



# IAPPS NEWSLETTER

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## SP-IPM RESEARCH BRIEF No 6



A new research brief titled "*Incorporating Integrated Pest Management into National Policies*"

is now available. The IPM Research Brief series is part of the Consultative Group for International Agricultural Research (CGIAR) Systemwide Program on IPM (SP-IPM) strategy for promoting information exchange among stakeholders. Its purpose is to build public awareness and understanding of the benefits of integrated pest management and to encourage the full integration of this approach into mainstream agriculture. The past five decades have seen great improvements in agricultural productivity in many countries. High-yielding crop varieties and policies to promote the use of inputs such as fertilizers and pesticides have led to substantial yield increases. But these gains have not touched all regions: sub-Saharan Africa in particular lags behind. And the increased reliance on synthetic pesticides has brought environmental and health problems of its own. New approaches, capitalizing on the potential of IPM, are needed in order to maintain existing yield gains, and to support more productive agriculture in lagging areas.

National implementation of IPM strategies cuts across numerous sectors, government departments, and public and private initiatives. This brief examines the context and prospects for integrating IPM with national policies, both within existing plant protection policies and in the wider national and global policy environments. A range of policy and regulatory tools are described, as well as key steps for putting IPM policy into practice. Drawing on a wide range of examples and illustrative cases, the brief provides policy makers in developing countries with a succinct and practical introduction to the process of incorporating IPM into national policy.

This brief was prepared by the SP-IPM Secretariat under the leadership of the former SP-IPM Coordinator Dr. Braima James, and the current Coordinator Dr. Irmgard Hoeschle-Zeledon, in collaboration with Green Ink Publishing Services Ltd (UK), and with the financial support of CropLife International. It is based on materials provided by researchers at the International Potato Center (CIP), the International Center for Tropical Agriculture (CIAT), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Rice Research Institute (IRRI), the International Institute of Tropical Agriculture (IITA), the Wageningen University and Research Centre (WUR), and by colleagues from the Food and Agriculture Organization of the United Nations (FAO), the German Agency for Technical Cooperation (GTZ) and the Danish Agricultural Advisory Service. The Secretariat thanks everybody who supplied information and photos, reviewed drafts, or otherwise contributed to this brief.

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## INTEGRATED PEST MANAGEMENT PACKAGE FOR VEGETABLE CROPS IN THE TROPICS

Vegetables are important crops in subsistence and commercial production in the tropics. Essential to the food security of millions of poverty stricken people, vegetable production using IPM tactics increases income, decreases pesticide use, and increases the availability of nutritional vitamins and minerals.

Components of IPM have been developed and practiced at varying levels throughout the tropics. The IPM CRSP has been assisting in development of additional components of IPM for vegetable crops in developing countries in seven different regions of the world for the past decade and a half. Recently it has been concentrating on selecting and combining these individual components into a package that integrates all the elements into an IPM program for vegetable crops. It provides solutions to alleviate pesticide-induced problems and increase crop production. Its approach to vegetable production in the tropics reveals a new paradigm of integrated crop management. Instead of managing for one or two pests attacking a crop, the vegetable IPM package manages the plant production from pre-plant to start with healthy seedlings by applying bioagents, and using less synthetic fertilizers and toxic pesticides. While each country has its own pest problems characteristic to its own specific situation (climate, topography, geography, etc.), many pest problems are similar across the board. Several of the technologies developed in one

country could be transferred to other countries with some efforts to integrate them to the local conditions.

A comprehensive IPM CRSP vegetable package includes:

**1) Soil preparation:** Preparing the soil before planting will result in raising healthy plants. Using tactics such as soil solarization and fertilization with combination of compost, neem cake or mustard cake and Vesicular arbuscular micorrhizae (VAM) improve the nutrients available to vegetable crops and reduce the incidence of nematodes and weeds. Additionally, they contribute to the build-up of beneficial soil microbes that assist in nutrient availability to the plants.

**2) Selection of seeds:** Selecting seed varieties that produce plants resistant to pests and diseases, produce high yields and are acceptable to consumers in the market can be predictive to a reduction in pesticide costs and an increase in yields of products that guarantee profits.

**3) Seed treatment:** Treating seeds with the fungus Trichoderma sp. and the bacteria Pseudomonas fluorescens and Bacillus subtilis protects seedlings from fungal, bacterial and nematode attacks and induces defense in seedlings against diseases. An important exception includes seeds that are already treated with a fungicide called "Thiram." These seeds should not be treated with Trichoderma, as the fungicide will kill this fungus. However, seedlings raised from those seeds should be treated with Trichoderma before planting, as the fungicide will have dissipated and will no longer affect Trichoderma.

**4) Seedling nursery:** Media used for raising seedlings should be sterilized. The nursery should be screened to prevent infestation by insect pests, especially vectors of virus diseases and irrigation should be regulated to prevent excessive watering, which increases the incidence of fungal diseases.

**5) Seedling selection:** All seedlings in the nursery should be closely examined for diseases. Virus-infected and unhealthy seedlings should be eliminated from the planting material.

**6) Physical/mechanical Tactics:** Using physical IPM tactics such as staking, mulching, and other tactics are important to reduce the incidence of pests and diseases. For instance, staking tomatoes to keep them off the ground, away from moisture, can reduce late blight infection and fruit rot.

**7) Grafting:** Grafting of high yielding scions on disease resistant rootstock can control soil borne fungi, bacteria and nematodes. Grafting is a rapidly spreading technology that not only helps to increase the yield and robustness of plants such as tomato, eggplant, cantaloupe, and watermelon, but it also creates jobs, often for women in developing countries.

**8) Traps and biopesticides:** The setting up of yellow sticky traps in fields will help reduce pest populations such as aphids, thrips and whiteflies.

Several sex pheromone traps for monitoring key pests are available. For example, sex pheromone traps for the tomato fruit worm (*Helicoverpa armigera*) and army worm (*Spodoptera litura*) should be set up in tomato field. Once pests are found in the traps, the field should be monitored and a specific biopesticide, a nuclear polyhedrosis virus (NPV, a viral formulation) available in most countries for both of these pests, should be used. These biopesticides are nontoxic to humans and do not have non-target negative effects. Similarly, pheromone traps for the fruit borer (*Earias fabia*) of okra and the eggplant shoot and fruit borer (*Leucinodes orbonalis*) are available, and they should be set up in the appropriate fields to monitor the pest population. Currently, there are no viral formulations available for okra fruit borer and eggplant shoot and fruit borer. Spraying with neem formulations that are either prepared on the farm with neem seeds or obtained commercially from formulations available in the market will control these pests.

Pheromone traps for pests of cabbage and its related crops and gourds are also available in most countries. Additionally, formulations of the fungi *Verticillium*, *Metarhizium* and *Beauveria*, and nematode formulations of *Heterorhabditis* and *Steinerinema* are used for control of whiteflies, thrips and leafminers. Biopesticides have little or no impact on parasitoids and predators of pests. For this reason, these natural enemies will continue to serve as effective regulators of a variety of pests and will prevent their resurgence. By using these biopesticides, one can totally negate the use of synthetic pesticides and thus produce pesticide-free produce for consumers.

**9) Natural enemies:** Using local natural enemies such as predatory mites for control of phytophagous mites in strawberries reduces the need for pesticide applications. Inundative release parasitoids such as *Trichogramma* spp. and *Bracon* spp. are frequently adopted in control of caterpillar pests in vegetable crops.

Adopting this IPM package, farmers can produce certified organic produce that will yield higher profits, help to improve the health of farmers and consumers and alleviate the negative impacts of synthetic pesticide use.

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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.

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