
Profitability and risk of integrated pest management

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By using extensive data gathered by scientists from many disciplines, complex mathematical models of given ecosystems have been developed which enhance our understanding of crop ecosystems.

Recent research conducted at the University of California concludes that integrated pest management (IPM) is as profitable as and less risky than conventional control. It was also concluded that pesticide applications are reduced by about 50 percent with IPM.

Approximately 100 cotton and citrus growers in the San Joaquin Valley were interviewed twice. Yield and pesticide expenditure data were collected for the five-year period, 1970 to 1974. Roughly one-half of those interviewed followed the advice of chemical salesmen, and the other half paid a per-acre fee to private pest management consultants. Over the five-year period, there was no significant difference between the average profit of growers who hired consultants and growers who relied upon chemical salesmen. Factors taken into account were yield, expenditures for pesticide materials, application costs, and the fee charged by consultants.

Yield

Over the five-year period, there was no significant difference between the average yield of growers who hired consultants and growers who relied upon salesmen. However, for particular crops and years, there was a discernible effect upon average yield. In 1973, citrus yields increased on the average due to IPM and, in 1972, cotton yields decreased on the average. In all other years for both crops, the difference in average yield was insignificant. Yield is only one component of profit. Savings from reduced pest management expenditures must also be considered.

Pest management expenses

Growers who hired consultants reduced pesticide applications between one-third and two-thirds in both crops when averaged over 1970 to 1974. Average expenditures for materials and application were significantly reduced by IPM. If the consultant's fee is subtracted from these savings, growers who hired consultants still significantly reduced total pest

management expenditures. The amount of these savings may have varied from year to year, but the savings were significant in every year for both crops.

Net profit

Pest management expenses represent a relatively small proportion of total expenses. Revenue from yield is the most important factor that determines profit: results concerning the effect of IPM on yield dominated profit calculations. There was no significant difference in profit between growers who hired consultants and growers who relied upon salesmen when averaged over the five-year period. However, there was a significant difference for particular crops and individual years. In 1970 and 1971, cotton growers who hired consultants had significantly more profit on the average than cotton growers who relied upon salesmen. This reversed in 1972 when cotton growers who hired consultants had significantly less profit on the average than cotton growers who relied upon salesmen. There was no significant difference in 1973 and 1974 for cotton growers. When averaged for 1973, citrus growers who hired consultants had significantly more profit than citrus growers who relied upon salesmen. There was no significant difference in 1970, 1971, 1972, and 1974 for citrus growers.

Risk

The profitability of IPM depends upon the particular consultant hired. Out of twelve consultants in two crops, two consultants significantly reduced profit and one consultant significantly increased profit when averaged over the five-year period. For all other consultants, there was no discernible difference in profit.

IPM reduces risk when compared with conventional control. Growers who hire consultants have less variability of yield, pest management costs, and profit.

There are three possible mechanisms through which IPM reduces risk. First, natural enemies may keep the pest popu-

lation relatively stable in the absence of a pesticide application. A conventional spray program can destroy beneficial insects, enabling the pest population to re-establish itself with increasing rapidity. Pest resurgence, with repeated pesticide applications, may result in less predictable yield than with IPM. An important component of IPM is to monitor the pest population instead of spraying for insurance. With IPM, information from monitoring becomes the insurance instead of pesticides.

Second, predators and parasites of other potential pests, if undisturbed by pesticides, frequently provide more than adequate protection. Pesticide applications for an unrelated pest can upset this balance leading to secondary outbreaks of pests normally not posing any problem. Damage caused by secondary outbreaks may result in less predictable yield than with IPM. An important aspect of IPM includes checking for beneficial insects. When they are present, it is often wiser to forego or postpone a pesticide application. For some crops, beneficial insects may have developed resistance to a particular pesticide which may then be the preferred pesticide to control some pests. Entomologists trained in the principles of IPM can apply these tactics.

Third, some pesticides have phytotoxic effects. Even though pesticides are designed to interfere with biological activities of animals, plants can be adversely affected. Especially large doses may appreciably reduce yield. One consequence of IPM is to reduce pesticide use and, consequently, reduce the risk of phytotoxicity.

IPM is an information technology, where information and knowledge are substituted for pesticides.

Because information and knowledge tend to reduce uncertainty, it was not surprising to find that IPM is less risky than conventional control.

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