

Cotton IPM - Research success and field disappointment: Why are implementation projects not succeeding?

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ABSTRACT

Integrated pest management in cotton has been a research success. However, the results of projects to encourage small scale cotton farmers in developing countries to adopt IPM have often been disappointing in that continued implementation by farmers has not met expectations. The underlying concepts and execution of such projects are examined and questioned in an attempt to identify reasons for the poor long-term results. It is suggested that the underlying philosophy of IPM projects should be reversed. Projects should not be restricted to a limited area and attempt to educate a limited number of farmers to be IPM experts, but should be wide-scale, eventually country-wide, and involve as many people as possible at all levels. IPM should be introduced in a step-wise manner through simple participatory extension methods, starting with basic practices and placing emphasis on meeting the farmers concerns. A critical mass of people who understand and can implement practical IPM is essential to long term sustainability, while negative external policies and factors must be addressed where necessary.

Introduction

Integrated Pest Management (IPM) in cotton has been a research success. From the late 1960s a range of practices, techniques and strategies have been developed by research for a variety of crop situations and pest complexes. These consider pest management in the context of overall crop management; reduce pesticide use and costs; avoid pesticide resistance; prevent the development of secondary pests; support sustainable cotton production; and protect the environment. However, most attempts to encourage small-scale cotton farmers in developing countries to adopt these practices have been disappointing. Cotton IPM projects have been established at great expense, involved farmers have adopted the practices to a greater or lesser extent during the life of the project, but the long-term adoption rate by farmers of IPM as a standard component of cotton production has not met expectations.

Everyone is convinced of the advantages of IPM in cotton, except, it would superficially appear, the small cotton farmer. This paper attempts to identify reasons for the limited success of the introduction of IPM, and is based on the personal experience and observations of the authors, in particular the project with which they are currently involved in Egypt. The underlying concepts and implementation of IPM projects are examined, and it is hoped that the questions asked and conclusions drawn will provide some food for thought in

the design of future development projects.

The "typical" IPM Project and small-scale cotton grower

Before discussing the possible reasons for the poor performance of IPM projects, we need to examine the existing philosophy of the introduction of cotton IPM to small farmers, as this affects the broad structure and implementation activities of a "typical" project. The objective of such a project is for cotton farmers to implement efficient, sustainable and environmentally safe cotton pest management. Broad activities are to develop the cotton IPM strategy and practices, to train local entomologists, extension staff and other experts, and to train small cotton farmers in cotton IPM and crop management.

The basic philosophy which influences the design and implementation of the project is that cotton IPM is knowledge-intensive, location-specific, and involves complex principles and a range of inter-acting practices. These location-specific strategies must be developed, while farmers and the extension service require concentrated support in understanding the principles and in putting them into practice.

Expatriate staffing consists of IPM and extension experts. Local counterpart staff are appointed, who are trained by the expatriate staff, and who are expected to continue the work on completion of the project. The IPM expert develops local IPM practices through on-farm research, possibly through linkages to the local research departments, passes these results to the extension expert, and provides extension support. The extension expert develops and implements the extension program, trains local extension staff, and introduces the practices to farmers. Participatory methods in the form of Farmer Field Schools may be used to educate farmers in the underlying principles of crop and pest management, so that they become expert practitioners of IPM.

Because of the need for intense support of extension staff and farmers, and to obtain both maximum effect and implementation by farmers, activities are only undertaken in a limited part of the cotton producing area. Once developed and introduced to the project area, later expansion to other cotton areas is expected to occur through the activities of the trained counterpart staff and the partner organization. Project duration is between three and six years, longer-term projects often having development and implementation phases in which the local situation is first examined and suitable IPM practices are developed, following which these are introduced to farmers.

The typical small cotton grower in a developing country, who has to implement the IPM/ICM packages, has a lack of fundamental knowledge of cotton

agronomy and pest management (the "why" of the recommendations), is resource poor, is risk averse, and is conservative. It is for these reasons that intense education and training programs in IPM is required.

Where do the weaknesses lie?

This broad description of a typical project appears on the surface to be perfectly logical in terms of structure and activities, bearing in mind the complex nature of cotton IPM and the need to educate knowledge-poor farmers. However, considering past results, the question needs to be asked, "Is this the best way to introduce sustainable IPM to small cotton farmers?" Experience would seem to indicate otherwise. It is only when the underlying philosophy of introducing IPM to small farmers, the various project components, and the manner in which they are implemented, are examined in more detail, that potential weaknesses start to emerge.

The typical project has limited coverage of cotton area, numbers of farmers, and extension staff. While government staff at all levels and in all cotton growing areas may profess support to IPM, in reality this is often lacking as many do not fully understand IPM and consider it to be risky and complex. The assumption that the practices developed and introduced by the project will continue, and be transferred by the partner organization to all cotton areas, is thus over-optimistic.

For IPM to become self-sustaining, this paper argues that it is essential to create a critical mass of people who both understand and can implement IPM principles. IPM must also become embedded in policy and crop production practices at all levels and in all cotton growing areas. This requires wide coverage of partner organization staff, cotton area, and farmers.

Based on this premise, the following discussions examine and question various factors of the philosophy and structure of the typical project. Factors are divided into those of project design and implementation, and those external to the project. Many of the factors are interlinked, a change in one dictating a change in another, while some have both internal and external effects.

Project factors

Project factors are the most difficult to logically dissect because of their compound inter-linkages. This examination takes as the first two starting points the typical project philosophy that cotton IPM is a complex subject, and the type of approach used to the small farmer.

The complexities of cotton IPM

The need to educate farmers so that they be-

come IPM experts is the foundation of most projects. However, while a farmer can become an IPM expert with time and the support of Farmer Field Schools, to raise him to such a level requires a massive extension effort. It is also a huge technological advance for him to take in one step. We are asking him to understand all the crop and pest interactions of a full IPM/ICM package, while during the process we expect him to implement what he perceives as potentially risky techniques. Put these together and in IPM he sees a steep learning curve, little immediate benefit, and a lot of risk. The question thus needs to be asked, "Do farmers actually need to become IPM experts in one step?" It could also be asked, "Is it better for a country to have a small number of cotton farmers practicing 100% IPM; or all farmers practicing 50% IPM, and to build on this over time?"

The common starting situation is where farmers are applying an excessive number of "insurance" pesticide sprays, often with poorly calibrated or maintained equipment. The first step away from this situation is rational pesticide use and effective spray application – the two fundamental pillars of cotton IPM. If a farmer understands the economics of pesticide use, realizes that a pesticide application has to be paid for by the crop, and as a result thinks twice before applying a pesticide, then pesticide use becomes more rational. Pest scouting and threshold levels are an additional step to assist him in taking decisions on pesticide use, but these must be practical and easy for him to understand and use. Effective spray application is a commonly forgotten component of IPM. All too often pesticides are applied with unsuitable, un-calibrated, and badly maintained equipment. This leads to excessive and ineffective pesticide use, followed by additional poorly applied sprays to compensate for the low level of control. Applying pesticides effectively can both reduce the amounts used in each spray and the number of applications, and so reduce the farmer's costs.

Beneficial insects can play an important role in limiting pest numbers. Simply showing farmers these insects in the field is usually sufficient for farmers appreciate the help they can provide, and the fact that they are killed by pesticide applications. Once this is realized, farmers again think twice about applying a pesticide, supporting the concept of rational pesticide use and reduced pesticide costs.

These IPM components are simple to implement, are easily understood, and provide an immediate benefit. Once a farmer has adopted such basic practices, then he has started on the IPM road and other techniques can be introduced over time.

The approach used to the small farmer

In the typical project, the approach to the small farmer is also based on the intricacies of cotton IPM

and the need for him to become an IPM expert. However, in formulating our approach should we not ask, "In what is the small cotton farmer really interested?" In most cases, he is concerned with making the best profit from the crop so that he can feed and clothe his family, and send his children to school. He is not really interested in the complexities of cotton IPM, sustainable agriculture, or protecting the environment, and to formulate the approach through these aspects better meets our concerns, than his. If the existing approach of "Cultivate a healthy crop with improved pest and crop management (and incidentally obtain higher profits)" is reversed to "This is how you can achieve higher profits (incidentally through improved pest and crop management)" this would better meet the farmers economic concerns. If his concerns are addressed and he can see direct financial benefits then he is more likely to incorporate IPM practices as part of his standard production system. Moreover, addressing the farmers concerns establishes trust and confidence in project staff and the messages being given. Once this has occurred, farmers are more receptive to additional practices, which as part of a complete knowledge-intensive IPM package would have been considered too risky.

Farmer Field Schools (FFS)

In the typical project, the complexities of cotton IPM and the approach used to the farmer dictate the need for "classic" FFS, developed in the Philippines and Indonesia for rice, and adopted in other countries and on other crops. However, such FFS are extremely resource demanding. Extension staff requires season-long training to obtain the knowledge and skills to run a FFS, while the training of farmers is knowledge intensive, involving such things as eco-system analysis and insect zoos. For these reasons, the inevitability limited project resources determine that activities are restricted to a limited area and a relatively small number of farmers. From the farmer point of view, the need to commit to long group sessions is a deterrent, as they often have to sacrifice other activities in order to attend. Extension staff can be trained and FFS can be established with project resources. But what happens after project completion? The local extension service rarely has the resources to continue and expand these activities, so the assumption that IPM implementation will be expanded to all cotton areas is over-optimistic.

The best that can be expected is that farmers in the project area continue to practice IPM. Even then, external factors will gradually force a regression to the pre-project situation. If the premise is accepted that the introduction of cotton IPM is not necessarily a knowledge intensive activity, and that simpler concepts can be introduced as a starting point, then the classic FFS approach is not required. If extension is considered as a sliding scale, with the top-down, instruction approach at the bottom end, and the classic participatory farmer field school at the top end, then the extension methodology can be brought back down the scale somewhat.

Participatory methods and group activities remain important, as the discussions and testing on group fields are appreciated by farmers, but training of extension staff can be less rigorous, and group sessions can be shorter and so more acceptable to farmers. A flexible session structure can also be adopted, depending on the message to be transmitted. A group session on the role of beneficial insects requires more farmer discussion, facilitation and field observation than a session on sprayer calibration or use, which can be adequately covered in a demonstration and short discussion, followed by a farmer practical session.

A less intense and more flexible extension methodology enables the project to cover a wider area and include a greater number of farmers and extension staff with the same resources. It is also more easily maintained by the partner organization after project completion. Such a system has been adopted in Egypt, where they are referred to as Farmer Learning Groups, and which have been established in almost all cotton areas. There are a large number of involved farmers and supporting extension staff, and basic cotton IPM is now embedded in standard cotton production practices.

Local extension structures

On occasion, partner organization staff may be considered unsuitable to act as extension officers for a participatory program, and the project establishes what is effectively a parallel extension structure using its own staff. While meeting the objective of transferring IPM techniques to farmers, such a structure depends totally on the existence of the project, there are few external links, and is completely unsustainable. Where there are links into the local extension structure, these usually only exist in any strong form in the project area itself, and do not extend to the full extension service, or to policy and decision makers at central level. Furthermore, a great deal of resource support is often provided to the extension organization within the project area, but on project completion, this support is lost and activities collapse. To ensure sustainability of extension activities, it is essential that existing structures be used, and adjusted only to meet any changes required for a participatory extension program. This may entail some compromises, but an alien structure forced on the extension service will quickly revert after project completion. The objective should be to establish the extension methodology as the standard for all extension activities, not just IPM, throughout the country. If necessary, links to other projects with an extension component need to be made, and a common extension methodology agreed.

Research and on-farm trial

The time and effort in developing complete locality-specific IPM packages and messages before and during introduction to farmers takes project resources and limits coverage. However, many well-established

crop and pest management practices can be immediately introduced to farmers without the need for extensive research or on-farm trials. Plant spacing, thinning, weeding, timing and rates of fertilizer and irrigation applications can all usually be improved at the farmer level from existing research information. These have consequent benefits of more efficient input use, cost reductions, and have effects on pest levels and effectiveness of control. Improvements to pesticide application, such as nozzle selection, sprayer calibration, sprayer types and use, and sprayer maintenance can usually be introduced immediately. Research and on-farm trials are still required, but if these are designed to add to basic practices, rather than derive complete location-specific packages, then less time and resources are needed.

Implementation flexibility

There is often a long interval between project design and start-up. Situations change in the interim, and to blindly continue with objectives and activities as detailed in the design log frame alienates the partner organization, which does not see the project meeting its actual needs, and so withdraws active support. In addition, the perceptions of project objectives and activities may be different between project staff and those of the partner organization. The project must have the flexibility to adapt whenever necessary to these changes in situations and differences in perceptions. Furthermore, factors may emerge during project execution that were not considered or realized at the design stage. This particularly applies to unforeseen externalities and policy aspects. Flexibility is required to address these factors if they are sufficiently important to achieving project success, and may require a large adjustment in activities or allocation of resources. Unfortunately, project staff is often overly enthusiastic IPM or farmer field school proponents. A more flexible and practical approach is needed in evaluating the local situation and assessing what IPM practices and extension methodology, which will be most accepted and that provide the quickest wide-scale benefits.

External factors

Sustainable IPM does not just depend on extension staff and farmers adopting the concepts and practices. There are many external factors that can either support or oppose IPM. These occur at both national and local level, generally oppose sustained IPM, and are often difficult to anticipate in project design. Even so, their potential impact needs to be considered, and activities included to address the negative effects. External factors can be broadly divided into those that can be addressed by field implementation activities and those that need to be addressed by policy reform. The following examples of such factors are by no means exhaustive, and will vary with each country.

Implementation

Trained IPM staff may be transferred to non-project areas, where they are unable to promote IPM as the concepts are less well established or understood. They are replaced by staff unfamiliar with the principles of IPM and who do not provide the necessary support to farmers. During the period of the project, new staff in the project area can be trained, but after project completion, this is unlikely to happen. Staff transfers thus slowly dilute support to the continued use of IPM and to practicing farmers. However, if the project has wide coverage this effect is minimized, due both to the greater number of trained extension staff and to the greater number of senior staff who understands and support IPM. Farmers may obtain pesticides from a range of sources, which may also provide advice on pest control and pesticide use. However, the introduction of IPM through project activities is negated if these sources give farmers opposing, pesticide-based advice on cotton pest management. This is particularly so with private sector pesticide dealers, who are in business to sell pesticides to farmers. Pesticide dealers, including cooperatives, need to be included in project activities so that they also promote the use of IPM. Similar comments apply to pesticide companies and distributors. Most responsible multi-national manufacturers support the concept of IPM, but at the national level, the situation is often different. Local agents and distributors are also in the business of selling pesticides and they need to be persuaded of the benefits of IPM.

Policy reform

Projects generally do not have a policy reform component. While negative external influences can perhaps be overcome in the project area, there is little effect in other cotton areas, or after project completion. A policy reform component should thus be included in project design and implementation, and may involve activities apparently well outside the scope of pure cotton IPM, such as pesticide registration or subsidies. Pesticide registration procedures need to be effective, simple and transparent while ensuring adequate safeguards. Procedures which are too bureaucratic, slow, or strict, hinder the registration of the latest products which are generally more specific, used at lower rates, less harmful to beneficial insects, less toxic, and cause less environmental contamination. Procedures, which are too lenient, allow the manufacturer import of cheaper, generic products often of lower quality, which may be unsuitable for an IPM program, while the low cost encourages farmers to spray as a low-risk, insurance measure. Subsidized pesticides or pest control services encourage the use of pesticides. If subsidies are considered necessary, these should be directed in a manner that supports IPM and discourages spraying by farmers. An example would be the use of a subsidized seed dressing, with farmers paying the full cost of pesticide sprays. The seed dressing reduces the need for early season pesticide sprays, which is a saving to the farmer, and also encourages the establish-

ment of beneficial insects, while having to meet the full costs of pesticides discourages farmers from spraying.

Government research programs often include pesticides as a central component, whether these are for pesticide testing and registration procedures or as part of a pest management package. The perception by extension staff and farmers of such programs is that pesticides are central to cotton pest management. Changing the research emphasis to one of developing true IPM practices also changes these perceptions.

Conclusions

It is considered that the concepts of the "typical" project should be reversed. A central objective should be to reach a critical mass of farmers, extension staff and policy makers in order to embed IPM in policy, organizational structures, agricultural practices, and cotton production. The Cotton Sector Promotion Program in Egypt is an example of a long-term sector project with both field implementation and policy reform components, and has proved to be successful in reaching the critical mass to embed IPM in cotton production practices and in addressing negative external factors:

- The project should be wide-scale. Pilot areas can be included in the early project stages, to develop and refine extension methodologies and basic IPM messages, but expansion to cover the full area of cotton production and all farmers must be included in the project design.
- A sufficient time-scale must be allowed to achieve this wide coverage, in the order of six to ten years or more depending on the country situation. Sufficient staff and funds must be allocated for the full project period from both the funding and the implementing partner organization.
- The project should have both field implementation and policy support and reform components, work-

ing at the macro, meso and micro levels of the partner organization, and with links to other involved organizations.

- Project activities, and staff members, must have the flexibility to meet the needs of the partner organization and to address unforeseen negative factors.
- The emphasis in the approach to farmers should be economic, to enable the farmer to reduce costs or make the most profit from cotton production. It should not concentrate on the complexities of IPM.
- A step-by-step approach should be taken, starting with basic IPM practices that can be quickly introduced. These should be those that are easily understood and implemented by the farmer, and which have a low risk and high benefit. Once these are accepted and implemented, more complex practices can be introduced at a later stage.
- Participatory extension methodologies should be employed, but the "classic" Farmer Field School approach is not necessary. The extension techniques should be adjusted to suit the message being transmitted. The Farmer Learning Group approach allows wider coverage of extension staff and farmers for the same level of resources.
- Externalities that support or oppose IPM should be considered and measures, which take into account of them included in project activities. In particular, this applies to sources of pesticide supply, and the involvement of the private sector.

To implement a project in such a manner will require donors to rethink strategy, in particular the underlying philosophy of project design, coverage and time scale. Projects need to be wider in scope and activities, longer in execution, and more flexible in implementation. This will require the allocation of greater resources to individual projects. However, when considered against the background of previous expenditures and disappointments, the cost: benefit ratio is likely to make such expenditure worthwhile.