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Perceptions of Integrated Pest Management Practices for Cucurbit Pests by South Texas Growers

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ABSTRACT

Questionnaires mailed to cucurbit growers in two Texas counties (Cameron and Hidalgo) were used to assess perceptions and current practices regarding integrated pest management (IPM), including sampling for pests of cucurbit crops. Given a potential infestation, the average time growers were willing to spend inspecting a field was about 35 minutes which was considered ample time for a sound pest control decision. The sweetpotato whitefly was considered to be the most serious cucurbit pest and the most difficult to sample and control. The perception of risk was hypothesized to have a negative influence on IPM adoption. In other words, as the cost per acre increased in terms of pest control ($85 per acre in cucumber/pickles, $108 per acre in watermelons, and $221 per acre in muskmelons) the less likely growers were willing to participate in an IPM program (55%, 40%, and 36% respectively). The adoption of an IPM program will tend to take place earlier on larger farms (100 acres or more in a single cucurbit crop) than on smaller farms since 44% of the respondents were willing to participate in an IPM program and most of these represented large farms. The primary reason for not currently using economic thresholds was that most growers distrusted current thresholds.

RESUMEN

Se realizó una estimación del conocimiento y las prácticas comunes relacionadas con manejo integrado de plagas (MIP), incluyendo el muestreo para plagas de cucurbitaceas, mediante el uso de cuestionarios enviados por correo a productores de cucurbitaceas en dos condados de Texas (Cameron e Hidalgo). Dada una infestación potencial, el tiempo promedio que los agricultores estuvieron dispuestos a dedicar a la inspección de una parcela fue de alrededor de 35 minutos el cual se consideró tiempo suficiente para la toma de una decisión no perjudicial para el control de plagas. La mosca blanca del camote se consideró la plaga más seria y más difícil de muestrear y controlar en las cucurbitaceas. Se hipotetizó que la percepción del riesgo tiene una influencia negativa sobre la adopción de un MIP. En otras palabras, a medida que el costo del control de plagas se incrementó por acre ($85 por acre en pepino/pepinillos, $108 por acre en sandía y $221 por acre en melón redondo) fue menor la posibilidad de que los productores estuvieran dispuestos a participar en el programa de MIP (55%, 40% y 36% respectivamente). La adopción de un programa de MIP tenderá a presentarse más temprano en grandes plantaciones (plantaciones exclusivas de cucurbitaceas de 100 acres o más) que en plantaciones más pequeñas ya que la mayoría del 44% de los encuestados que estuvieron dispuestos a participar en un programa de MIP fueron representantes de grandes plantaciones. La razón principal para la falta de aplicación de los umbrales económicos en la actualidad es que la mayoría de los agricultores no confían en los umbrales económicos que prevalecen hoy en día.

Synthetic pesticides were first actively marketed in the United States in the late 1940's and their use has since played an integral role in the advances that have reduced agricultural labor requirements and doubled productivity (USDA 1991). However, increased pesticide use has increased health and environmental concerns among consumers especially regarding food safety issues. Concerns regarding pesticide residues are especially important in fruits and vegetables since these commodities are often consumed fresh with little postharvest processing (NAS 1987). Fruit and vegetable production has traditionally required high pesticidal inputs and pesticide expenditures by fruit and vegetable growers were nearly seven times the agricultural average in 1990 (USDA 1991). Growers as a whole spent approximately $16 dollars per acre for pesticides in 1990 while fruit and vegetable growers spent more than $100 per acre (USDA 1991).

Integrated pest management (IPM) techniques were designed to meet some of these health and environmental concerns and to address the problem of pest resistance to pesticides (Fernandez-Cornejo et. al 1992). IPM is a systems approach that combines biological, cultural, and agri-chemical pest control techniques to reduce a pest infestation to economically acceptable levels while minimizing agrichemical hazards to man and the environment. While IPM gained prominence in the late 1960's and first received significant federal support in 1972, IPM adoption and implementation by fruit and vegetable growers has moved quite slowly (Fernandez-Cornejo et. al 1992). Relatively little work has been done in fruits and vegetables to identify their needs and successful implementation.

Successful implementation of IPM depends on an understanding of the needs, perceptions, resources, constraints, and objectives of the targeted growers (Merchant and Teetes 1994). Despite the demonstrated economic and environmental benefits of IPM, persuading farmers to adopt IPM technology has frequently been difficult (Wearing 1988). Factors

affecting the adoption rate of an innovation such as IPM include attributes of the innovation itself (i.e., its relative advantage, compatibility, complexity, trainability, and observability), the channels through which information concerning the technology is communicated, market and infrastructure characteristics, and characteristics of the potential adopters (Wearing 1988).

Surveys can be useful tools for evaluating grower perceptions concerning IPM. Most surveys concerning IPM have been conducted to provide general information about an IPM practice or to evaluate why farmers did or did not adopt a particular technology (Wearing 1988). Relatively few studies concerning IPM have been conducted before attempts to implement new IPM technologies were made (Merchant and Teetes 1994). Such studies could provide useful insights into the innovation-decision process and aid in the design of Extension Service programs delivering IPM technologies to growers.

Information on general perceptions and practices of cucurbit growers is important in the development and delivery of IPM technology to potential adopters. The objectives of this study were to: (1) evaluate the extent to which IPM practices have been adopted by cucurbit growers and (2) gain insight into some of the perceptions of cucurbit growers that might influence the rate of adoption of improved IPM recommendations for certain cucurbit pests. The major source of information on IPM recommendations for cucurbit pests at the time of this study is the Texas Agricultural Extension Service.

MATERIALS AND METHODS

A survey was developed and mailed to known cucurbit growers in two counties in south Texas (Cameron and Hidalgo). Three survey forms were developed for the cucurbit commodities of interest (muskmelon, watermelon, and cucumber/pickle). Recipients of the grower survey were selected from an Agricultural Soil Conservation and Stabilization Service (ASCS) list of landowners in the two counties and telephone surveys were conducted to survey as many cucurbit growers as possible. Survey questions were close ended, with space provided at the end of the survey for additional comments. The survey was mailed on March 20, 1995. It consisted of a cover letter, one survey questionnaire with 14 short answer questions, and a postage paid return envelope.

RESULTS AND DISCUSSION

A total of 32 of the 79 surveys (41%) mailed to potential cucurbit growers in the two county area were returned. Many of the individuals disqualified themselves because they were not presently growing cucurbits. Some of the individuals called but were not interested in any kind of survey because they feared that it might provide information which regulatory agencies could use to impose restrictions on agri-chemical use on cucurbits.

Growers were requested to provide information concerning their cucurbit pest problems. In addition, economic information in regards to current pest control tactics was also solicited. The cucurbit crops that were surveyed were muskmelon, watermelon, and cucumber/pickle because of their economic importance to the area.

Out of the 19 muskmelon growers totaling 4,216 acres of the total acreage for muskmelons for spring 1995, there were 11 respondents (58%) which totaled 3,329 acres (79%) out of the 4,216 acres. For muskmelons, the most important pest being cited by 83% of the growers and the one causing the most economic loss was the sweetpotato whitefly. The second most cited pest was evenly divided between aphids and downy mildew. On average, muskmelon farmers made about 6 insecticide applications per season and average total cost for these applications was about $135 per acre. The average number of fungicide applications per season was approximately 5 and the average cost for these applications was $86 per acre. This brings the total insecticide and fungicide costs on average to $221 per acre. Ninety percent of all the muskmelon growers indicated that they inspected their own field(s). Ninety percent of those surveyed said that a chemical sales representative inspected their field and made recommendations. Ten percent of the growers said that they hired a private consultant to inspect their field and that they used something other than insecticides or pesticides to manage an infestation. Ninety percent of those surveyed said that they would only apply a pesticide when a field inspection indicated a potentially injurious insect or pest population present. Ten percent indicated that they applied a pesticide on a routine basis regardless of abundance of pests. Given a potential infestation, the average grower was willing to spend 36 minutes inspecting a field for insect/pests. Thirty-six percent of the growers were willing to participate in an IPM program if IPM practices were established with sound field experience. The other 64 percent were not willing to participate. Most growers indicated that $10 dollars / acre would be considered a reasonable fee for a season, including a twice per week inspection of muskmelon fields.

Out of the 27 watermelon growers totaling 4,539 acres of the total acreage for watermelon for spring 1995, there were 10 (37%) who responded to the survey totaling 3,761 acres (83%) out of the 4,539 acres. For watermelons, 70% of the growers reported the most destructive pest being the sweetpotato whitefly. The second most destructive pest was equal between aphids and downy mildew. On average, the growers made 4.5 insecticide applications per season. The total average cost of these applications per season was $65 per acre. There were 2.5 fungicide applications on average per season at a cost of $43 per acre. This brings the total insecticide and fungicide costs on average to $108 per acre. Ninety percent of the growers said they inspected their own field and that a chemical sales representative also made recommendations. None of the growers employed a private consultant to inspect their fields. None of the growers reported using anything other than insecticides or other pesticides to manage infestations. Seventy percent of the growers said that they applied a pesticide when a field inspection indicated a potentially injurious insect or pest population present. Thirty percent of them

said that they would apply a pesticide on a routine basis regardless of the abundance of insects. Given a potential infestation, the average time spent inspecting a field was 35 minutes. Forty percent of the growers were willing to participate in an IPM program if IPM practices were established with sound experience. The other 60 percent were not willing to participate. For irrigated watermelons, the average fee for season long inspections of twice per week was $8 per acre, and for dryland watermelons of once per week was $6.50 per acre.

Of the 33 cucumber/pickle growers which made up 2,381 acres of the total acreage for cucumbers, there were 11 respondents (33%) who answered the survey totaling 1,283 acres (54%) of the 2,381 acres for spring 1995. Seventy-three percent of the cucumber/pickles growers cited the sweetpotato whitefly as the most destructive pest. The second most destructive being cited were worms (pickleworm). For cucumber/pickle growers there was an average of 3 insecticide applications made per season. The total average insecticide cost for these applications was about $65. There were an average of 2 fungicide applications per season and the total average cost per acre was about $20. This brings the total insecticide and fungicide costs on average to $85 per acre. Approximately 83 percent of the growers said that they inspected their own fields and 55 percent indicated that a chemical salesman also inspected their fields and made recommendations. Eighteen percent indicated that a private consultant made recommendations. Ten percent of the growers said that they used something other than insecticides or pesticides to manage an infestation. Seventy-three percent of the growers said that they applied an pesticide when a field inspection indicated a potentially injurious insect or pest population present. Twenty-seven percent said that they applied a pesticide on a routine basis regardless of abundance of the pests. Given a potential infestation, the average time that growers were willing to spend inspecting a field was 35 minutes. If IPM practices were established with sound field experience, 55% were willing to participate in an IPM program and 45% would not participate. According to the growers, a reasonable fee for season long inspections of twice per week would be $8 per acre.

The use of economic thresholds is fundamental to the practice of IPM. Use of recommended economic thresholds may indicate the adoption of IPM. Respondents' attitudes about the use of economic thresholds were assessed by asking them to choose the statement with which they most agreed: "I will apply an insecticide/pesticide when a field inspection indicated a potentially injurious insect or pest population present" or the converse "I apply an insecticide/pesticide on a routine basis regardless of abundance of insects/pests". About seventy-seven percent of the respondents agreed with the first statement, however, IPM concepts in general were not widely accepted in this study since only 44% were willing to participate in an IPM program even if improved recommendations were proven with sound field or grower experience.

CONCLUSION

First, given the nature of yields and production costs, quantifying the economic advantage of IPM is difficult for growers, at least in the short run. The majority of the growers agreed and practiced certain IPM tactics but less than half were interested in participating in an IPM program which was probably due to the little economic advantage that would be realized by participating in such a program (possible savings by fewer pesticide applications). The perception of risk was hypothesized to have a negative influence on IPM adoption as the cost per acre increased in terms of pest control ($85 per acre in cucumber/pickles, $108 per acre in watermelons, and $221 per acre in muskmelons) the less likely growers were willing to participate in an IPM program (55%, 40%, and 36% resectively). Second, unlike traditional agri-chemical methods which provide the grower with precise recommendations, IPM is often in conflict with a grower's intuition about pest control. For example, a recommendation to do nothing is inconsistent with the grower's traditional notion of pest control because the grower crop quality needs such as the aesthetic or cosmetic criteria placed on these cucurbits by consumers and buyers sometimes is a dominating factor depending on the market. Third, IPM is very complex, information-intensive technology that requires more time and effort in order to be successful. In this regard, the adoption of an IPM program will tend to take place earlier on larger farms (100 acres or more in a single cucurbit crop) than on smaller farms since 44% of the respondents were willing to participate in an IPM program and most of these represented large farms. This is probably due to larger farms having more manpower and resources to take the time and effort to be successful in utilizing a complex information-intensive technology. Although sound research based information may exist it may not be accepted since the primary reason for not currently using economic thresholds was that most growers distrusted current thresholds.

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