Symposia

Symposium One: **Knowledge Transfer to Farmers in Plant Protection**

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Symposium One: Knowledge Transfer to Farmers in Plant Protection

S 1

IPM KNOWLEDGE TRANSFER – CURRENT DEVELOPMENTS AND NEEDS IN FARMER TRAINING FOR IPM IMPLEMENTATION. Janny Vos. CABI Bioscience, Bakeham Lane, Egham, Surrey TW20 9TY, UK, E-mail j.vos@cabi.org

To become successful producers, farmers need access to advisory expertise that helps them make better and more open choices about their own livelihoods. Globalisation poses a threat to smallholders unless they get more effective support in accessing new technologies and markets, and in meeting new standards of quality and reliability. The extension role needs to move towards a mode ranging from advice and training on specific technologies to facilitation in relation to technologies (e.g. improved access) but also in relation to a wider service context (including credit, input supply, processing, marketing). The research role needs to be linked and move towards a mode of seeking to solve farmers' problems and addressing their needs. Examples are given of tackling plant disease problems through farmer participatory training modes. Farmer Participatory Training (FPT) focuses on transfer of knowledge through discovery learning, facilitated by extension. Farmer Participatory Research (FPR) focuses on knowledge generation through novel farmer experimentation, facilitated by research and extension. The focus in FPR is on meeting farmers' needs and demands in appropriate knowledge generation through local technology development and/or validation. The focus of knowledge transfer and generation is indirectly to achieve food security, but first and foremost to improve smallholder producers' livelihoods. Impact assessments of participatory training programmes show more stable production with improved product quality and increase in farmers' incomes. However, for these programmes to move beyond pilot stages, it is concluded that a wider focus would be needed to involve all stakeholders in the IPM knowledge system.

S 2

IPM POLICY: THE NEED TO CREATE AN ENABLING ENVIRONMENT FOR IPM IMPLEMENTATION. Hermann Waibel, Department of Economics and Business Administration, University of Hannover, Germany, E-mail: waibel@ifgb.uni-hannover.de

The situation with pest problems on the global level and past experience with their control strongly suggests that unilateral control strategies such as chemical pesticides or single biotechnology approaches are unlikely to provide

sustainable solutions. Instead, global developments, as evidenced in the literature as well as through casual observations in farmers' fields around the world, underlines the need to develop and implement location-specific IPM solutions. Unfortunately, adoption of IPM on a global scale has not met its expectations. For example, despite evidence that insecticides in Asian rice production are overused from an economic, ecological and human health point of view, it remains a puzzle why apparently farmers' don't change their pest control practices. Although success was demonstrated in selected areas, e.g. in Indonesia and Vietnam, the overall evidence of a change in farmers' practice is not clear. A recent study from Indonesia even found that farmers who had received intensive IPM training in Farmer Field Schools are now spending more on pesticides than before the training in spite of a declining trend in yields and lower rice prices. In addition to a review of examples of IPM implementation from around the world, the paper also assesses the institutional environment for IPM on the global level. It is found that the growing complexity of pest management systems raises a number of policy research questions. Firstly, the trend towards market liberalisation in the absence of specific policy frameworks has often been negative for IPM. For the pesticide market, liberalisation without effective regulations and adequate market-based incentives may lower the costs of supplying pesticides, but at the same time can increase the tendency for ineffective, inefficient and non-sustainable crop protection. Hence, the question of how an effective and efficient policy framework suitable to facilitate the sustainable management of pests could be designed poses a challenge for international agricultural research related to IPM. Secondly, the question of cost-effective extension approaches to bring IPM to millions of farmers has been subject to controversial debates among major development organisations. These discussions were not always carried out on scientific grounds and sometimes were used as a vehicle of a controversy among different stakeholder for their different views on development. This has increased the danger that in the case of IPM the situation can be exploited by companies who sell crop protection products and who use IPM as a marketing instrument to maximise sales of chemical pesticides biotechnology products. The paper outlines an agenda that can help to more effectively link the science of IPM with an agro-environmental policy framework. A number of measures are proposed that can be further specified in the context of interdisciplinary research.

Symposium Two: Safe Management of Pesticides

S 3

REGULATIVE FRAMEWORK FOR PESTICIDE CONTROL. Gero Vaagt, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy, E-mail: Gero.Vaagt@fao.org

The International Code of Conduct on the Distribution and Use of Pesticides (Code) is the world-wide guidance document on pesticide management for all public and private entities engaged in, or associated with, the distribution and use of pesticides. In particular for developing countries the Code is the core document to regulate pesticides through national legislation. It was adopted for the first time in 1985 by the FAO Conference and has been one of the first international standards on chemicals (pesticides) in protection of human health and the environment. The Code is designed to provide standards of conduct and to serve as a point of reference in relation to sound pesticide management practices, in particular for government authorities and the pesticide industry. In 1999 FAO initiated the update and revision process of the Code, following the adoption of the Rotterdam Convention in 1998 and in recognition of the changing international policy framework, as well as the persistence of certain pesticide management problems, in particular in developing countries. In November of 2002 the Revised Version of the Code was approved by FAO and provides an up-to-date standard for pesticide management. The Revised Version of the Code embodies a modern approach, in line with other international agreements and leading to sound management of pesticides which focuses on risk reduction, protection of human and environmental health, and support for sustainable agricultural development by using pesticides in an effective manner and applying Integrated Pest Management (IPM) strategies. It incorporates the life-cycle concept and it is applicable to all pesticides used in agriculture, public health or elsewhere. The implementation of the Code is supported by technical guidelines and other guidance materials. An electronic version of the Code is available under http://www.fao.org/AG/AGP/AGPP/Pesticid/. The views expressed in this abstract are those of the author(s) and do not necessarily reflect the views of the Food and Agriculture Organization of the United Nations.

S 4

DESCRIPTION OF THE ROTTERDAM CONVENTION ON THE PRIOR INFORMED CONSENT PROCEDURE FOR CERTAIN HAZARDOUS CHEMICALS AND PESTICIDES IN INTERNATIONAL TRADE. Gero Vaagt, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy, E-mail: Gero.Vaagt@fao.org

The Rotterdam Convention was adopted on 10 September 1998. As of 16 June 2003 there were 44 Parties to the Convention. It will enter into force 90 days after deposit of the 50th instrument of ratification. The objectives of the Convention are: (i) to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm; and (ii) to contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties. The Convention creates legally binding obligations. It builds on the existing voluntary PIC procedure, operated by UNEP and FAO since 1989. The Convention establishes the principle that export of a chemical covered by the Convention can only take place with the “prior informed consent” of the importing party. The Convention establishes a means for formally obtaining and disseminating the decisions of importing countries as to whether they wish to receive future shipments of specified chemicals and for ensuring compliance with these decisions by exporting countries. The Convention also contains provisions for the exchange of information among Parties about potentially hazardous chemicals that may be exported and imported. The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons. . Severely hazardous pesticide formulations that present a hazard under conditions of use in developing countries or countries with economies in transition may also be nominated for inclusion in the procedure. The Convention initially covers 22 pesticides (including five severely hazardous pesticide formulations) and 5 industrial chemicals. Five pesticides have been added during the interim period, and many more are expected to be added in the future. Once a chemical is included in the PIC procedure, a “decision guidance document” (DGD) is circulated to participating countries, who are then given nine months to prepare a response concerning the future import of the chemical. The decisions of the importing countries are circulated and exporting country Parties are obligated under the Convention to take appropriate measure to ensure that exporters within its jurisdiction comply with the decisions. The Convention provides for the exchange of information concerning: (i) national bans or severe restrictions of a chemical; (ii) problems caused by a severely hazardous pesticide formulation under

conditions of use; (iii) exports of banned or severely restricted chemicals; (iv) safety data sheet when exporting chemicals that are to be used for occupational purposes; (v) specific labeling for exports of chemicals included in the PIC procedure, as well as for other chemicals that are banned or severely restricted in the exporting country. Parties also agree to cooperate in promoting technical assistance to enable countries to develop the capacity and infrastructure to implement the Convention. The Convention also establishes a Secretariat, whose functions are to be performed jointly by UNEP and FAO.

S 5

ISSUES AND PROBLEMS OF OBSOLETE PESTICIDE STOCKPILES.
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Obsolete, unwanted and banned pesticides constantly pose significant threat to human health and the environment. The problems are widespread in developing countries and countries with economies in transition. There are no facilities to destroy them and the unawareness of the inherent danger of pesticides is widespread, no expertise and financial resources. At present repackaging and transport to a high temperature incinerator in Europe is the only viable disposal method. This is expensive and time consuming, and involves cleaning up, repackaging in UN approved containers and transporting hazardous chemicals long distances across many borders, over land and high seas. While there are a number of alternatives to incineration for pesticide disposal, they are too expensive, too complex, and too dangerous or have limited applicability and are less versatile. There is a desperate need for a cheap and effective pesticide disposal technology that is appropriate for use in developing countries. The need for urgent cleanup of stockpiles of obsolete pesticides and associated waste and the prevention of further accumulation in African countries requires a coordinated, multi-stakeholder approach. Africa needs to adopt strong legislative measures to extricate itself from the legacy of permanent toxic stockpiles inflicted upon it for decades. It needs to have a united policy and a concerted international policy to avoid future accumulation of waste to ensure safer and healthier environment.

Symposium Three: Desert Locust Control

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DESERT LOCUST THREAT TO AGRICULTURAL DEVELOPMENT AND FOOD SECURITY AND FAO / INTERNATIONAL ROLE IN ITS CONTROL. Michel Lecoq, Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Prifas, TA40/D, 34398 Montpellier Cedex 5, France, E-mail: lecoq@cirad.fr

The Desert Locust is a major pest in many countries in Africa and the Near East. The episodic invasions are linked to favourable periods of rain in its desert outbreak areas where it originates. Recent studies have dealt with the persistence of the threat and have highlighted the economic, social and environmental issues which are very different from the usual crop protection problems encountered and which require specific actions. Monitoring and control are organised at both the national and regional levels with the support of the FAO (Food and Agriculture Organization), thanks to three Desert Locust control commissions. At the international level, the FAO plays a major role – mandated by its members – in the coordination of monitoring and control activities. It operates a central forecasting and warning service and plays an important role in the coordination of assistance, particularly during periods of recrudescence and plague. The Desert Locust Control Committee was created by FAO in 1955, uniting the concerned countries and is responsible for following the development of locust activity throughout the entire invasion area, defining the most well adapted control strategies, mobilising the resources necessary for control operations, promoting research earmarked for the improvement of locust control and encouraging the coordination of domestic and international operation plans concerned with preventive actions. The last plague, from 1987-1989, the result of the gradual weakening of the preventive control system (responsible for the long recession period beginning in the 1960's) set off the debate once again about the importance of the Desert Locust and control strategies, in which the FAO played a key role. Today's preventive control strategy is still considered as the best possible approach and consists of two basic elements: early warning and early reaction. In 1994 the FAO launched the EMPRES program, aimed at reinforcing the locust control capabilities of countries with outbreak areas and strengthening related regional and international cooperation. The success of the EMPRES program is vital to ensuring the sustainability of preventive control, to reducing invasion risks, to maintaining food safety in the region and to guaranteeing the preservation of the environment threatened by intensive chemical locust control campaigns.

S 7

FAO'S EMPRES (DESERT LOCUST) PROGRAMME – TOWARDS SUSTAINABLE PREVENTIVE CONTROL. Clive Elliott, Locust Group AGPP, FAO, Via delle terme di Caracalla, 00100 Rome, Italy, E-mail: Clive.Elliott@FAO.ORG

The Desert Locust plague of 1986-1989 and the upsurges that followed in 1992-1994 led to widespread concern at the cost of control and the potential for adverse environmental side-effects. In response to these concerns, the FAO Director-General launched a Special Programme EMPRES (Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases) with one component addressed only to the Desert Locust *Schistocerca gregaria*. EMPRES was launched with a Central Region field programme in 9 countries around the Red Sea in 1997, and is in the process of being extended to 9 countries in the Western Region (West and North-West Africa). EMPRES includes a further 4 countries in the Eastern Region (South-West Asia), but no programme has been developed there so far. The programme focuses on strengthening national capacities to carry out Early Warning locust surveys and to implement Early Reaction control practices with the objective of reducing the risk of plague development. The presentation will review the progress achieved to date in establishing preventive control in the Central Region and the pilot activities accomplished in the Western Region. New technologies offer the prospect for better detection of the initial outbreaks, reduced survey costs and environmentally friendlier/cheaper control, but the ability of national units to carry out regular and efficient surveys remains fundamental to avoiding surprises. EMPRES Central Region is also placing emphasis on contingency planning, such that countries can react in an orderly way to the different scenarios that may develop as Desert Locust populations increase.

S 8

THE FAO COMMISSIONS FOR CONTROLLING THE DESERT LOCUST. Abderrahmane Hafraoui, Senior Officer, Locust and Other Migratory Pests Group, Plant Production and Protection Division (AGP), Building B746, Food and Agriculture Organization of the United Nations (FAO), Viale delle Terme di Caracalla, 00100 Rome, Italy, E-mail: Abderrahmane.Hafraoui@fao.org

The Desert Locust, an acridid transboundary pest, remains a major threat to agriculture and pastureland in certain parts of Africa, the Near East and South-West Asia. For a long time, the locust-affected countries have recognized the importance of inter -country cooperation in combatting the pest. After the Second World War, France created a structure for locust control in the old French West Africa, known as the Anti-Locust Office, based in Algiers. In 1951, FAO took the

initiative to encourage multilateral cooperation by for ming a Consultative Committee on Desert Lucust Control, which became, in 1955, the Desert Locust Control Committee (DLCC). This was followed by the creation of three regional commissions, the Commissions for Controlling the Desert Locust in North-West Africa, in the Near East, and in the Eastern Region of its Distribution in South-West Asia, respectively. The name of the second has been changed to "Central Region", of the third has been shortened to "South-West Asia", and of the first, with the incorpor ation of four Sahelian countries, has become the "Western Region". The countries of the Western and Central Regions each managed, not without difficulty, to regroup themselves out of the institutions already existing in their regions that competed to cover the whole area. In the Western Region, the two bodies were the North-West Africa Commission, created by FAO with its HQ in Algiers, and OCLALAV (Joint-Organization for Locust and Bird Control) covering Sahelian countries, which was outside FAQ, had its HQ in Dakar, Senegal and replaced the Anti-Locust Office in Algiers. The formation in 2002 of the Western Region Commission, bringing together again the locust-affected countries of North-West Africa and the Sahel, is without doubt an important event. It will allow an efficient and effective cooperation in pursuing the preventive control of the Desert Locust in the medium- to long-term. An examination of the Establishment Agreements through which the Commissions were established, reveals much about how they have been created.

Symposium Four: Pest Resistance to Pesticides

S 9

FUNGICIDE RESISTANCE IN CROP PROTECTION. Francesco Faretra, Department of Plant Protection and Applied Microbiology, University of Bari, Via Amendola 165/A, I-70126 Bari, Italy, E-mail: faretra@agr.uniba.it

Fungicide resistance is a challenge in modern crop protection. Most of new fungicides have a very specific, single-site, mode of action, whereas the old chemicals interfer with numerous cell functions in the target pathogen. Specific modes of action have several advantages (enhanced biological activity, usage at low rates, high selectivity for non-target organisms, low environmental impact, etc.), but make more likely the occurrence of acquired resistance in phytopathogenic fungi. In addition to the particular fungicide, the risk of resistance depends also on the genetic and physiological mechanisms underlying resistance, the fitness of resistant strains, the characteristics of the disease (number of cycles per season, size of fungal population in the field, etc.), and growing conditions (i.e., weather, protected crops). Simple methods for monitoring fungicide resistance are crucial for assessing promptly modifications induced in the pathogen's population by treatment schedules. Crop protection management must implement anti-resistance strategies aiming at reducing as much as possible the selective pressure exerted on fungal populations. This can be achieved adopting integrated disease control, limiting the number of sprays with fungicides at moderate-high risk of resistance, and using mixtures or alternations of fungicides with different mode of actions.

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INSECTICIDE AND ACARICIDE RESISTANCE. Gregor J. Devine, Plant and Invertebrate Ecology Division, Rothamsted Research, Harpenden, Hertfordshire, AL5 2JQ, England, UK, E-mail: greg.devine@bbsrc.ac.uk

Insecticide resistance is an example of a dynamic evolutionary process in which chance mutations conferring protection against insecticides are selected for in treated populations. Since the 1940s, synthetic insecticides have been used on an increasing scale to control the insects and mites that cause immense crop losses and pose major threats to public and animal health. However, because many of the target species have evolved resistance, some of these chemical control programs are failing. At the current time, more than 500 arthropod species have evolved resistance to at least one pesticide, and a few populations of some of those species are now resistant to all, or almost all, of the available products. This article will review the diagnosis and mechanisms of resistance, and their extent across species

and chemical groups. It will also review the genetic, ecological and operational factors that affect the rate at which resistance develops. Finally, it will examine how best to combat resistance and will consider some recent success stories in the continuing battle between insect evolution and human ingenuity.

S 11

HERBICIDE RESISTANCE IN WEEDS. Pedro J. Christoffoleti, ESALQ/USP – LPV, Av. Padua Dias, 11 - Caixa Postal 09, 13.418-900 - Piracicaba – SP, Brazil, E-mail: pjchrist@carpa.ciagri.usp.br

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MANAGEMENT OF RESISTANCE IN AGRICULTIRAL PESTS. Mohamed Abdel Mageed, Plant protection Department, Faculty of Agriculture, Ain Shams University, P.O. Box 68, Hadayek Shoubra, 11241 Shoubra, Cairo, Egypt, E-mail: dimamt@yahoo.com

The evolution of resistance is determined by many factors that influenced the degree of selection pressure. These are genetic, biological, behavioral and operational factors. Integrated pest management proved to be the most effective tool for management of resistance in agricultural pests. Principals, guidelines, basic elements and strategies of IPM were considered. Major barriers for the progress of integrated pest management and challenges to overcome the constraints are outlined. Another direction for resistance management by using chemical strategies can be placed under three categories: (1) management by moderation through low dosages, chemicals of short persistence, less frequent applications, localized applications, avoidance of slow release formulation, (2) management by saturation i.e. suppression of detoxication mechanisms by synergists, (3) management by multiple attack using mixtures of chemicals and pesticide rotations. Recommendations concerning management of resistance to pesticides with special concern to extension, industry polices, research will be presented.