

# Country Report - India

Prepared for the meeting of the Programme Advisory Committee  
(PAC), Ayutthaya, Thailand, November 2001

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## 1. Introduction

India is an agrarian country. The 1012.4 million population is dependent on agricultural commodities from 124.07 million hectares cropped area produced by 110.7 million cultivators. Plant Protection involves protection of agriculture from pests and diseases through promotion of Integrated Pest Management (IPM), regulatory measures to prevent introduction of exotic pests/diseases, ensuring availability of safe and quality pesticides and biopesticides, training of extension functionaries in plant protection and locust control in the Scheduled Desert Areas.

Directorate of Plant Protection, Quarantine & Storage under the Ministry of Agriculture, Government of India is the Central Government organization exclusively devoted to plant protection services in the country. In the States, Plant Protection set up exists from block level upwards. At the State Headquarters, the Plant Protection work is being attended by Joint Director (Plant Protection).

The Central Directorate of Plant Protection is functioning with the support of 87 Sub-offices which include 26 Central Integrated Pest Management Centres, 29 Plant Quarantine Stations, 2 Regional Pesticides Testing Laboratories, 29 Locust Control Stations and 1 National Plant Protection Training Institute. The main functions of the Directorate include, promotion of Integrated Pest Management (IPM) programmes, enforcement of Plant Quarantine Regulations under Destructive Insects & Pests (DIP) Act, 1914, Implementation of Insecticides Act, 1968, Training in Plant Protection and Locust Control in Scheduled Desert Areas, etc.

At national level, major emphasis is being given on the promotion of Integrated Pest Management to minimize the use of harmful pesticides as well as to protect human health and environment from the hazards of pesticides. Under this programme, the farmers are being trained through Farmers' Field Schools (FFSs) to grow healthy crop and manage pests/diseases with need based use of chemical pesticides. To encourage biopesticide industry, the data requirement for the registration of bio-pesticides has been simplified and commercialization of all such bio-pesticides is allowed during the period of provisional registration.

In India, the IPM demonstrations in paddy commenced during 1981. These were being organised by erstwhile 19 Central Surveillance Stations. In 1991, the field formations

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viz., Central Surveillance Stations, Central Biological Control Stations and Central Plant Protection Stations were reorganised to form 26 Central Integrated Pest Management Centres (CIPMCs) located in 22 States and one Union Territory. These centres have the mandate to monitor pest and disease situation in the States for undertaking suitable control measures by the States.

In addition, these centres mass produce biocontrol agents for control of field pest and diseases and organise Farmers' Field Schools to train Extension Officers and farmers in IPM concept. Innovations made in the management of pests and diseases by employing cultural, mechanical, biological control methods with emphasis on need-based use of chemical pesticides, is being disseminated among the states by these centres.

Through regulatory measures, the Government is encouraging the import of elite varieties of seeds and planting materials for increasing production and productivity of various crops. In order to give a boost for the export and import of agricultural commodities, four laboratories with modern facilities have been established at four Regional Plant Quarantine Stations. Similar facility is being established at Regional Plant Quarantine Station at Mumbai.

## 2. Outbreak of Major Pests and Diseases

During 1999, due to the inclement weather conditions, the incidence of sugarcane pyrilla appeared in 5,77,901 ha in five Divisions of western Uttar Pradesh. The same was successfully contained by *Epiricania melanoleuca* - a potential nymphal and adult parasite of this pest. The farmers were trained to conserve this naturally occurring biocontrol agent in the sugarcane ecosystem. The severe incidence of Diamond Back Moth (DBM) on cauliflower/cabbage crop around Delhi was controlled effectively with *Bacillus thuringiensis* (B.t.) and neem based biopesticides. The incidence of coconut mite in the States of Kerala, Tamil Nadu, Andhra Pradesh, Karnataka and Pondicherry is being controlled with the use of neem based formulations. Fields trials with *Hirsutella thompsonii* are being conducted in the above states. The incidence of Bihar hairy caterpillar reported on soybean in moderate to severe intensity in Maharashtra has been contained successfully.

Year	State	Crop	Pest/diseases	Affected area (in ha.)	Treated area (in ha.)
1999-2000	Uttar Pradesh	Sugar-cane	<i>Pyrilla perpusilla</i>	5,77,901	5,77,901
2000-2001	Andhra Pradesh	Groundnut Cotton	Bud Necrosis <i>Helicoverpa</i>	2,46,137 1,76,386	NA NA
	Rajasthan	Soybean	<i>Spodoptera litura</i>	2,60,350	2,16,782
	Assam	Rice	<i>Dicladispa armigera</i>	15,765	5,168



	Kerala	Coconut	<i>Aceria guerreronis</i>	1,83,22,554 (No. of palms)	28,84,137 (No. of palms)
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During 2000-2001, the pest and disease situation in the country remained at low ebb. However, there has been moderate to severe incidence of Bud Necrosis Virus disease on groundnut in Andhra Pradesh. The outbreak of *Spodoptera litura* on soybean in Rajasthan, moderate to severe incidence of rice hispa on rice in Assam and moderate incidence of *Helicoverpa armigera* on cotton in Andhra Pradesh have been reported. The details are as under-

### 3. Pest Control and Extension

#### 3.1 Status of Plant Protection techniques and control measures

India is a large country and more than 60 per cent of population practice farming. For rapid dissemination of IPM information, Farmers' Field Schools (FFSs) are being organized by 26 Central Integrated Pest Management Centres located in 22 States and one Union Territory to transfer the knowledge and skill on Integrated Pest Management (IPM) to farmers including small farmers. IPM demonstrations in rice, cotton, sugarcane, pulses and oilseeds are being organized by the State Governments with the financial assistance extended by Union Department of Agriculture & Cooperation under the Centrally Sponsored Scheme. States are promoting IPM from the State funds as well.

#### 3.2 Technology Mission on Cotton:

Encouraged by the results obtained in oilseeds production by Mission Mode approach during the 1990s, a similar approach has been initiated through Technology Mission on Cotton (TMC) for improvement of production, productivity and quality of cotton. This is being done by bringing in the entire gamut of research, development including technology transfer, marketing and processing of cotton under one umbrella.

##### 3.2.1 Objectives:

To improve the yield and quality of cotton by developing better cotton varieties and through improved Pest Management and transfer of technology to farmers.

To increase the income of the cotton growers.

To improve cotton processing facilities by upgrading/modernising the existing ginning and pressing factories.

##### 3.2.2 Mini Missions:

To fulfill the above objectives, four Mini Missions are established under TMC as follows:

- Mini Mission I* : Cotton Research and Technology generation
- Mini Mission II* : Transfer of Technology and Development
- Mini Mission III* : Improvement of Marketing Infrastructure



*Mini Mission IV* : Modernization/upgradation of G & P factories

Following are the components under the Mini Mission II:

- technology transfer through demonstration and training;
- supply of delinted certified seed by setting up of delinting units;
- accelerating Integrated Pest Management activities; and
- providing adequate and timely information on input to the farmers.

Government of India and State Governments will share the expenditure on 75:25 basis.

### **3.3 Development of IPM Packages:**

In order to disseminate the IPM approach uniformly among the extension functionaries and farmers, IPM packages for 20 cereals, pulses, oilseeds and vegetable crops have been developed. 24 IPM packages for coarse cereals, fruits, plantation, commercial and spices crops have also been developed for use by extension functionaries and farmers.

The IPM packages are encompassing various management strategies for containing the pest and disease problems. The major IPM practices are cultural (deep summer ploughing, use of tolerant/resistant varieties, crop rotation), mechanical (collection and destruction of pests stages, removal of infested plant parts), biological (conservation and augmentation of natural enemies) and need based use of chemical pesticides preferably in combination with botanicals and biopesticides. Pest monitoring is also one of the important component of IPM to take proper decision to manage any pest problem. It can be done through Agro-Ecosystem Analysis (AESA), field scouting, pheromone, stick/yellow pan traps. The economic threshold levels (ETL) of important pests and diseases are also given in the packages to take appropriate control measure when pest population crosses ETL.

### **3.4 National plan of action on IPM:**

During January, 1999, national plan of action on IPM has been finalised in consultation with the State Departments of Agriculture. Under this programme, among other issues each state has to spend at least 50 per cent of their state budget on plant protection for promotion of IPM.

### **3.5 Standing Committee on IPM:**

To coordinate and promote IPM activities at the national level, the Government of India during 1993 has constituted a Standing Committee on IPM. This Committee reviews IPM strategies for large-scale adoption in the country.

### **3.6 IPM Coordination Committee:**

IPM Coordination Committee has also been constituted in each State. These Committees plan, implement and review the IPM programmes in the States.



### 3.7 New Strategies to Promote IPM:

IPM is a knowledge intensive approach in plant protection. Promotion of this approach at village level largely depends upon the availability of trained extension functionaries/farmers. To achieve this, a three-tier training approach has been evolved viz., (i) Training of Trainers through Season Long Training; (ii) training of extension officers and farmers through organisation of Farmers' Field Schools and (iii) training of farmers by conduct of IPM demonstrations for popularizing field tested IPM practices.

#### 3.7.1 Training of Trainers (ToT):

Under this programme, Subject Matter Specialists receive intensive field training in Integrated Pest Management in different crops by associating them for the entire crop season. These Season Long Trainings are being run by International Experts and National Resource Personnel drawn from Central and State Departments of Agriculture, State Agricultural Universities and Indian Council of Agricultural Research (ICAR). The trainees organise FFSs in the surrounding villages wherein they train the farmers in the field. During these training programmes, field exercises like Agro-Eco-System-Analysis (AESA), participatory action research, special topics like rice-fish culture, bee keeping, rodent management, nutrition management, weed management, simulation experiments on detilling and defoliation etc are also dealt with.

#### 3.7.2 Farmers' Field Schools (FFSs):

The objective behind Farmers' Field School (FFS) is to train farmers in their fields to enable them to analyse the situation in the field and take adequate decision on pest management measures needed. The training strategy, having its foundation in non-formal education principles, emphasizes LEARNING BY DOING, and empowering farmers to actively identify and solve their own problems. The trainer is a facilitator instead of an instructor. In the FFS, the farmers are trained days about the pest/disease problems in relation to prevalent biotic and abiotic factors. This helps the farmers in understanding the fluctuations in the population of insect pests as influenced by increase or decrease in the natural enemy population.

This is the second set up of training programme involving organisation of Farmers' Field Schools in farmers' fields to train Agriculture Extension Officers and farmers. These are being run by the Core Training Team comprising of one Master Trainer trained in the Season Long Training courses, 2 Agricultural Extension Officers and an Officer from Central Integrated Pest Management Centre. These Core Training Team members visit each FFS once in a week on fixed days. These visits continue for 10-12 weeks wherein the Core Training Team members undertake field observations with the farmers and hold discussions. Such weekly training session with the farmers provides them opportunity to study the interactions between the harmful and friendly insects throughout the cropping season.



### 3.7.3 IPM Demonstrations:

The States are conducting IPM demonstrations in rice, cotton, pulses, oilseeds, sugarcane and vegetables with the financial assistance extended by the Union Department of Agriculture and Cooperation. In each demonstration, 30 farmers are being trained by the Agricultural Extension Officer trained in the Farmers' Field Schools.

### 3.7.4 Availability of IPM trained manpower:

Governmental efforts for human resource development in IPM during last 7 years have created substantial manpower resources:

Master Trainers	:	2,320
Extension Functionaries	:	31,326
Farmers	:	11,75,451
Women farmers	:	1,67,400
NGOs	:	7,417
<i>Total</i>	:	<i>13,83,914</i>

### 3.7.5 Training of personnel abroad:

A total of 41 policy makers and scientists under the UNDP project "Development and Strengthening of IPM in India" visited abroad on study tour and 28 officers underwent fellowship training on biological control in cotton and vegetables etc.

### 3.7.6 Establishment of Central and State Biocontrol Laboratories:

Following research and extension efforts, demand of biocontrol agents and biopesticides is gradually increasing. In this direction, production units under the control of Central and State Govts. as well cooperatives are producing these eco-friendly inputs. Various State Departments of Agriculture and Horticulture have taken positive steps for the production of biocontrol agents through Central and State Biocontrol Laboratories. Current status of biocontrol agents produced during 1998-99 and estimated requirement during 2000-01 is given at annexure - I.

The Government has recognised the usefulness of biological control approach in the IPM programme. In its effort to promote biological control as a viable input in the IPM approach, the Government of India is providing grants-in-aid @ Rs. 50 lakhs per laboratory for construction of building and purchase of equipments to set up 30 State Biological Control Laboratories.

Some of the States have already set up biocontrol laboratories from their own resources for mass production of potential biocontrol agents for field releases. Besides, some of the NGOs, Private entrepreneurs, State Agricultural Universities and Cooperatives have



also set up mass production units to supplement the Governmental efforts. Presently, 409 such biocontrol units are functioning in the country.

### 3.7.7 Action plan for monitoring pests and diseases situation in the country:

Pursuant to outbreak of pests and diseases during 1999 and 2000, the Government of India constituted a working group to formulate action plan for monitoring pests and diseases situation in the country. Based on the deliberations, the working group has suggested measures to the State Governments to identify hot-spots of pest/disease occurrences and keep a watch on the pest/disease situation to undertake timely control measures.

### 3.7.8 Research input on plant protection:

The Indian Council of Agricultural Research and State Agricultural Universities are providing research input in plant protection.

## **4. Need For Community IPM in India**

Efforts made since 1994 towards Human Resource Development has helped in creation of trained manpower as master trainers and trained extension officers who are able to pursue IPM related activities in the states. In addition farmers have also been trained in IPM approach. Now it is essential that Food and Agriculture Organisation may consider taking up programmes for community IPM in India so that the message is spread faster.

## **5. Impact of IPM**

With the background of IPM knowledge, the farmers are practicing farming with minimum use of pesticides as agro-chemicals. Instead they are depending on biocontrol agents. They are using biopesticides for the control of pests and diseases.

As a result of implementation of IPM Programme, there is significant reduction in the consumption of pesticides from 61,357 MT (Tech. Grade) during 1994-95 to 46,195 MT (Tech. Grade) during 1999-2000.

## **6. Prospective Plan**

The efforts made since 1994, has helped in creating awareness about the IPM concept among the Policy Makers, Technical Experts, Extension workers and farmers alike. In addition, sizable number of trained manpower in the form of Master Trainers, trained Extension Officers and farmers have become available. However, considering the vastness of the country and number of farmers to be trained, the present contingent of trained manpower is still a mismatch. In this direction, it is proposed to associate NGOs,



Women Organisations, Panchayati Raj Institutions etc. to spread the IPM message among the farming community. In this direction, FAO may provide technical and monitory assistance to launch community IPM programme in the country.



## Annex 1:

### Production and Estimated Requirements of Biocontrol Agents

No.	State	Production of Bio-control Agents (1998-99)	Estimated requirement of Bio-control Agents (2000-2001)
1.	Andhra Pradesh	37,60,000 (Approx.) LE& Tricho cards	*
2.	Assam	Tricho 67.90 Million	75 Million
3.	Gujarat	--	Tricho 60 Million 25,000 Kg (Trichoderma) 400 lakh
4.	Himachal Pradesh	Tricho 87.80 Million	Tricho 15.00 Million
5.	Jammu & Kashmir	Tricho 82.00 Million	*
6.	Karnataka	Tricho 92.46	180 Million
7.	Kerala	1,21,25.281	180 lakh
8.	Madhya Pradesh	2380 Million 10,165 LE (NPV) 25 Kg (Trichoderma)	77,000 eggs 40,000 LE 25,100 Kg (Trichoderma)
9.	Maharashtra CIPMC, Nagpur  CICR, Nagpur  3 SAUs	150 Million  3500 Cards (Egg parasite) 6 Million (Larval parasite) 12 Million (Pupal Parasite) 2400 litre (NPV)  1,050 litre (NPV) 20 Million (Egg Parasite) 600 Kg (Trichoderma)	Tricho 404 Million NPV 550 LE      *
10.	Orissa	2061.50 lakh 1660 lakh	*
11.	Punjab	548.64 Million 6 lakh eggs 50,000 Cocoons 20,000 Parasites 6,689 Cards	90.2 Million 10 lakh eggs    5,000 cards
12.	Rajasthan	4330 Cards 3875 Kg	1,56,800 LE (NPV) 8,184 Trichocards 11,000 Kg Trichoderma
13.	Tamil Nadu	Trichogramma 118 Million Bethylid 10,000 Tubes Bracomid NPV 1920 litre Pseudomonous 4800 Kg	5 lakh C.C. 1200 lakh Nos. 20,000 tubes 10,000 litres (NPV)
14.	West Bengal	Trichogramma 73 Million 180 LE (NPV)	Tricho 90 Million
15.	Pondicherry	Tricho 9.6 Million	Tricho 37.2 Million