# IAPPS NEWSLETTER

Number I      January, 2010

## PLANT HEALTH RESEARCH TO ACHIEVE THE CGIAR OBJECTIVES

Providing sufficient, affordable and safe food for the increasing world population is one of the biggest challenges the international agricultural community is facing over the next decades. The first and most logical step towards this aim is the reduction of the current yield losses caused by pests, diseases, and weeds in the field and during storage. Without any pest control, crop losses would be considerably higher than they are today. However, anticipated future attempts to intensify agricultural production, coupled with climate changes are likely to exacerbate pest-related problems.

Activities on integrated pest management (IPM) have been going on for many years in most CGIAR Centers. IPM researchers studied pests of their mandate crops and developed effective pest control technologies and packages. In 1996, the Systemwide Program on Integrated Pest Management (SP-IPM) was launched to increase the efficiency of the Centers' research, by focusing on particular research themes and problems common to several Centers, and linking pockets of disciplinary expertise available across the Centers. In 2008, SP-IPM underwent major changes and adopted a new programmatic strategy which focuses on three research areas (AIM):

> ***A***dapting IPM to climate variability and change
> ***I***mproving agro-ecosystem resilience for soil, root and plant health
> ***M***anaging contaminants in food, feed and the environment.

These three research areas are further strengthened by a fourth thrust (Training) on expanding knowledge on IPM technologies through capacity building at the NARS' and policy makers' level in cooperating countries.

**Adapting IPM to climate variability and change**
The Problem: The multiple impacts of climate change could significantly reduce the effectiveness of current IPM strategies, leading to higher crop losses. Better knowledge and understanding of pest behavior under different projected scenarios are required to adopt and develop new IPM technologies to respond to threats resulting from climate change.
The Solution: SP-IPM will respond to these threats by carrying out collaborative research and surveillance to evaluate the changes in cropping systems and production practices affected by climate change, and to find out which cropping systems are the most vulnerable to increased biotic stress. This will include the establishment of a biodiversity monitoring system to detect and analyze climate change effects on above- and belowground biodiversity, and plant and soil health.

**Improving agro-ecosystem resilience**
*The Problem:* Plant health is intimately linked to the health of the agroecosystem in which the plant flourishes. Inappropriate agricultural practices, such as intensive monoculture, extensive mechanical tilling and over-reliance on agro-chemicals, change the biological, physical and chemical nature of the soil and hence alter the sound ecological balance of different soil organisms, affecting long-term agricultural productivity and sustainability. Improved resilience together with increased deployment of biodiversity is necessary to achieve the goals of sustainability and productivity.
*The Solution:* Agroecosystems have to be managed in ways that conserve and enhance functional agro-biodiversity, including soil biota abundance and diversity, even with further intensification of agricultural production. SP-IPM focuses on broadening the understanding of the ecological relationships in agricultural production systems to improve soil, root and plant health in key cropping systems. By doing so, eco-disturbances due to the expected agricultural intensification in the future will be prevented.
Emphasis is placed on the following areas

- development and promotion of crop production practices that retain and stimulate the biological diversity needed to mitigate damage to soil and plant health
- development of strategies for adapting host-plant resistance to pests under different agroecological conditions

**Managing contaminants in food, feed and the environment**

*The Problem:* Pesticide residues, heavy metals, microbes, and toxins produced by fungi, such as aflatoxins and fumonisin, in food and animal feed cause serious health risks. Climate change is expected to aggravate the mycotoxin problems with higher insect damage in dry areas facilitation contamination with toxin-producing fungi. Excessive applications of pesticides and the increasing use of generic products of doubtful quality are a hallmark in fruit and vegetable production. Residues related to improper use of pesticides and stringent quality standards for food deprive farmers and exporting countries of vital income.

*The Solution:* SP-IPM addresses trade losses and the threat to human, animal, and environmental health by:

- developing tools to identify and develop germplasm of crops with resistance to insect damage and subsequent fungal colonization, reduced toxin production, and swifter toxin degradation;
- providing cost-effective mycotoxin detection tools to exporters and food monitoring agencies to increase the market opportunities for agricultural produce and allow for the reduction of health risks from local food supplies;
- developing aflatoxin biocontrol methods;
- developing and adapting storage technologies for agricultural produce at risk of insect and mycotoxin infestation;
- improving IPM systems to take advantage of biological control and other non-pesticide alternatives that supplement low to moderate levels of plant resistance;
- supporting the rational use of modern pesticides to replace overuse of highly toxic outmoded chemicals;
- influencing policy makers to adopt national food safety enhancing policies.

**Training and capacity building to increase national research and innovation capacity**

Increasing food production in a relatively short time to keep pace with growing demand requires invigorated national capacities for research and innovation. SP-IPM has a vital role to play in supporting NARS to upgrade their research capacities by

- the implementation of a Rotational Advanced Training and Knowledge Exchange Program for key national scientists, research managers, CGIAR staff, and political decision makers to expose them to the latest technologies available to enhance plant health while reducing negative impacts on human and environmental health;
- tailor-made training of national researchers and practitioners in (a) the development of IPM practices, in particular production systems such as peri-urban horticulture, and small-scale cropping systems in the humid tropics, drylands, and temperate highlands; (b) specific topics relevant across cropping and ecosystems such as harnessing functional biodiversity to increase ecosystem resilience, assessment of the vulnerability of production systems to pests induced by climate change.

**Plant Health Management in the new CGIAR**

The concept of Mega Programs proposed as the key delivery mechanism for the outputs and outcomes of the Strategy and Results Framework at the medium- and long-term time horizons, leaves the future destiny of Systemwide and Ecoregional Programs (SWEPS) uncertain. However, the SP-IPM team is confident that plant health management and crop protection will feature high on the future CGIAR agenda as pests, diseases and weeds destroying substantial parts of farmers' harvests are major limiting factors to sustainable increased food security and safety.

When reflecting on the role IPM has to play in a reformed CGIAR System, further important aspects should be taken into account.

In addition to its primary role of reducing crop losses to biotic stresses, IPM is increasingly associated with other benefits such as ecosystem services. Healthy, biodiversity rich environments, culturally diverse landscapes, clean water ways, and watershed protection are services and public goods that IPM is providing. IPM also makes safer food available for people to lead a healthy and productive life, less burdened with diseases. By tackling sanitary and phytosanitary issues, IPM facilitates agricultural trade worldwide. Allowing farmers from developing countries to participate in international markets is recognized as an effective avenue out of poverty.

**Dr. I. Hoeschle-Zeledon**
SP-IPM Coordinator
E-mail: i.zeledon@cgiar.org

## TERMITE MANAGEMENT FOR NERICA RICE IN WEST AFRICA

Termites constitute a major biotic constraint to rice production in West Africa. Yield losses of 50 to 100% have been attributed to termites in farmers' fields. Smallholder farmers have over the years depended on their indigenous knowledge for the control of termites. With the increasing problem of termites in upland rice due to uneven distribution of rains and the recent ban on the use of persistent pesticides, there is a paradigm shift towards incorporating farmers' indigenous knowledge with appropriate environmentally-friendly technology for better management of the pest.
Studies were conducted at Ikenne, southwest Nigeria and Niaouli, Benin Republic to assess the effectiveness of the following treatments against termites:

- Biological control: chopped ripe and unripe pawpaw mixed with red palm oil (attracts ants that attack termites), and entomopathogenic fungus *Metarrhizium anisopliae* (2 g of *M. anisopliae* mixed with 60cc of wood powder applied at a depth of 3 cm around the rice plots at a distance of 40 cm between holes and 10 cm from the rice stands).
- Natural pesticides: neem seed oil and neem seed powder (2 litres of neem seed oil concentrate in 20 liters of water per 90 m2 and 800 kg/ha, respectively), powdered tobacco (200 g of powdered tobacco was mixed with 15 liters of water and sprayed on the plots).
- Cultural practices: bamboo (500 cm long bamboo stems were buried about 250cm deep into the soil), pigeon pea (sown in two rows around the rice plots at the rate of 4 to 5 seeds and at a distance of 40 cm between stands), sawdust (sprinkled on the plots), and a control against termite attacks on 15 rice varieties: NERICAs 1 - 10, LAC 23, OS 6, WAB 56-104, CG 14 and a local farmer rice variety.

The results showed that *M. anisopliae* and neem seed oil gave the best protection against termite attack across locations. Amongst the rice varieties, termite attack was significantly lower on NERICA 1, NERICA 5, NERICA 7, CG 14, LAC 23 than on the other rice varieties. These findings indicate that biological control using pathogens such as *M. anisopliae* and botanicals such as neem seed oil can provide effective control against termites on rice fields and can also be used as alternatives to persistent chemical pesticides.

**Dr. F. Nwilene**
IAPPS Coordinator, Region IV: West/Central Africa
E-mail: f.nwilene@cgiar.org

The IAPPS Newsletter is published by the International Association for the Plant Protection Sciences and distributed in *Crop Protection* to members and other subscribers. *Crop Protection*, published by Elsevier, is the Official Journal of IAPPS.

IAPPS Mission: to provide a global forum for the purpose of identifying, evaluating, integrating, and promoting plant protection concepts, technologies, and policies that are economically, environmentally, and socially acceptable.

It seeks to provide a global umbrella for the plant protection sciences to facilitate and promote the application of the Integrated Pest Management (IPM) approach to a the world's crop and forest ecosystems.

Membership Information: IAPPS has four classes of membership (individual, affiliate, associate, and corporate) which are described **here**.

The *IAPPS Newsletter* welcomes news, letters, and other items of interest from individuals and organizations. Address correspondence and information to:

**Dr. Manuele Tamo, Editor**
**IAPPS Newsletter**
**Biological Control Center for Africa, IITA-Benin**
**08 B.P. 0932 Tri Postal, Cotonou, Republic of Benin**
**E-mail: m.tamo@cgiar.org**