly binding with Cry1A. This type of resistance to Cry1A toxins could be overcome by modified toxins that do not require binding to cadherin to kill caterpillars. Using knowledge from the study, the scientists designed and created modified toxins called Cry1AMod toxins. Subsequent tests at the University of Arizona showed that Cry1A-resistant pink bollworm caterpillars were killed by the Cry1AMod toxins, suggesting the modified toxins may be useful for countering or delaying resistance to standard Bt toxins in caterpillar pests.

(**Source**: **Stacy Kish,** CSREES Staff, July 7, 2008)

PESTS & PEST MANAGEMENT

Fighting a Worldwide Wheat Threat – WHEAT stockpiles are at a 30-year low and production costs are rising, but what really scares wheat growers is the spectre of Ug99, a new rust fungus to which very few of the currently grown varieties of wheat are resistant (See earlier reports in NL).

ARS scientists are likely to release this fall the first wheat lines pyramiding two or more genes for resistance to Ug99. Wheat breeders will be able to use the new line along with others to develop new commercial varieties with high yield and Ug99 protection.

ARS has a priority program tackling many aspects of Ug99 with a team of more than 10 scientists, all of whom are keenly aware of Ug99's growing shadow, which emerged in Uganda and has already spread to Kenya, Ethiopia, Sudan, Yemen, and Iran. Among their tasks are determining U.S. wheat and barley vulnerability to Ug99, identifying new sources of genetic resistance, discovering molecular markers to speed up breeding for protection, developing rapid detection methods, and nationwide surveillance for Ug99 in the United States.

To support the monitoring work, ARS has established "trap" plots of wheat along known wheat rust pathways throughout the United States.

Of course, the ARS scientists are not going it alone. They're collaborating with researchers across the country and around the world to find ways to deal with this massive threat to a global staple food . As part of this cooperation and collaboration, ARS coordinates sending promising U.S. wheat varieties to Kenya and evaluating them for Ug99 resistance. This provides U.S. wheat breeders with a head start on protecting the country's wheat. The screening is done in partnership with the CIMMYT, based in Mexico. ARS has already evaluated more than 5,000 U.S. wheat lines in Africa through this program. Results from the 2005-2007 screening showed that Ug99 has overcome even more major resistance genes than previously believed.

ARS also will develop new sources of genetic resistance to rusts from three wild relatives of wheat and make it easier to introduce those genes into commercial wheat varieties.

Source: PMN News (June 16, 2008).

New Method May Thwart Pecan and Peach Diseases-- NATURAL bacterial extracts may offer some assistance to peach and pecan growers in treating fungal diseases such as brown rot in peaches and pecan scab. Various diseases result in annual losses of more than $3.5 million for peach growers and $13 million for the pecan industry.

Although bacterial methods for controlling fungi are not new, the ARS bacterial compounds have never been used to control disease in these two commodities.

In these studies, compounds obtained from two genera of bacteria, *Xenorhabdus* and *Photorhabdus* were used. They were found to be effective against common pecan and peach disease organisms that cause significant damage. The scientists tested compounds from a variety of bacterial strains and species to determine which would be most potent. The results indicated that *X. bovienii* and *P. luminescens* (VS) bacterial compounds generally exhibited the greatest suppression of plant pathogens. Applying 6- to 12- percent dilutions of the bacterial compounds achieved 90 to 100 percent suppression of *Phytophthora cactorum* lesions on pecan leaves. *P. cactorum* can cause root, collar and crown rots, as well as foliar and fruit infections.

The researchers also used bacterial compound treatments on pecan shoots to control pecan scab disease caused by *Fusicladosporium effusum*. The treatments reduced spore formation of *F. effusum* to levels similar to those by chemical fungicides.

Anti-Virus Technology for Peanuts– INDIA'S Department of Biotechnology has given the approval for field trials of a new, genetically modified groundnut (peanut), which crop scientists believe will be resistant to a major viral pest, peanut clump virus (PCV). The new variety has been developed by scientists at ICRISAT, using genes supplied by the Scottish Crops Research Institute, after attempts to find traditional sources of PCV resistance, which included the screening of over 10,000 groundnut varieties, failed. PCV is a serious problem in India and several West African countries, causing estimated losses of up to US$40 million per year. The virus is particularly difficult to control as it can survive dormant in the soil for years, and chemical treatments are unavailable. Virologists are keen to begin trials in West Africa to see if the new groundnuts are also resistant to African versions of the virus.

(**Source**: Biosmart Briefs).

Beneficial Bacteria Help Control Produce Pathogens-- PRODUCE pathogens are a prominent source of food-borne illness in the United States. A new food safety treatment was developed by the ARS scientists that could increase the effectiveness of conventional produce sanitization methods by pitting beneficial bacteria against potentially harmful ones.

The beneficial bacteria inhibit the growth of pathogens that survive initial physical or chemical attempts to remove them from fresh produce. Three beneficial bacterial antagonists for use in food safety intervention were identified. Dipping bell peppers in solutions of water containing the beneficial antagonists, effects on surface pathogens such as *Salmonella* and *E. coli* O157:H7 were tested. One bacterium, *Pseudomonas fluorescens(Pf 2-79)*, was particularly effective. Dipping peppers in its solution for about two min halted pathogen multiplication almost entirely.

On untreated peppers, pathogen populations multiplied about 10 x10^4 times when stored at 20° C for two days. But treating peppers with Pf 2-79 suppressed pathogen growth. This treatment could potentially prevent pathogens from proliferating to numbers capable of causing human illness.The dip also stopped the growth of two common spoilage bacteria and reduced the development of soft rot.

Pf 2-79 is easy to grow and can colonize several types of produce. Because it can grow at refrigeration temperatures, it could be an effective control agent for cold-tolerant pathogens such as *Listeria monocytogenes* and *Yersinia enterocolitica*.

The research aims to identify additional bacterial strains that could be used with Pf 2-79 to further improve produce safety and quality. Consumers can of course help remove pathogens from produce at home by taking simple food safety precautions, such as peeling, washing or cooking the produce.

(**Source**: Posted 23 June 2008. Plant Health Progress)

A Little Bit of Egg Makes Tracking Aphids Easier-- THE GREEN peach aphid, despite its name, is a pest of potatoes. Besides siphoning off juices from potato plants, the aphid can infect the plants with viruses that cause an estimated $100 million annually in yield losses in US alone.

Now, tracking where and when the aphid is likely to transmit potato viruses could be easier to do, thanks to a new marker technique that uses egg whites, plastic-mesh screens and an antibody-based test which is still experimental. But, ultimately, information derived from its use could help potato growers improve the timing of insecticide application to deter virus-laden aphids from feeding on

plants. The technique was deviced to support studies to determine whether virus-carrying aphids are flying into potato fields from nearby weed patches. Existing methods of capturing and marking the dash-sized pests have been found to be difficult and unreliable. The solution involved mixing egg-white proteins with water to create a solution that can be sprayed onto potato plants or associated weeds like nightshade. Aphids pick up the egg proteins while crawling over treated areas. To track them, the wide-mesh screens secured below a teepee-like scaffold that can be placed in or near potato fields is relied upon. An adhesive holds the aphids so they can be returned to the laboratory for analysis using an immunological assay, which employs antibodies to detect egg proteins if they're present.

In fields, more than 50 percent of green peach aphids that contacted treated potato plants tested positive for egg proteins. More field tests are under way.

(**Source**: Posted 20 June 2008. Crop Management)

Mycorrhizal fungus boost to biofertilisers-- LEGUMES play a major role in many crop rotations as *Rhizobium* bacteria in their root nodules fix nitrogen, adding it to the soil and making it available for following crops. However, scientists are now showing that, in order to function efficiently, this symbiotic relationship often needs a third

partner, a mycorrhizal fungus. Working in Zimbabwe, scientists from ICRISAT and Penn State University have shown that both legume growth and nitrogen fixation are limited by the amount of phosphorus in the soil. Phosphorus, although present in most soils, is often 'locked up' in insoluble forms. Mycorrhizal fungi that form a close association with the roots of many plant species, are able to mobilise this phosphorus and make it available to the plants.

The scientists tested their ideas by first enriching peanut fields with mycorrhizal fungi and found that the plants' nitrogen content was significantly increased. However, for rotation purposes, peanut is not an ideal crop as most of this extra nitrogen is harvested with the nuts. The research team is therefore now focusing on another legume, *Dolichos lablab*, which grows more vigorously and which retains nitrogen in its leaves and stems. The lablab can then either be ploughed in directly or grazed, allowing the animals to naturally manure the field.

(**Source**: 17 March 2008. Crop Management)

PESTSICIDE & INDUSTRY

Halex GT Continues to Exceed the Competition-- WHILE facing adverse weather conditions for much of the 2007 growing season, the newest corn herbicide from Syngenta still managed to outperform the competition. HalexTM GT recorded high marks when tested against Roundup Original Max® on broadleaf weeds, pigweeds and grasses. Halex GT also managed to out-yield Roundup® by at least five bushels per acre. It was a dry year, and the results from university trials show Halex GT performed better than competitive products even in a year when conditions were extremely dry in most areas. In addition to Syngenta trials, field trials were conducted at key universities across USA, including Midwestern growing areas such as Iowa, Illinois, Indiana and Minnesota. The results proved one application of Halex GT outperformed one application of Roundup and performed as well as or better than two applications of Roundup in each trial. When it came to yield, however, Halex GT was unmatched. One early post-emergence application of Halex GT out-yielded one application of Roundup by seven bushels per acre, and two applications of Roundup by five bushels per acre. New Halex GT promises substantial benefits to U.S. corn growers choosing an Agrisure® GT or Roundup Ready® corn hybrid by delivering glyphosate with residual, which will allow for greater application timing flexibility. Halex GT contains mesotrione and glyphosate for control of emerged weeds and mesotrione and S-metolachlor for season-long residual control of broadleaf weeds and grasses. With three active ingredients in one premix, Halex GT will control the toughest broadleaf weeds and grasses, including rag weeds, water hemp, lambs quarters, pigweeds and foxtails. As a Resistance Fighter™ brand, its three modes of action will help control broadleaf weed biotypes resistant to glyphosate, ALS-inhibiting and triazine herbicides.

(**Source**: http://www.syngentacropprotection-us.com/**David Pinon,** Syngenta Crop Protection. David.pinon@syngenta.com)

Scientists Warn of EU Legislation: Reduced Number of Pesticides Will Lead to Resistant Pests-- LEADING European agricultural experts gathered in Ljubljana (Slovenia) in order to present the Slovenian EU presidency with a declaration on potential risks of the proposed EU legislation. The scientists from seven countries fear that reducing the available range of pesticides could lower their efficiency as it is likely that it will increase resistance. The scientists' spokesperson, Dr Ian Denholm, Head, Plant and Invertebrate Ecology Division, Rothamsted Research, UK pointed out that, "*In order to safeguard the production of food at affordable prices, it is essential to provide farmers with access to sufficient diversity of crop protection solutions. This is essential to prevent or delay the development of resistant pests, and to maintain the efficacy of remaining crop protection products*". The scientists who drafted and signed the "Declaration of Ljubljana" are calling for European politicians to acknowledge the need to retain sufficient product diversity in order to manage the threat of resistance development. It appears that this biological requirement has so far been largely neglected by policy makers. The scientists are concerned that the proposed European legislation will force farmers to use a smaller number of substances more intensively. This would increase the likelihood of resistance developing to the remaining pesticides, thereby threatening agricultural productivity and income of European farmers.

(**Source**: Business Wire, 22nd April, 2008. . **Andrej Simončič**, E-MAIL: Andrej.Simoncic@kis.si. Http://www.kis.s

Major Counterfeit Pesticide Facility Uncovered in Russia-- THE REGIONAL police in the Kursk Oblast, Russia, have uncovered a major pesticide counterfeiting facility, according to recent reports. The police raided premises last week near the city of Kursk, where around 100 tonnes of counterfeit and illegal pesticide products were found with an estimated market value of over 1 million Euros. Most of the products are illegal copies of patented and branded products from major legitimate global manufacturers and were pre-packed into containers ready for commercial sale. Initial examination of the symbols on the seized product containers indicate that the products were manufactured in China. There are also indications that the transport routes to Kursk may be different for differing consignments with some arriving by sea and others by road, and some possibly running through an EU port.

Kursk is only about 100 km from the Ukraine boarder. There is a high likelihood that the products were also destined for the Ukraine and then possibly into the EU.

No one can be sure what these products contain. Counterfeit and illegal pesticide products are completely untested and can contain toxic impurities and contaminants as well as dangerous solvents and other materials. This raid in Russia follows the major seizure in late 2006 at the port of Odessa, Ukraine, where over 500 tonnes of counterfeit and illegal pesticide products were seized.

(**Source: Rocky Rowe,** Trade Affairs Adviser, Rocky.Rowe@ecpa.eu., 18 June 2008).

Polish Police Seize Counterfeit Pesticides-- THE QUIET town of Lubaczow, some 35 km from the border with Ukraine, was recently disturbed by a visit from the Polish security service, who tracked a consignment of counterfeit pesticides reported to have been flown into Warsaw directly from China. They followed the consignment to Lubaczow where

additional counterfeit pesticide products, about two tonnes worth, were found at a variety of locations near the town.

Many different fake and illegal products were found carrying the labels of major pesticide suppliers operating in Poland and throughout Europe. Of the 34 samples taken, at least 29 were confirmed as being fakes.The special police and industry have worked together effectively in making this seizure. What appears to be happening is that some products are being delivered directly from China for repackaging and distribution, whilst others are being smuggled over the border from Ukraine and are also re-packaged and re-labeled.

The Polish authorities' decisive action should be seen as an example to other national authorities. Counterfeiters have no regard for farmer or consumer safety and are willing to jeopardise agricultural production to make rapid profits.

PSOR and ECPA are pleased to be working with the Polish Plant Protection Inspectorate and will be jointly hosting a conference in November in Poland, where enforcement officials from across Europe will meet to share experiences and develop strategies to combat counterfeit and illegal pesticides.

(**Source**: ECPA, 3 July 2008.www.ecpa.eu).

Monsanto to Expand Glyphosate Plant-- MONSANTO is to invest up to $196 million over the next 18 months in its US glyphosate herbicide manufacturing facility in Luling, Louisiana. The new process improvements at the facility will have the potential to increase the site's manufacturing capacity of Roundup herbicide by around 20% and the overall global supply of glyphosate by more than 10%, the company says.

(**Source**: **Jackie Bird**, Agrow World Crop Protection News.18 April 2008).

IPM NEWS

IPM Braces to Fight Outbreak of Plant Diseases at Experimental Farms of Manipur-- POTATOES in the fields at Ishikha in Imphal east were affected by disease and the pea leaves turning reddish. 'The potatoes were infected with leaf-blight disease caused by caterpillars and the peas being dwarfed and leaves becoming reddish which is very common if there is excessive rain during the growing period'. The IPM team, in collaboration with CAU, Imphal and SPAM, an NGO working in the field for growing plants in Pukhao, Ishikha and Tangkham area of Imphal east and some other places of Imphal west and Thoubal district with field demonstrations, are growing potatoes in 70 ha across the state.Their production target is 1118 mt from these fields with an income of Rs. 1.10 crores including the investment. They are also growing peas in 134 ha in different parts of the state and mustard in 110 ha this season. (*The Imphal Free Press*, Feb 22, 2008).

The Manipur agriculture department has also taken a step to grow black gram, one of the most important grain legumes consumed in the state's high elevation areas which are not suited for paddy plantations. It is the first time the IPM has taken its farming techniques to a hill area of the State. The T-19 variety, a high yielding variety will be grown in 10 ha of land located at the foothills of the Luwang Sangol village. The department is targeting to harvest four tonnes of black gram from this field. Seed treatment was claimed to prevent 30 percent of the diseases which infect the crop during its growing period (The *Imphal Free Press*, Jun 14, 2008).

However, things are not as rosy as perhaps painted above. Thus, even though they got rice seeds and other requirements for cultivation free of cost through the state agriculture department under a scheme of the North Eastern Council, farmers of Bishnupur are worried over the IR-64 rice variety supplied. Except saying the variety is a blast (a common disease of rice) resistant one and of short duration, no satisfactory answer could be got by the farmers from the CAU agriculture scientists and experts of the agriculture department. The department decided to grow this variety of rice in 1000 ha of paddy fields this year. During a seed treatment demonstration the farmers mentioned on the sidelines of the programme that they were apprehensive of what would happen if the crop failed. The delay in the arrival of monsoon rains and the non-availability of satisfactory replies to their queries about the rice has added to their doubts (*The Imphal Free Press*. Kangla Online, Jul 6, 2008).

Is this an example of the attention our NE states are receiving from concerned IPM scientists and ICAR!

(**Compiled by:** **S. Das**, BCKV, Mohanpur-741252, WB. E-MAIL: sridas_bckv@rediffmail.com).

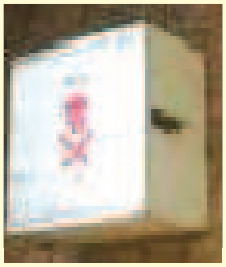
Environment-friendly tools for lettuce growers-- LETTUCE growers have a number of practical new tools at their disposal thanks to a large science programme that has developed a system of IPM specifically for the outdoor lettuce crops grown in New Zealand. Under IPM systems growers monitor crops regularly and manage pests and diseases in a manner which is sensitive to the environment by encouraging predators and other biological control agents. Below are features of an IPM programme

- Effective pest and disease control
- Production of crops that meet market standards
- Use of techniques that emphasise monitoring in some form
- Reduction of pesticide risks
- Use of selective pesticides in preference to broad spectrum materials
- Minimal impacts on the environment

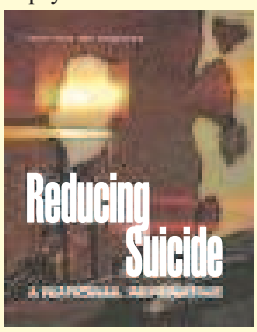
A key message of the programme is the need to monitor, to know if you have enough beneficial insects or too many problem insects. Once you know this, you can make a decision to spray or not to spray and most importantly, what to spray with.

(**Source**: Press Release: Crop and Food Research, 21 May 2008)

Pesticide Poisoning in Deliberate Self-harm: A Study From Sundarban Delta, India– DELIBERATE self-harm (DSH), particularly with pesticides, is a major public health problem, especially in developing countries. Sundarban region under South 24 Parganas district is a backward region by all yardsticks of socioeconomic development. The literacy rate and per capita income is much lower than the state average, and about 88.5% inhabitants are dependent on agriculture. Pesticides are extensively used in agriculture, and these agents are also most frequently used in DSH. Reports from the Chowdhury *et al*.,2007 revealed that organophosphorous pesticide poisoning was found to be the most common method (85.1%) in DSH in Sundarban region pinpoints the issue of DSH with pesticide poisoning as an emerging public health agenda in this region.



The report also indicated that "unknown poisoning" is responsible for a good number of DSH cases. Some form of restriction and instruction for safe use and custody of pesticides is imperative to reduce the burden of pesticide-related morbidity and mortality in the region, using less harmful compounds in agriculture. Restriction on availability of lethal pesticides is now considered as one of the basic approaches in DSH prevention. Reduction of psycho-social stressors constitute an important agenda in suicide-prevention strategy in this region. An inter-sectorial program involving local agricultural office (for farmer's education on safe use and custody and health hazards of pesticides) and block primary health center (community awareness and psycho-social intervention) is the ideal goal for a community mental-health program in this rural region. The findings of Chowdhury *et al*.,2008 enlightened that the time has come to acknowledge the seriousness of the situation as a first step towards preventing this massive unnecessary loss of life.



Chowdhury AN, Banerjee Sohini, Brahma Arabinda, Biswas MK Indian J Psychiatry [serial online] 2007 [cited 2008 Mar 15];49:262-266

Endosulfan victims in Kerala-- SEVEN-YEAR old Sandhya belonging to Swarga village of Kasargod district in Kerala, born blind due to the deadly fallout of the hazardous pesticide endosulfan had her vision restored after two surgeries and prolonged treatment. Sandhya is just one of the many in Kasargod district who are the living victims of aerial spraying of endosulfan in the cashew plantations of Plantation Corporation of Kerala (PCK) for over two decades. This pesticide was extensively sprayed aerially in the aforesaid cashew plantations spread over 2209 ha in various divisions of Kasargod district. PCK started using this pesticide in 1979 and reports of unusual health disorders started coming from places like Vaninagar, Adur, Mulleria, Padre etc. Disorders of the central nervous system, cerebral palsy, mental and physical retardation, epilepsy and congenital anomalies like stag horns etc became very common. There were also many cases of liver cancer, blood cancer, infertility, miscarriages, hormonal imbalances, skin diseases and asthma. These disorders were traced to endosulfan. 'Endosulfan' a pesticide banned by many countries in the world, including Denmark, Germany, Netherlands and our neigbouring countries Pakistan and Sri Lanka. Endosulfan is chemically very close to other pesticides that have already been banned in India and are slated to be phased out globally under the Stockholm Convention 2001, to which India too is a signatory. It is known to bioaccumulate in humans and other animals, collecting particularly in the liver, kidneys and fatty tissue. There is strong evidence that endosulfan is an endocrine disrupting chemical. A study conducted in Kasargod by the Centre for Science and Environment (CSE) confirmed the presence of high quantities of endosulfan in the samples of water, earth, fruits, mother's milk and blood. After mass agitations and several studies by various agencies, the use of endosulfan was banned in Kerala.

(Source : P N Venugopal , *The Quest Features & Footage, Kochi* , Feb. 11, 08)

Safety Measures Proposed for Soil Fumigant Pesticides: A Model (?)-- NEW draft safety measures for soil fumigant pesticides proposed by the US-EPA require that users of these chemicals submit written, site-specific fumigant management plans before fumigations begin. All soil fumigant products will be classified as restricted-use pesticides, to ensure that only specially trained individuals can apply and oversee fumigant operations.

Soil fumigants are pesticides that, when injected or incorporated into soil, form a gas that permeates the soil and kills a wide array of soil-borne pests. Fumigants are used primarily on potatoes, tomatoes, strawberries, carrots, and peppers, among other crops.

To protect human health, EPA is requiring a suite of new mitigation measures for the soil fumigants methyl bromide, chloropicrin, dazomet, metam sodium, and metam potassium.

When fumigants dissipate from the soil, workers or bystanders who are exposed to these pesticides may experience eye or respiratory irritation, or more severe and irreversible effects, depending on the fumigant and level of exposure. Human exposure to high concentrations of methyl bromide, for instance, can result in CNS and respiratory system failure, as well as specific and severe adverse effects on the lungs, eyes, and skin.

As part of the new program, users must set up buffer zones around treated fields to reduce the chances of immediate harmful effects to bystanders from fumigant concentrations in air. Buffers can be adjusted based on the use of other good management practices that also reduce risks to bystanders. Users will be required to post notices at the borders of the fields to be fumigated to inform bystanders and field workers about the location and timing of fumigations and buffer zones so people do not enter these areas.

Fumigant registrants must adopt more stringent worker protection measures, and develop training for fumigation handlers and workers to enhance their knowledge and skills and to promote product stewardship. EPA is providing 60 days for public comments on implementation of the new mitigation measures and will refine the measures as needed. EPA's decision also will halt the use of the fumigant methyl bromide on sites where alternatives are available. Methyl bromide is an odorless, colorless gas that depletes the stratospheric ozone layer, so use of it is governed by the provisions of the Montreal Protocol. When used as a soil fumigant, methyl bromide gas is injected into the soil at a depth of 12 to 24 inches before a crop is planted. This will sterilize the soil, killing the vast majority of soil organisms. Immediately after the methyl bromide is injected, the soil is covered with plastic tarps, which slow the movement of methyl bromide from the soil to the atmosphere. Additional methyl bromide is emitted to the atmosphere at the end of the fumigation when the tarps are removed. When an entire field is fumigated, the tarps are removed 24 to 72 hr later, as can be the case in strawberry production in California. But with row fumigation, as with tomato production in Florida, the tarps are left on for the entire growing season, as long as 120 days. Up to 95 percent of the methyl bromide injected into the soil can enter the atmosphere.

(**Source**: © Environment News Service, 2008. Abridged).

NEXT ISSUE OF AAPP NEWSLETTER DUE BY 30TH SEPT, 2008

Registration No.S/1L 37974/2006-07, Kolkata

Combating Climate Change-- ONCE upon a time, Kacholola Ndhlovu village in Mzimba was as good as the Garden of Eden. Rains always came in time and fell consistently throughout the season. The favourable rains, coupled with fertile soil, gave the 200 plus subsistent farmers of this innocent village more than enough of their food requirements in a year. During the rains, mushrooms grew in abundance in the bushes surrounding the village, enabling the residents to enjoy this delicacy as much as they wished.

However, now, 2008, the village is a shadow of its past glory. Since early 2000, the rains are inconsistent, erratic and unreliable. Either, they come too late and last for a few months; sometimes are so destructive, go beyond the season and sometimes they come with hailstorm, destroying the crop and houses. The forests around Kacholola, are now shaven like a bald head, owing to population pressure. The inhabitants of the village can only dream about the delicacy of mushrooms, as the plant is on the brink of extinction.

This reversal of fortunes for the unsuspecting people of Kacholola village is a result of climate change. A group of Scientists resolved to take on this bull by its horn and organised a national consultative workshop on climate change and climate variability in Lilongwe on July 2-3 to seek solutions to the phenomenon. Crop and animal diversification was suggested as a way of combating the phenomenon. Farmers were urged to plant drought resistant and fast maturing varieties of crops. Yes, maize is a staple but not all that is food! Most people in Malawi traditionally regard nsima (hard porridge from maize mealie) as their bread and butter. Hence dietary diversification was prescribed. Farmers should adopt affordable technology for growing mushrooms for which skills were available. Cotton growers were prompted to grow pest resistant varieties.

However, an expert warned on unbridled crop and animal diversification which may lead to producing very little quantities of food. Soil and water conservation was another way of adapting to climate change. So was the need for intensified production of organic manure. Farmers, need to employ other water conservation techniques, such as terraces for steep slopes, making ridges and planting grass.

Participants also proposed marketing as a tool of adapting to climate change. They don't have to be forced to grow, let's say maize, if their area is suitable for cotton or tomatoes. The research team, which started its project in June last year, is scheduled to complete its studies in 2011, at the end of which tangible results should be available.

(Source: Daniel Nyirenda, Daily Times, Malawi. 10 July, 2008).

Sustainable Intensification and Pesticide Risk Reduction Programme in West Africa– THE CROP Production and Protection division of FAO is adding to the growing legacy of Farmer Field School (FFS) programmes around the world with the Integrated Production and Pest Management (IPPM) programme in West Africa. The programme is targeting 130,000 farming families in Benin, Burkina Faso, Guinea, Mali, Mauritania, Niger and Senegal. Cropping systems include rice, vegetables, cotton, mangos and sesame. Expected outcomes include major reductions in chemical pesticide use, improved agronomic skills, on-farm crop diversification, human disease vector management, improved marketing and business skills of farmers and their organisations for sustainable and healthy agricultural produce and policy of national and regional reforms.

In July 2008, project will introduce a state-of-the-art pesticide monitoring component. Capacity will be built for employing new pesticide monitoring technology, including models for fate of measured pollutants moving through aquatic systems from local to transnational scales. Detailed analyses at the community level will estimate human health risks due to agricultural pesticides.

Pilot tests in three villages along the Senegal River found 19 pesticides in the river's water, at levels which, in 90% of the samples, were tens-to-hundreds of times above MRL of pesticides considered acceptable for safety of humans and the environment. As part of its comprehensive monitoring and evaluation system, the programme will establish an accurate and comprehensive picture of contaminant levels in dozens of communities along the Senegal and Niger river systems, prior to and after establishment of the FFS. In this manner it will accurately measure the impact of farmer training on productivity and profitability, but also on lowering risks from pesticides to human health and the environment.

(**Source**: FAO(UN) Agric & Crop Prot. Deptt, 30th May, 2008).

Nuclear Technology can Enhance Food Security – THE IAEA Director-General, Dr Mohamed El-Baradei, said nuclear technology could enhance crop productivity, pest control and livestock health. ``*Food security is among the most challenging problems facing Africa. Boosting agricultural production requires genetically enhanced crop varieties, increased soil fertility, better soil and water management and improved crop protection practices*'. The introduction of nuclear technology into agricultural activities would bring about increased food production, he said.

He noted that several countries in Africa were already using nuclear techniques in mutation breeding and biotechnology to develop enhanced varieties of crops. Since 2001, six new crop varieties had been officially released. Crops with higher yield, improved nutrition and/or more hardy characteristics for harsh environments have been released. These include new varieties of sesame seed in Egypt, cassava in Ghana, wheat in Kenya, banana in Sudan and finger millet and cotton in Zambia.

El-Baradei also called for the adoption of Sterile Insect Technique (SIT) in pest control. The technique utilises radiation to sterilise otherwise healthy insects. The insects were then released into the environment to mate, without producing offspring, thereby controlling and gradually eradicating the pest population. SIT had been used successfully for different pests in different regions. SIT is one of the methods being used to combat tsetse fly in Africa. He noted that Trypanosomiasis, the disease carried by the flies, remained a major constraint to sustainable development in many parts of Africa. It affects both humans and livestock and also impedes agricultural productivity.

(**Source**: Daily TRIUMPH, July 18, 2008)

Kew Provides Climate for Agricultural Change – A DEVICE to help some of the most impoverished farmers in Africa to maximise their crop yields is being tested at London's Kew Gardens. Developed by engineers at the University of Leeds, the sensor device gathers data on air temperature, humidity, air pressure, light, and soil moisture and temperature information crucial to making key agricultural decisions about planting, fertilisation, irrigation, pest and disease control and harvesting.

It is being tested by Kew's Diploma students and staff over the next four months in the School of Horticulture's new student vegetable garden at the Royal Botanic Gardens, Kew. The sensors are monitoring conditions around some typical crops to test possible future applications. The Leeds team has been working with two Kenyan villages to develop the technology as part of the Engineering and Physical Sciences Research Council (EPSRC) Village E-Science for Life (VESEL) project, a collaboration of key research groups in the UK and Kenya. The project aims to apply advanced digital technology to improve quality of life, both through its use in education and to optimise agricultural practices.

"In some areas of Kenya, localised variations in growing conditions can cause severe fluctuations in crop yields. Our part of the VESEL project is about providing the right information at the right time to farmers," says Professor Jaafar Elmirghani from the School of Electronic and Electrical Engineering. This means they can use available water more efficiently, minimising wastage and helping to optimise their harvests to feed their families. The information is fed back via a wireless network to a central hub, or server, which will be located at the village school, and is then sent to agriculture experts who will provide advice to assist farmers' decisions. The ongoing data gathered will also feed into agricultural teaching at Kenyan schools, which forms a central part of the education system.

During the tests at Kew, the data collected by the device will be sent back to the University of Leeds, but ultimately, the management of the system will be handed over to the University of Nairobi. *"We're pleased to put these devices through their paces and give feedback to the project. Our students are keen to learn about emerging technologies, especially with such clear sustainability goals as the VESEL project",* says Kew scientist, Rowan Blaik. The tests are expected to be complete by Autumn 2008, after which time the devices are initially to be trialled in the two Kenyan villages. It is hoped that, during 2009 and beyond, the technology will be rolled out to other communities.

(**Source**:**Jo Kelly**, : www.leeds.ac.uk, nächste Meldun 28.05.2008).

Secretary : Dr. Shantanu Jha, designed & composed by Sankar Dhar
Published by: Secretary, Association for Advancement in Plant Protection, Bidhan Chandra Krishi Visvavidyalaya, Mohanpur, Nadia W.B.-741252,E-mail:aapp_bckv@yahoo.co.in
Printed at :***Laser Aid Printers,*** B-9/107, Kalyani, Nadia, Ph: 9874364984, Email:kaushik_lap@sify.com