Pest Management in U.S. Agriculture. By Jorge Fernandez-Cornejo and Sharon Jans, Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Handbook No. 717.

Abstract

The report describes the use of pest management practices, including integrated pest management (IPM), for major field crops and selected fruits and vegetables. The data came chiefly from the 1996 Agricultural Resource Management Study (ARMS) developed by USDA. Because different pest classes may dominate among different crops and regions, requiring different pest management techniques to control them, the extent of adoption of pest management practices varies widely. For example, insects are a major pest class in cotton production, while minor for soybeans. As insect management has a wider variety of nonchemical techniques than weed control, cotton growers are expected to be further ahead on the IPM continuum than soybean producers.

Keywords: Pest management, IPM, pesticides, green technologies, field crops, fruits and vegetables.

Acknowledgments

The authors thank Margriet Caswell, Catherine Greene, George Norton, Craig Osteen, Merritt Padgitt, Harold Coble, and Mike Fitzner for helpful comments. We are also grateful to William Lindamood for his help with the ARMS data, and Cathy DeShano and Tom McDonald, who provided editorial assistance.

1800 M Street, NW
Washington DC, 20036-5831 August 1999

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Summary

During the last 40 years U.S. farmers have achieved unparalleled increases in land productivity due, in part, to pesticides. But pesticides have come under scrutiny for their potential hazard to human health and the environment. While USDA, land-grant universities, and the private sector have helped develop Integrated Pest Management (IPM) techniques, many institutions have played an active role in encouraging IPM adoption. They include USDA, other government agencies, land-grant universities, agricultural extension services, private consultants, consumer groups, and environmental organizations.

IPM programs address at least one of the following goals: to improve farmers' profitability, to minimize the risk of pesticide use to human health and the environment, and to reduce pest resistance to pesticides. Because IPM has multiple objectives, opinions vary as to which of these should be emphasized. Moreover, the relative importance among the goals of IPM may be shifting (and will likely to continue to shift depending on local need) from the early emphasis on farm-level profitability to the current emphasis on reduction of pesticide use, a goal more in line with the public's desire to reduce risks associated with pesticide use.

Just as pests are specific to particular crops and locations, IPM programs are specific to the crop and region for which they are designed. Because the development of IPM programs has not been uniform across pest classes (insects, plant pathogens, weeds), crops, and regions, it is difficult to provide a general measure of IPM use. There have been encouraging advances in methodology in recent years, but a complete, practical, and accepted method to measure overall IPM adoption is not yet available. For this reason, this report does not provide results on the overall measure of IPM use. This report includes survey results on the extent of adoption of individual pest management practices or techniques for major field crops and selected fruits and vegetables by crop and region. The report also summarizes the major issues and discusses unresolved questions related to the development of pest management strategies, including Integrated Pest Management, in U.S. agriculture and provides detailed information on primary target pests by State and crop, and pesticide use by crop and active ingredient.

The data for field crops, including corn, soybeans, cotton, potatoes, and wheat were obtained from the 1996 Agricultural Resource Management Study (ARMS) conducted by USDA. Data for selected fruits and vegetables came from USDA's Chemical Use surveys and include apples, grapes, peaches, oranges, tomatoes, and strawberries.

Among the pest management practices, scouting was used extensively by most farmers: 72 to 94 percent of the field crop acreage (depending on the crop) was scouted for weeds and 59 to 98 percent was scouted for insects. Cultural techniques were the leading pest management practices for field crops and crop rotation was the top cultural practice used to control weed and insect pests. Mechanical cultivation for weed control was also a major cultural tool used by growers of row crops.

Weeds are the biggest problem for most field crops and, consequently, more herbicide is used on U.S. farms than insecticide and fungicide. The leading herbicide users are corn

and soybean producers, while the main users of insecticides and fungicides are cotton and potato growers, respectively.

Among growers of fruits and vegetables, scouting for pests ranged from 71 percent of the peach-planted acreage to 98 percent for strawberries, with an overall average of about 80 percent. Pheromones for both control and monitoring were more often used on fruit and vegetable acreages relative to field crops. Pest-resistant varieties were also used at relatively high rates for tomatoes (37 percent), strawberries (37 percent), and peaches (44 percent). A common pest management practice among growers of fruits and vegetables was alternating pesticides to reduce pest resistance. Its use ranged from 36 percent for grape acreage to 75 percent for apples. Growers considered beneficial insects in selecting pesticides on 80 percent of the apple acres.

Cotton and potato producers make more use of IPM practices than do producers of other field crops. Comparison across crops and regions is complex, however, because different pest classes may dominate among different crops and regions, calling for different pest management techniques to control them. For example, insects are a major pest class in cotton production, while minimal for soybeans. Thus, adoption of insect management techniques is more widespread among cotton producers than among soybean producers. Furthermore, since insect management has a wider variety of (nonchemical) control measures than does weed control, cotton growers are likely to have a higher overall measure of IPM adoption than soybean producers. On the other hand, weed control is very important for soybeans and corn. As a consequence, and given the large corn and soybean acreages, future progress in IPM adoption will depend upon weed management efforts.