

IPM Implementation and Acceptance by Cucurbit Growers over a 5 Year Period in the Lower Rio Grande Valley, Texas

Juan R. Anciso, Gloria E. Treviño and Norma Torres

Texas Cooperative Extension, 410 N. 13th Street, Edinburg, Tx. 78540

ABSTRACT

Questionnaires mailed to cucurbit growers in two Texas counties (Cameron and Hidalgo) in 1995 and 1999 were used to assess perceptions and current practices regarding integrated pest management (IPM). A total of 32 of the 79 surveys (41%) solicited from potential cucurbit growers in the two county area were returned in 1995. However, IPM concepts in general were not widely accepted in 1995 since only 44% were willing to participate or practice IPM strategies even if improved recommendations were proven with sound field or grower experience. In 1999, a post-questionnaire was mailed to 78 cucurbit producers in the two county area to determine whether the adoption of IPM practices had increased due to the response effort of educational meetings and implementation of alternative techniques through the various grower demonstrations. This questionnaire was conducted during the fall of 1999 after the spring crop of cucurbits to determine any changes in attitudes, knowledge, or practices as compared to 1995. A total of 45 of the 78 surveys (58%) mailed and solicited from potential cucurbit growers in the two county area were returned in 1999. Of the 45 that responded, 96% answered that IPM strategies were important in their cucurbit production system in 1999. The use of economic/action thresholds and monitoring is fundamental to the practice of IPM. Respondent's attitudes about the use of action thresholds and monitoring were assessed in 1995 and the majority used them (77%) but this did not increase in 1999 since 77% still practiced them. The results indicated that the growers perceptions have not changed on the use of action thresholds and monitoring mainly because some distrust them but the majority use these practices. However, a dramatic increase occurred in practicing or participating in IPM strategies from 44% in 1995 to 96% in 1999. The IPM strategies identified as important did not solely depend on monitoring and action thresholds but were quite varied from planting earlier, spraying earlier for the whitefly, awareness/conservation of beneficials and increasing fertility.

RESUMEN

Se determinaron las percepciones y prácticas actuales sobre manejo integrado de plagas (MIP) mediante la utilización de encuestas solicitadas a productores de cucurbitáceas en dos condados de Texas (Cameron e Hidalgo) en 1995 y 1999. En total, 32 de las 79 encuestas (41%) entregadas a los productores potenciales de cucurbitáceas en el área de los dos condados fueron regresadas en 1995. Se encontró que en general, los conceptos de MIP no eran bien aceptados en 1995 ya que solo el 44% de los productores estaban dispuestos a participar o a poner en práctica estrategias de MIP aun cuando existieran mejores recomendaciones demostradas por experiencia sólida de campo o de agricultores. Se enviaron cuestionarios posteriormente en 1999 a 78 productores de cucurbitáceas en el área de los dos condados para determinar si la adopción de prácticas de MIP se había incrementado como respuesta a la realización de reuniones educacionales y de la implementación de técnicas alternativas expuestas a través de demostraciones a los agricultores. La encuesta se realizó para determinar si después de 1995 hubo cambios de actitud, conocimiento, o prácticas, y se efectuó durante el otoño de 1999 después de la cosecha de cucurbitáceas de la estación de primavera. Un total de 45 de las 78 encuestas (58%) enviadas a los productores potenciales de cucurbitáceas en el área de los dos condados fueron contestadas en 1999. De los 45 que respondieron, el 96% respondió que las estrategias de MIP fueron importantes en su sistema de producción de cucurbitáceas en 1999. El uso de umbrales de acción / económicos y monitoreo es fundamental para la práctica de MIP. La actitud de los entrevistados sobre el uso de umbrales de acción y monitoreo fue evaluada en 1995 y se encontró que la mayoría los aplicaba (77%) pero este porcentaje no se incrementó en 1999. Los resultados indicaron que aunque la mayoría utiliza estas prácticas, las percepciones de los productores sobre el uso de los umbrales de acción y monitoreo no han cambiado principalmente porque algunos agricultores desconfían en estas acciones. Sin embargo, ocurrió un incremento dramático, de un 44% en 1995 a un 96% en 1999, en la práctica y participación en estrategias de MIP. Las estrategias de MIP identificadas como importantes fueron muy variadas y no solo dependieron del monitoreo y uso de umbrales de acción sino que incluyeron fechas más tempranas de siembra y aspersión contra la mosca blanca, el conocimiento y la conservación de organismos benéficos y el incremento en la fertilidad.

Successful implementation of IPM depends on an understanding of the needs, perceptions, resources, constraints, and objectives of the targeted growers. Despite the demonstrated economic and environmental benefits of IPM, persuading growers to adopt IPM technology has frequently been difficult. 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 growers 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 and after these technologies have been introduced. 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. Therefore, a study was conducted during 1995 (pre-questionnaire) to determine the ability to implement new IPM technologies for cucurbits (cantaloupe/honeydew watermelons, and pickles) followed by a post-questionnaire in 1999 to determine any changes after conferences, grower demonstrations and meetings addressing these needs (Barrientos and Anciso 1996).

MATERIALS AND METHODS

Various educational efforts were conducted during 1995-1999 to increase awareness of IPM practices and principles for cucurbit producers in Hidalgo and Cameron counties. A Cucurbit IPM Conference and Workshop was conducted on November 16, 1995 in Weslaco, TX to present the 1995 survey results to cucurbit growers and consultants and gather more information about perceptions of IPM and technology transfer methods (Riley et. al. 1998). Over 76 individuals attended this educational meeting in which all aspects of pest management were discussed including cultural practices and host plant resistance. One important topic that was addressed through a grower facilitated discussion was for growers and consultants to voice their concern and needs. Although their concerns and needs were quite varied, the general consensus was similar to the results of the 1995 survey (Barrientos and Anciso 1996). Details of the 1995 survey in general indicated that 44% were willing to participate and practiced IPM strategies and 77% used economic/action thresholds and monitoring as part of their pest management practices.

In 1996, three large field demonstrations were used to evaluate scouting/monitoring techniques while in 1997 two large field demonstrations were used to evaluate disease forecasting programs. In 1998 and 1999, eight large field demonstrations were used to evaluate the use of biological control agents for the whitefly (*Bemisia tabaci*) to complete the total bio-intensive IPM program (Goolsby et. al. 1998). Awareness of the IPM practices and principles for cucurbits was disseminated through various vegetable meetings and grower contacts through the course of the 5 years but major events included the following:

- 1) IPM Initiative for Cucurbits session during 1996 Texas Produce Convention
- 2) Cucurbit/Pickle IPM Conference on Whitefly

Management in 1997

- 3) Whitefly control using a bio-intensive IPM approach during 1998 Texas Vegetable Association Meeting and 1998 South Texas Melon Committee Annual Meeting
- 4) Whitefly control using a bio-intensive IPM approach during 1999 South Texas Melon Committee Annual Meeting

In 1999, a post-questionnaire survey was developed and mailed to known cucurbit growers in two counties in south Texas (Cameron and Hidalgo) to measure implementation and acceptance of IPM after these educational meetings and grower demonstrations. Recipients of the grower survey were selected from an Agricultural Soil Conservation and Stabilization Service (ASCS) list of landowners in the two counties. Telephone surveys were conducted to survey cucurbit producers that did not respond to the mailed survey. Three survey forms were developed for the cucurbit commodities of interest (cantaloupe/honeydew, watermelon, and pickle/cucumber). Survey questions were close ended, with space provided at the end of the survey for additional comments. The survey was mailed on September 10, 1999. It consisted of a cover letter, one survey questionnaire with 13 or 14 short answer questions, and a postage paid return envelope.

RESULTS AND DISCUSSION

A total of 45 of the 78 surveys (58%) solicited from potential cucurbit growers in the two county area were returned in 1999. 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.

In comparing this 1999 survey to that of 1995 for the total cucurbit producer population, more growers responded in 1999 (58%) than in 1995 (41%) while both had almost identical total grower numbers (78 and 79, respectively). Of the 45 that responded in 1999, 43 (96%) answered that practicing IPM strategies was important to their cucurbit production system in contrast to 44% in 1995 that were willing to participate or practice IPM strategies.

The use of economic thresholds is fundamental to the practice 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 indicates 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". In 1995, the results indicated 77% agreed with the first statement and in 1999 the results were also 77%. The results indicate that the grower's perceptions have not changed on the use of economic/action thresholds mainly because some distrust them.

The majority of the growers already used action thresholds and monitoring in 1995, while 23% still indicated a reliance on spray schedules in 1999. However, grower recognition and use of other IPM strategies did increase from 44% in 1995 to 96% in 1999. These IPM strategies identified as important did not solely depend on action thresholds and monitoring but were quite varied from planting earlier, spraying earlier for the

whitefly (*Bemisia tabaci*), awareness/conservation of beneficials and increasing fertility which were employed in the grower demonstrations.

Out of the 20 surveyed cantaloupe/honeydew growers producing 3,245 acres for spring 1999, 6 responded (30%) with a total acreage of 2,340 acres (72%). In contrast to 1995, this reflects a decrease from 4,216 acres in 1995 to 3,245 acres of these crops in 1999 yet having similar number of growers with 19 in 1995 and 20 in 1999. This decrease in acreage is primarily attributed to the relatively weak markets for the past few years and high inputs or higher risk as well as the limited irrigations available due to the drought conditions affecting the water reservoirs.

For cantaloupe/honeydews in 1999, the most frequently observed insect pest by 67% of the growers was the whitefly but the one causing the most economic loss was spider mites. This is in contrast to 1995 when the whitefly was both the most observed and most destructive. The second most destructive insect pest in 1999 was melonworm (*Diaphania hyalinata*) indicating much of the new IPM strategies against the whitefly were successful since its status as a destructive pest declined since the 1995 survey even though it was a dry spring and the most frequently observed insect pest.

On average, cantaloupe/honeydew growers in 1999 made about 6 insecticide applications per season with an average total cost of \$105.33 per acre. The average number of fungicide applications per season was 6.6 with the average cost for these applications being \$144.83 per acre. This brings the total insecticide and fungicide costs on average to \$250.16 per acre. This reflects an increase in the total amount of \$29.16 per acre from the 1995 survey in which a total of \$221 per acre (11 total spray applications) was spent. There was an increase of 1.6 total spray applications in 1999 when compared to 1995.

Out of the 41 surveyed watermelon growers totaling 12,175 acres for spring 1999, 31 responded (75.6%) with total acreage of 10,279 acres (84.4%). In contrast to 1995, this reflects an increase of acreage from 4,539 acres in 1995 to 12,175 acres in 1999. This dramatic increase in acreage is mostly due to the fact that a pilot crop insurance program for watermelons was available for the first time in history even though only 65% of the growers in the survey purchased crop insurance. The number of producers increased from 27 in 1995 to 41 in 1999.

For watermelons in 1999, the most frequently observed insect pest (52% of the growers) was aphids (*Aphis gossypii*) and the one causing the most economic loss. This is in contrast to 1995 when the whitefly was both the most observed and most destructive. The second most destructive insect pest in 1999 was the whitefly indicating its slight decline in its pest status.

On average in 1999, watermelon producers made about 3.4 insecticide applications per season with an average total cost of \$61.19 per acre. The average number of fungicide applications per season was 3.5 and the average cost for these applications was \$49.89 per acre. This brings the total insecticide and fungicide costs on average to \$111.08 per acre in 1999. This reflects an increase in the total amount of

\$3.08 per acre from 1995 in which a total of \$108 per acre (total 7 spray applications) was spent. There was a decrease of 0.1 fewer total spray applications made in 1999.

Out of the 17 surveyed pickle/cucumber growers producing 1,016 acres for spring 1999, 8 responded (47%) with a total acreage of 762 acres (75%). In contrast to 1995, this reflects a decrease from 2,381 acres in 1995 to 1,016 acres in 1999 as well as a decline in the number of producers from 33 in 1995 to 17 in 1999. Most of the pickle/cucumber producers grow on a contract basis with the average producer growing 95.25 acres for their respective buyers.

For pickle/cucumbers in 1999, the most frequently observed insect pest (45% of the growers) was the whitefly. The whitefly was also causing the most economic loss. The second most destructive insect pest was pickleworms (*Diaphania nitidalis*) indicating no change since the 1995 survey. However, only 25% of the respondents in 1999 reported routinely encountering a pest management problem, while 88% experienced factors such as labor or weather impacting their production over the past 5 years which has contributed to the dramatic decline in the pickle/cucumber acreage since 1995.

On average, pickle/cucumber producers in 1999 made about 2.57 insecticide applications per season with an average total cost of \$85.83 per acre. The average number of fungicide applications per season was 1.5 and the average cost for these applications was \$13.33 per acre. This brings the total insecticide and fungicide costs on average for 1999 to \$99.16 per acre. This reflects an increase in the total amount of \$14.16 per acre from the 1995 survey in which a total of \$85 per acre (total of 5 spray applications) was spent. There was a decrease of 0.93 fewer total spray applications made in 1999.

CONCLUSION

The acceptance and practice of IPM strategies and concepts by cucurbit growers in Hidalgo and Cameron counties has dramatically increased from 44% in 1995 to 96% in 1999 even though grower perceptions on the use of monitoring/scouting and economic/action thresholds has remained the same at 77% use for 1995 and 1999. While most growers realize the importance of monitoring and action thresholds, some distrust that such measures provide effective control. While the whitefly was the insect of most importance in 1995 in cucurbits, its status has declined primarily because of new IPM strategies that have educated growers in planting earlier, spraying much earlier than once accustomed, more informed about the role and conservation of beneficial insects, and proper use of systemic insecticides (Ciomperlik and Anciso 1999). While the whitefly continues to be a troublesome pest in cucurbits, its effective control depends on the continued efforts to educate growers in IPM strategies and concepts that are dynamic and effective. Reliance on one particular control method may be successful temporary but it will take a program that utilizes all the available and alternative tactics to keep the whitefly as well as other pests to manageable or tolerable levels.

LITERATURE CITED

- Barrientos, T. and J.R. Anciso. 1996. Perceptions of Integrated Pest Management Practices for Cucurbit Pests by South Texas Growers. *Subtrop. Plant. Sci.* 48: 19-21.
- Ciomperlik, M. and J.R. Anciso. 1999. Biological Control Based - IPM of Silverleaf Whitefly, A Grower Demonstration of Parasitoid Inoculated Banker Plants in Spring Cantaloupes. 1999 South Texas Melon Comm. Res. Rept. pp 64-70.
- Goolsby, J., M. Ciomperlik and J. R. Anciso. 1998. Biological-based Control IPM Demonstration using Parasitoids and “Banker” Plants in Managing Sweetpotato Whitefly Populations on Muskmelons and Surrounding Cropping Systems. 1998 South Texas Melon Comm. Res. Rept. pp. 52-56.
- Riley, D. G., J. V. Edelson, R. E. Roberts, N. Roe, M. E. Miller, G. Cuperus and J.R. Anciso. 1998. Integrated Pest Management in Cucurbit Crops in South-Central USA: Pest Status, Attitudes toward IPM and a Plan for Implementation. *Journal of Extension* 36 No 4.
- Wearing, C. H. 1988. Evaluating the IPM Implementation Process. *Ann. Rev. Entomol.* 33: 17-38.