evaluating practice adoption: one approach

Ronald H. Smith
John L. Boutwell
James W. Allen

Often to determine program effectiveness, the success or involvement of program participants has been compared with that of a control group of nonparticipators.[1] However, as programs reach higher levels of acceptance, finding a pure nonparticipating control group can become difficult, for educational information is transferred between program participants and others in a local area.[2] An alternative has been to try to use, as a control group, the participator group in a time span before their participation. The additional variables introduced by this alternative make it a less-than-ideal procedure.

Such traditional approaches, then, haven't always been successful, especially for integrated pest management programs (IPM).[3] A new evaluation concept measuring the percentage of IPM practices cotton producers used annually doesn't involve a separate control group. In this approach, the Extension program is divided into discrete, observable behaviors the program seeks to encourage. To assess behavior, a scale is created by which to measure the degree of acceptance of or participation in the program. Then, the correlation, if any, between degree of acceptance and achievement of intended benefits can be determined. This approach may also have applicability in other Extension programs.

The development of the evaluation tool and its validation by correlating practice adoption and end results are pre-

Ronald H. Smith: Entomologist, Alabama Cooperative Extension Service, Auburn University—Auburn; *John L. Boutwell:* Former Economist, Pest Management, Alabama Cooperative Extension Service, Auburn University—Auburn; and *James W. Allen:* Information Specialist, Publications, Alabama Cooperative Extension Service, Auburn University—Auburn. Accepted for publication: May, 1983.

sented. When it's impractical or difficult to identify a control group, we perceive this approach has application to assess the impact of educational programs. Such information can be used to determine if program objectives are being met.

Evaluation of Cotton IPM Program

Cotton insect pest management is one Extension program in which it has become almost impossible to isolate a pure control group. Traditionally, program participation in field crops has been measured by the number of acres in an Extension scouting or field monitoring program. However, as programs evolved, many producers have learned how to monitor crops and now do their own scouting. Some producers, however, monitor pest populations in their cotton fields, but don't properly use the pest infestation reports in making IPM management decisions.

Another complicating factor is that on most crops, including cotton, IPM isn't an exact science. Field recommendations, due to different weather, agronomic, or other conditions, may call for different actions in fields having about the same pest levels. This variability compounds the difficulty of evaluating IPM programs.

The evaluation approach used in this study should have merit for the evaluation of other Extension educational programs, particularly in areas focusing on repetitive behavior or practices. This approach would be especially true for program areas where a comparison group isn't available.

However, the adoption and use of IPM practices by producers can be measured. What has been needed is a reliable assessment of the relative importance of recommended management practices, and a method of measuring annually the percentage of IPM practices producers use. The following explains the way this task was done and applied to cotton insect management in Alabama.

Developing Evaluation Process
Step 1: Identify Factors

The first requirement in applying the evaluation technique was to identify all factors involved in applying IPM to cotton. These decisions were made by analyzing the existing Extension program recommendations. The result was the five-factor analysis shown in Table 1.

Table 1. Weighted importance of recommended IPM cotton practices.

Management category	Weighted value of individual category	Maximum weighted value of specific practices
1. Field monitoring (twice/week scouting)	20	20
2. Use treatment thresholds and beneficial insects	20	
a. Weevils		5
b. Bollworms		8
c. Plant bugs		5
d. Thrips		2
3. Use proper insecticide application techniques	20	
a. Adequate water volume for thorough coverage		5
b. Correct rate of insecticide		5
c. Recommended chemical		5
d. Proper timing of application		5
4. Use recommended cultural practices	20	
a. Correct quantity of nitrogen		5
b. Recommended stand density		8
c. Proper planting date		5
d. Fall stalk destruction		2
5. Use other recommended practices that affect insect management	20	
a. Proper rate of systematic insecticide		8
b. Proper use of arsenical herbicides		8
c. Miscellaneous		4

Step 2:
Assign
Weights

Each of the factors previously identified was then assigned a weight based on its relative importance within the total IPM educational program. These values were assigned by those who carried out the educational program. Decisions were based on experience and observations about the causes and effects of each of these factors within the framework of the total program, supported by a review of the relevant literature. The weighting system was designed so

maximum IPM use would be indicated by a total score of 100. Table 1 shows the weighting system developed for cotton IPM.

As new IPM research technology becomes available or new pest problems occur, this evaluation technique will be adapted to include these changes. The weighting system used to evaluate the IPM program would then be revised to reflect changes in emphasis. The total maximum score would remain 100, but individual factors and their relative weights would be adjusted to correlate with their IPM importance for the particular evaluation year.

Step 3:
Conduct
Random
Survey

To validate the instrument, a sample of producers was selected at random from lists of cotton growers obtained from local county Agricultural Stabilization and Conservation Service (ASCS) offices. A questionnaire was used to collect information concerning actual practices used by each producer. Data were collected from 30 cotton producers located in the major cotton growing areas of Alabama. Each producer responded by personal contact or telephone to 23 questions concerning adoption and use of recommended Extension IPM practices.

Step 4:
Analyze and
Evaluate

Based on the survey information, each producer was scored on the items shown in Table 1. When the scores on individual items were totaled for individual producers, a composite IPM use score resulted.

Composite IPM scores ranged from 62 to 95, indicating that in this particular year, these cotton producers were using from 62% to 95% of recommended IPM technology. The mean score for the sample was 80%.

Yields varied from 300 to 800 pounds/lint cotton per acre (seed removed), with a mean yield of 532 pounds/lint cotton per acre. A correlation analysis revealed a direct relationship between the percentage IPM used and crop yield. This relationship explained 34% of the yield variation among farmers, significant at .01. The locally variable rainfall distribution experienced during the growing season made the R^2 value of .34 even more significant.

The cost of insect control varied from $0 to $73 per acre. The mean cost of control for all growers in the sample was $39.40 per acre. Little correlation was found between the IPM composite score and the cost of insect control.

Discussion

The primary benefit expected to come from a cotton grower's participation in an Extension IPM program is increased profit, which could come either from increased

yield or from decreased cost of insect control. The high positive correlation between IPM participation and yield, coupled with the lack of correlation between participation and insect control cost, indicates that the program is a successful one, leading to increased yields for those who participate.

Very often, factors beyond the scope of the IPM educational program, such as extreme local variability in rainfall or insect pressure, have an overriding influence on measurements such as yield and cost of insect control used to reflect benefits from program adoption. In this case, the lack of correlation between insect control costs and IPM participation is probably due to the great variability in insect pressure encountered between different regions of the state and even among different fields, farms, and/or communities within the same region of the state. Complicating factors such as these should be minimized as the evaluation technique is applied over several consecutive years.

In addition to showing the economic benefits from Extension educational efforts, the results of this evaluation technique can be used to indicate which of the individual program components weren't being accepted and used as readily as others. This information will prove useful in focusing or concentrating educational efforts in the future. Emphasis on individual components of an overall educational program can be increased as the result of findings from this evaluation technique.

A revised version of this evaluation technique will be used again later to compare to the benchmark data obtained in the initial evaluation. Over time, this type of evaluation will show changes in IPM acceptance levels among producers as well as cost-benefit ratios for dollars expended by both Extension and producers. This measurement in itself should prove extremely useful in program evaluation.

Applying to Other Extension Programs

The evaluation approach used in this study should have merit for the evaluation of other Extension educational programs, particularly in areas focusing on repetitive behavior or practices. This approach would be especially true for program areas where a comparison group isn't available.

However, applicability of this evaluation concept to other Extension programs depends on several considerations. First, the Extension program itself must be sufficiently complex to admit resolution into several separate factors. Ideally, these should be observable *behaviors* the program seeks to encourage.

Second, those administering the program must be able to determine the relative importance of the factors with some confidence, to create a weighted measurement scale. Third,

the expected benefits should also be capable of objective determination and measurement, to assure the reliability of the correlation analysis.

Footnotes

1. John L. Boutwell and Ronald H. Smith, "A New Concept in Evaluating Integrated Pest Management Programs," *Bulletin of the Entomological Society of America,* XXVII (June, 1981), 117-18.
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3. Larry E. Gholson, "Evaluating IPM," *Tar Heel Economist* (Raleigh: North Carolina Agricultural Extension Service, Economics Division, September, 1981), p. 1 and Arthur H. Grube and Gerald A. Carlson, "Economic Analysis of Cotton Insect Control in North Carolina,"Economics Information Report No. 52 (Raleigh: North Carolina State University, Department of Economics and Business, January, 1978), pp. 1-48.