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Integrated Pest Management Experiences in pakistan

Abstract

Research and development on IPM was initiated in Pakistan in the 70's. However, efforts to implement IPM at the farm level did not bear fruit. A major obstacle has been the mindset at the policy level to increase crop production to feed the ever-increasing population. Pesticides became a major instrument of increasing production leading to 'pesticide treadmill' situation. Although IPM-FFS "Vehari Model" clearly demonstrated that IPM could be implemented on a large scale at the farm level, a positive enabling environment did not exist. An analysis of pesticide policy through a UNDP-FAO Policy Reform Project paved the way for the establishment of a National IPM Programme and provided instruments to scale up the Farmer-led IPM through integration of international

and national efforts on various fronts. The Policy Study has shown that Pakistan's laissez-faire approach to pesticide policy has imposed substantial costs on the national economy that have fallen most heavily on the poorest of the poor segments of the society. The pesticide dependence has given rise to costly negative externalities in the form of damage to human health, to agricultural production systems and to the environment. The study has underscored the need to remove incentives for pesticide overuse, create new incentives for farmers to develop skills in sustainable crop production including pest management, provide unbiased science based information on pesticides and IPM and strictly enforce clear and consistent pesticide rules and regulations. There is a paradigm shift



in the Government thinking leading to efforts on reforming the Pesticide Act and rules, taking in to consideration the health and environmental concerns and international agreements, and adopting IPM as a strategic option to reduce pesticide use. Thus IPM has been institutionalised through the establishment of a National IPM Programme. IPM is now considered as one of the most appropriate approaches to provide a sound transfer of knowledge system in the country's agriculture once it is used as an entry point to transfer crop protection technologies. The future trends as apposed to past, appear to be: i) a holistic IPM based on systems approach, ii) a large scale field implementation focusing on farmer empowerment through Farmer Field School Approach, iii) a strong commitment from Government for IPM as a strategic option to rationalize use of pesticides, iv) increased consciousness on the part of the consumers about toxic affects of pesticides on Society's health and environment with a resultant enabling environment for IPM, v) a continued "negative expansionist marketing and dumping of pesticide" attitude of agro-chemical industry due to tighter and stricter control in the developed countries, vi) attraction of GMO's appearing as a silver bullet syndrome, and vii) trade and globalisation increasingly playing a role in the liberalization of pesticide market.

Introduction

Pesticides use, in Pakistan, began in the fifties, but surprisingly the rules and regulations were formulated and approved much later in 1971 and 1973. Until 1980 the pesticides were subsidized and Plant Protection Department was responsible for pesticide import and their distribution in the country through national agricultural extension network. In 1980, the pesticide business was transferred to private sector, following which a considerable increase in pesticide use occurred over the years (Ahmad et al, 2002); from 665 metric tons in 1980 to 69897 metric tons in 2002, without significant gains in the yield of crops such as cotton, which consumes about 54% of the total pesticides used. However, there is 85% reduction in real value from base year, 1980. Per unit price of pesticides also decreased drastically since 1993 after the introduction of generics. The role of private sector in promoting the production and use of pesticides was found to be tremendous. The private sector also took full advantage of government's pesticide oriented policies (Khan et al, 2002).

The increase in use of pesticides not only drains the exchequer, but also presents a growing threat to the people and environment of the country. Increased pesticide use has created growing resistance among pests and destroyed natural predators. Unplanned use of chemicals resulted in environmental pollution and un-economical returns on the costly investments. The pressure to maximize outputs is enormous on low income and resource poor small farms. They have, therefore, little regard for degradation of natural resources, health risks and future productivity. On the other hand, roughly, 85 to 90 percent of pesticides applied in agriculture never reach the target organism; instead they become



dispersed through the air, water and soil. There is an ecological principle that the poison we put into the environment comes right back to us in our air, water and food. A depleted and polluted environment impact the poor by increasing health problems and lowering the productivity of the natural resources off which they often must live (Khan et al, 2002).

Pesticide policy analysis - a vehicle for IPM implementation

In Pakistan, research and development on IPM was initiated in the 70's. However, efforts to

implement IPM at the farm level did not bear fruit. Pesticides became a major instrument of increasing production leading to 'pesticide treadmill' situation. Although an IPM-FFS model implemented in 1996 - popularly known as "Vehari Model", clearly demonstrated that IPM could be implemented on a large scale at the farm level, a positive enabling environment did not exist. An analysis of pesticide policy through a UNDP-FAO Policy Reform Project during 2000 (UNDP, 2001) and the initial input from FAO-EU IPM Programme for Cotton in Asia paved the way for the establishment of a National IPM Programme and provided instruments to scale up the Farmer-led IPM through integration of international and national efforts on various fronts (Ahmad, 2003b; Soomro and Ahmad, 2002).

Pesticide policy analysis results shows sharp increase in external costs related to agriculture pesticide use and these costs fallen heavily on the poorer groups of the society. The economic analysis of pesticide use in Pakistan shows a benefit cost ratio of only 0.43 while including external costs of pesticide use to the society and even excluding these costs yielded a benefit cost ratio of 1.14 only. These results raise some doubts whether the current level of pesticide use in cotton or for that matter in other crops is economically justified (Ahmad, 2003b).

The pesticide industry has a very strong influence in the farming community. By reducing dependence on pesticides, IPM would reduce costs of production and could lead to improved rural health. Thus newly established National IPM Programme (Nat-IPM), based at the National Agricultural Research Centre (NARC) - an in-house research establishment of the Pakistan Agriculture Research Council (PARC) - the Apex NARS Research Coordination body of the Ministry of Food, Agriculture and Livestock, would play a crucial role in this direction (Ahmad et al, 2002; Ahmad, 2003a). Given the low capacity of agriculture extension departments to cater a large population of farmers, the National IPM Programme was challenged with a task of reaching 5.0 million farmers in the Country.

Farmer-led national IPM programme accomplishments

Since 2001 Nat-IPM with the technical support of FAO is implementing the following three projects using cotton as an entry crop as largest pesticide

use is in this crop. The experience gained is being extended to other crops moving from commodity to systems approach.

1. FAO-EU IPM Programme for Cotton in Asia: A Regional Project implemented in six countries; Bangladesh, China, India, Pakistan, Philippines and Vietnam.
2. FAO-ADB Technical Assistance for Cotton IPM in Pakistan
3. FAO-AGFUND Project on Pesticide Risk Reduction in Women in Pakistan.

The implementation of FAO-EU Cotton IPM Programme was initiated by organizing two TOF and 20 FFS in Sindh and revival of five old FFS of Vehari Project during 2001 cotton season. During 2002, two more TOF were organized at Mirpur Khas Sindh and Bhawalpur Punjab, while 104 FFS were organized in seven districts of Sindh. The activity was further expanded in 2003 with three more TOF for Field Assistants at D.G. Khan, Lodhran and Vehari in Punjab, a total of 174 FFS were organized in Sindh (130), Punjab (33) and Balochistan (11).

Thus by 2003, the Programme has organized 7 season-long trainings and trained 258 extension staff, researchers, NGO personnel and farmers as facilitators. It also organized 303 FFS and trained 7781 farmers including 156 females in Sindh (Ghotki, Sukkur, Khairpur, Naushehro Feroze, Nawabshah, Sanghar, Mirpur Khas, Hyderabad and Dadu districts), Punjab (Bahawalpur, Lodhran, Vehari and DG Khan) and Balochistan (Khuzdar, Jafferabad, Naseerabad, Sibi, Bolan and Lora Lai). The Programme in contrast to the FAO's residential TOT/FFS model modified it to be non-residential according to the socio-cultural requirement of the participants where the trainees were returning to their homes every evening; the experiment proved to be successful.

FFS results show that by practicing IPM, farmers have reduced pesticide use by 87% while expenditure on fertilizers have reduced by 26.5%. On the average, their yield was up by 10.5%, input expenditure was less by 22.3% and the gross margin was up by 46%. Only a case study of 90 FFS in six districts of Sindh Province during 2002 cotton season showed that FFS trained farmers adopted IPM technology and got higher profit because of low use of pesticides, fertilizers, irrigation water and intercultural practices. On

the average, IPM farmers earned Rs. 8,243/- per ha more net profit as compared to their non-adopter colleagues (Soomro et al, 2003a). It is estimated that if we adopt the IPM technology only on cotton acreage throughout the country we may save Rs. 25.7 billion to the national exchequer. Apart from the above visible benefits IPM approach, if widely practiced, the country could overcome a lot of other problems such as environmental pollution, food contamination; accidental deaths & suicides and diseases/disorders caused by pesticides, disturbance of agro-ecosystems, pest outbreaks and suppressed biodiversity, and more importantly bring about the change in social behavior of our farmer/rural communities (Soomro et al, 2003b).

Sustainable IPM programme establishment goals

FFS-based IPM approach in Pakistan has successfully switched from project to Programme phase and preparing for entering into a movement state. This will lead to empowerment of farming communities at gross root level, network of community organization, and effective linkages between research, extension, development agencies and formation of community organizations. The key element to enter into this desirable phase is to have a highly skilled team of dedicated facilitators. A core team of 20 expert facilitators at national and regional levels is evolved through TOF and FFS implementation processes, involvements of international experts on facilitation skills, evaluation of the use of facilitation skills and exposure of facilitators to cross-cultural and different agro-ecological environments. In the movement phase our focus is to take FFS approach out of merely plant protection and put it into mainstream extension, and further develop FFS into sustainable farmer groups that can continue to generate new knowledge in a self-reliant manner and to undertake several other developmental initiatives.

The Programme has experimented with many concepts to achieve the sustainability and social equity goals. All these concepts are at preliminary phases of testing and evolution to strengthen Programme footing for expanding IPM approach from commodity orientation to system focuses, addressing gender issues, institutionalizing farmer to farmer knowledge/skills transfers, participatory community development,

sustainable use of services of IPM facilitators for promoting farmers science and establishing a net work of FFS based community organizations. The validation of new Programme initiative is further explained as under:

Steps Towards Community IPM

The Sindh provincial extension department deputed the services of extension officers for training in TOF for establishing FFS in different regions. However, such cooperation was lacking from Punjab extension during initial Programme implementation phases. In Sindh also a saturation point was reached quickly, as the available manpower resources were greatly exhausted. It was realized at Programme management level that the goals of reaching a critical mass of the cotton growers, both in Sindh and Punjab provinces, are hard to achieve only by banking upon public sector human resources. Farmer-to-Farmer transfer of IPM knowledge and skills was experimented through organizing Farmers TOF and Women Open Schools (WOS). A team of male and female farmers facilitators was trained to achieve cost effective FFS-based IPM programme implementations. The community IPM concept is evolved through programme investments on producing a cadre of male and female farmers facilitators and a network of community organizations.

Community IPM would be a step forward towards sustaining the use of the services of FFS facilitators, development of WOS, TOF and FFS



on self help basis and establishment of network of regional and national level facilitators and farming community organizations. The farmers who graduated during 2003 as trained facilitators from Farmers TOF organized and registered themselves as Farmers Facilitator Organizations (FFO) in Punjab and Sindh provinces. The Women Facilitators trained through Women Open Schools (WOS) registered themselves as Women Agriculture Development Organization (WADO) in Sindh. The facilitators from Farmers Facilitator Organizations (FFO) organized farmer congresses in Bhawalpur (Punjab), Sukkur (Upper Sindh) and Karachi (Lower Sindh) where a network of Community Organizations of Farmers was established at village, tehsil, district, province and national levels. These organizational initiatives by farmers and facilitators were brought forward to promote community IPM on self-help basis and to link them to national and international NGOs for achieving other developmental goals as well. These are fresh initiatives and have the potentiality for developing required technical capability and financial strength with the passage of time. The National IPM Programme will be providing technical support to these young organizations for achieving maturity and sustainability for emerging as a well knitted independent functioning units.

Capacity Building Of National Institutions

In the EU funded IPM programme the manpower



of the provincial extension institutions is trained as facilitators. The prospects of the use of this trained manpower by respective provincial and local governments is vital in the institutionalization of IPM-based extension concepts. The Governments at different levels are convinced with the initial achievements of the programme and policies as well as institutional reforms are in process. The federal government has provided some basic resources for 5 years (2.31 million US\$) to strengthen FFS-based IPM programme implementation at national levels. Similarly, Punjab government is heading towards establishing its own FFS-based IPM programme. Advocacy of the outcomes of IPM programme implementation in Pakistan and the technical support from Nat-IPM programme to formulate proposal by provincial extension helped in this direction. Similar efforts would be required towards the institutionalization of FFS-based IPM procedures by other provincial and local government systems. These national and regional initiatives on IPM implementation are very important step towards the institutionalization of this approach and the national programme will be providing technical back-up support for sound programme planning and quality implementations.

The provision of expert facilitators and strong follow-up on the use of facilitation skills, during large-scale expansion of IPM programme in provinces or regions, would be the challenges for national IPM programme. Programme implementation at different levels without proper technical know how could go in the wrong direction and hence wrong conclusion could be drawn which would be detrimental for these new programme initiatives. National IPM Programme will be carrying out follow-up workshops on facilitation skills, practicum to upgrade the experimentation skills and participatory planning and appropriate interventions in the FFS and TOF curriculum, and devising new curriculum based on system aspects of crops management. The transition of expertise from National IPM Programme to provincial and local governments would be the end goal of the institutional capacity building at various levels.

Gender Absorption

Pakistani women play a significant role in agriculture with a participation rate of about 43% in a number of on-farm activities (Habib, 1996). Some even help their men to mix and

prepare pesticide solutions, but due to certain socio-cultural reasons they could not participate side by side with male farmers in the regular IPM FFS. On the other hand, studies on health hazards of pesticides to women cotton pickers showed that out of 2.6 million pickers 84% got sick because of exposure to pesticides used on cotton crop during on-farm activities (UNDP, 2001). Thus a special pilot project "Pesticide Risk Reduction for Women in Pakistan" for awareness of rural women was developed with the support of FAO and Arab Gulf Programme for United Nations Development Organization (AGFUND). Objective of the study was to train rural women on pesticide exposure and risk reduction within their traditional, cultural and socio-economic framework/setup as the Pakistani women would not participate in regular cotton IPM Farmer Field Schools (FFS) like in other participating countries (Ahmad et al, 2003).

The activity was implemented through workshops, women facilitators training (WFT) and women open schools (WOS) conducted on the pattern of IPM TOF/FFS in districts of Khairpur and Sukkur in 2002 and in districts of Khairpur, Sukkur, Naushehro Feroze and Bahawalpur in 2003. Thus a total of 38 women facilitators were trained in WFT and 493 women farm workers were trained in pesticide risk reduction through 14 WOS in 2002 and 19 in 2003 in Sindh (15) and Punjab (4). The WOS were run for one complete growing season where 25-30 women attend 3-4 hour weekly session at a place (either a house, a guest room, a school or in field), work in groups through discovery based learning in the field (Self-monitoring of acute pesticide poisoning) The pilot programme has developed a team of women facilitators and trained rural women who can serve as a lead group in capacity building of local communities. This pilot study helped to explore the role of Pakistani women in agriculture especially cotton farming community that could be utilized for future planning of such trainings on large scale.

The participating women facilitators were encouraged and promoted to interact with male facilitators and farmers apart from female farmers so as to develop a culture of tolerance and working together side by side. This also helped in spreading the message and understanding of IPM within and between the farm families. As a result of WOS activity, a welfare organization named, "Al-Noor Rural Development Organization" was also

formed in Jiskani Village of Khairpur district with the aim to enhance technical skills of rural poor women of the district so that they could earn a living on their own. "Zubeda Vocational Training Centre", named after the facilitator Ms. Zubeda Jiskani, who voluntarily initiated the activity.

After initial training of women facilitators through WOS in Sindh and Punjab, it is emerged to organize a season-long TOF for women. The gender study on women role in decision-making, consultation in decisions making and her role as laborer has strongly highlighted the need to more intensively involve rural women in TOF, FFS and WOS types of trainings. The complementary role of women in crop management, livestock raising, and small scale enterprises (sewing, embroidery etc.) development is further understood during 2003 through initial experimentation. The local government funding to foster IPM related management and developmental projects in Sindh, is a solid outcome towards strong practical linkage establishment between IPM and local institutions. National IPM Programme has to provide a specialized support and technical back up to sustain these women related crop management, rural livelihood and health initiatives.

Institutionalization of Farmers to Farmer Education

Farmers always performed a catalyst role in technology transfers that has been proved through several adoption studies. Generally, large or risk taking farmers are the early adopters and followed by the neighboring farming communities. Training of farmers as facilitators is an effort to institutionalize these informal technology transfer mechanisms. The initial effort shows a great potentiality towards low cost and sustainable transfer of knowledge, skills and technological packages. The farmers as facilitators have proved themselves more responsible, committed and motivated to deliver in an organized manner.

Farmer to farmer education was specifically experimented during 2003 cotton season. Two farmers TOF were organized one for each Sindh and Punjab provinces. The graduate farmers facilitators have organized themselves and prepared a low cost FFS implementation plan for the year 2004. They have also been able to implement the season long wheat FFS in Punjab as follow-up step with last season cotton FFS.

Successful running of F2FS by the project in the 2003 has also created great interest among local/provincial Governments and NGOs and they are positively thinking to induct the farmer-farmer education in their extension system and rural development programmes. These preliminary successes are achieved through technical backup from National IPM Programme in first rigorously train farmers as expert facilitators and to provide technical back-up in conducting FFS and FTOF during coming seasons.

IPM from Commodity to Cropping System Approach

The current EU-FAO IPM programme is specific to cotton crop only. However, the farming communities have shown keen interest to



participate in the FFS of other cereal, vegetable and fruit crops grown in the cotton-based systems. Through season long FFS on cotton crop, farmers are partially benefiting whereas, similar learning for other crop enterprises from system perspectives could manifestly contribute towards the economic prosperity of the farmers. This is why programme is now considering moving from cotton-IPM to system IPM. One such instance is that FTOF trainees of the Bhawalpur, Punjab established 7 FFS schools on wheat crop IPM, which is mainly followed after cotton. Refreshers courses are under consideration to up-grade the skills of facilitators from merely

cotton to other cereal, vegetable and fruit crops of the area. The planned refresher courses would enrich the cotton IPM facilitators to train farmers on complete cropping systems. This important skill enhancement activity planned to be carried out by the National IPM Programme in an organized way. The additional resources would be used to upgrade the skills of core team of facilitators as well as to expand their number for rapid coverage of many crop activities from system perspective.

Farmer Science

The main focus in FFS-based IPM approach is to empower farmers in making appropriate decisions for improved crop management. Deliberate efforts are made to help farmers in the identification of critical crop management issues, design

experiments and analyze data for drawing important conclusions. Farmers perform experimentation during FFS training with the help of facilitators to improve their knowledge base for independent decision-making. Farmers are expected to continue this experimentation during post FFS seasons to improve knowledge base and to evolve technological packages suitable under local conditions. This experimentation would be carried out either as group or individual farmers actions.

The sustainability of the programme components hang around strengthening experimentation by farmers during and post FFS scenarios. FFS-farmers were organized as alumni groups to strengthen farmers-led experimentation. The prime consideration in this activity was to keep communities intact on refining skills learned and generate technological components/packages best suited to their local circumstances. National IPM Programme would strengthen linkages between FFS graduate farmers and research systems to ensure authenticity of the scientific discoveries from farmers

Impact Assessment and quality FFS monitoring systems

Pre-FFS and Post-FFS surveys were conducted on pre-determined IPM-impact indicators that include income, environment, health, knowledge, organization, social justice, and institutional and policy reforms. The post-FFS survey of the

graduate farmers of the 2002 cotton season is accomplished during 2003 cotton season. This quick assessment just after a season long FFS would provide short-term conclusions for making appropriate adjustments in further programme implementations. The long-term impacts will be generated during due course of sustainable programme implementations with revised strategies and improvements in annual programme planning meetings. The new community IPM and farmers to farmers education concepts, experimented recently in the TOF and FFS processes, would require special focuses in future impact analyses, for separately measuring programme outcomes in these vital direction. The case studies to highlight the programme outcome for strengthening farmers' science, conducting mix male and female FFS, farmers led IPM, organizing participatory community development and joint quality/organic production and marketing of food and fiber crops would be other important areas of impact analyses. National IPM Programme will be performing all these impact evaluation functions in relation to future IPM programme implementation in different regions, provinces, and districts on commodity or system principles. The programme conceived and developed a model for effective monitoring and backstopping of FFS, F2FS and Alumni FFS group activities. It was practiced successfully during 2003 and it helped improving farmer education manifold. District level quality assurance monitoring is indispensable for sustainability, which is also a new approach for the provinces and newly devolved district governments. National IPM Programme will be providing technical backstopping in this important area for ensuring quality FFS establishment mechanisms.

Advocacy at Grass Root and Policy Levels

Neighboring communities of FFS villages are invited to share experiences with the FFS farmers during FFS season long implementations. This generates interest among neighboring communities to adopt/participate in FFS. Awareness workshops, seminars, field visits and study tours for policy makers to promote awareness at decision making levels to support and sustain farmer education in IPM have proved very important experience in Pakistan. National IPM Programme would be continuously interacting with stakeholders at policy and planning levels to provide update on IPM

programme accomplishments and convince them for appropriate policy and institutional reforms. The successful implementation of programme at grass root level would require favorable policies from government, appropriate regulatory mechanisms, incentives/disincentives for quality production and establishment of proper market mechanism for quality products.

To sum up the discussion, IPM is now considered as one of the most appropriate approaches to provide a sound transfer of knowledge system in the country's agriculture once it is used as an entry point to transfer crop protection technologies. The future trends as apposed to past, appear to be: i) a holistic IPM based on systems approach, ii) a large scale field implementation focusing on farmer empowerment through Farmer Field School Approach, iii) a strong commitment from Government for IPM as a strategic option to rationalize use of pesticides, iv) Increased consciousness on the part of the consumers about toxic affects of pesticides on Society's health and environment with a resultant enabling environment for IPM, v) a continued "negative expansionist marketing and dumping of pesticide" attitude of agro-chemical industry due to tighter and stricter control in the developed countries, vi) attraction of GMO's appearing as a silver bullet syndrome, and vii) trade and globalization increasingly playing a role in the liberalization of pesticide market.

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