A Community-wide Approach to Whitefly Management

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Abstract

An extension supported, grower controlled, community pest management group was initiated in the Laveen and Tolleson communities of Arizona with the management of sweetpotato whitefly (SPWF) as its initial focus. The three functions of this group were awareness, communication, and cooperation. Increased awareness and communication of pest management problems and solutions were achieved through regular meetings and newsletters. Community cooperation took the form of a community-based overwintering survey and a sticky trap network. These two cooperative activities served both an educational and a research function. From the overwintering survey and the sticky trap network, growers learned about the overwintering habits and movement dynamics of whiteflies in their area, the limits of sticky traps for SPWF detection, the need for the reduction of SPWF populations before they move onto cotton, and the need for careful infield sampling of SPWF populations.

Introduction

Over the past three years, the sweetpotato whitefly (SPWF), Bemisia tabaci (Genn.) has emerged as a major pest in Arizona cotton. Damage caused by these insects has been extensive; yield losses up to 2 bales below average have been observed. Because the SPWF is a new pest in the area, there is no database of successful management strategies and growers are faced with the task of differentiating among a host of new ideas. Grower education and communication have been critical in sorting through available strategies and implementing effective pest management action. In addition, because the SPWF utilizes numerous crops and other host plants in the course of its yearly cycle, grower cooperation in SPWF management should benefit all concerned.

The Laveen/Tolleson Pest Management Program

The Laveen/Tolleson Pest Management Program (LTPMP) is an example of grower cooperation in action. In February of 1993 cotton growers and pest control advisers (PCAs) within these two Maricopa County, Arizona communities in conjunction with the University of Arizona Cooperative Extension formed this pest management group as a means to share pest management information and concerns and to coordinate SPWF management activities. This education-based group is voluntary and grower-run. About twenty growers and ten pest management consultants regularly participate. Three University of Arizona Cooperative extension personnel: an IPM specialist, a county agent and an assistant in extension are also regularly involved, helping to coordinate activities and provide educational materials and technical assistance.

Growers within the Laveen and Tolleson communities have previous experience with community-wide pest management, having worked together from 1986 to 1989 in a successful community-wide effort to manage boll
weevil populations (Moore and Watson, 1990). The area represented by LTPMP encompasses approximately 160 square miles. It is bounded to the west by the Gila and Agua Fria rivers, to the north and east by the city of Phoenix and to the south by South Mountain and the Gila River. This area includes about 50,000 - 60,000 acres of crop land, approximately half of which is used to grow cotton. Other crops grown in the area include alfalfa, cole crops, melons, lettuce, silage corn, sorghum and citrus. The proximity of urban Phoenix also influences pest management decisions. Urban dwellers put pressure on growers to reduce pesticide usage. At the same time, urban and residential landscapes provide habitat for SPWF and other pest species, particularly during the winter when host plants are limiting. As metropolitan Phoenix continues to expand into rural areas, cooperation and communication with the urban communities will become more and more crucial for the survival of agriculture in this area.

The Laveen/Tolleson Pest Management Program has three aims:

1) Awareness of pest management problems and solutions.
2) Communication of management actions, and plans which effect pest population movement and dynamics.
3) Cooperation in implementing pest management action.

These aims are realized through regular meetings, newsletters, and community-wide pest management activities.

Since the first meeting in February, meetings have been held about once a month to exchange information about crop progress and pest management needs and have included presentations on SPWF biology and management practices. Topics have included overwintering biology, seasonal cycle and cropping dynamics, identification and sampling, action thresholds and control practices, and pesticide resistance management. Information presented in these meetings was supplemented with regular newsletters.

Educational presentations and materials concentrated on three aspects of SPWF management:

1) careful monitoring of SPWF numbers
2) the properly timed application of efficacious chemicals
3) the avoidance of whitefly populations by the observance of uniform planting and termination dates, management of SPWF in other crops, and sanitation practices.

By following sound management practices, a grower can successfully manage SPWF within his/her fields as was demonstrated in 1993 by numerous growers throughout Arizona. In addition, many of these practices, especially those in the category of SPWF avoidance, may be particularly effective when implemented on a community-wide basis.

Community pest management action in Laveen and Tolleson last year consisted primarily of two activities, an overwintering survey for whiteflies and a sticky trap network for early detection of SPWF. On March 10 the overwintering survey was conducted to determine which plants were hosting whitefly populations. Growers and PCAs collected vegetation samples from fields, front yards, ditch banks and other likely places. Few of the plants sampled sheltered any SPWF but whiteflies were abundant on two ornamental plants, lantana and roses (Table 1). Lantana is a common landscape plant in residences within Laveen, Tolleson and adjacent Phoenix, and also grows as a weed in unmaintained citrus groves. Roses are also abundant and are grown commercially just to the north of the Laveen/Tolleson area. Other whitefly hosts were lambsquarters and mallow, common weeds within the area. This survey was intended primarily as an educational tool; its research value is limited. The sample size was small and only a small fraction of the plant species present in the area were examined. However, as an educational exercise, this survey was more successful. Growers participating in this survey learned that SPWFs are present in their area year round, that these insects are dependent on the availability of hosts to survive the winter, and that by controlling winter weeds in fields, field edges and noncrop areas they can limit SPWF habitat during the winter months.

The sticky trap network was initiated in late March for early season detection and identification of whiteflies and for monitoring patterns of whitefly movement. PCAs put out and collected yellow sticky traps, and extension
personnel scored these traps and sent out maps summarizing trap numbers by section. The traps used were 3 inch by 3 inch yellow sticky cards. These cards were stapled to the bent over tab of flexible 6 inch polystyrene pot labels. Traps could then be set in the ground with the sticky yellow side facing skyward. This PCA network ran until early July at which time an exponential increase in SPWF numbers on the traps had begun (Figure 1). Extension personnel supplemented this network with traps which were put out in two transects in the area. These transects ran the length of the community, one running east-west the other north-south. Both transects started in urban areas before moving in to rural Laveen and Tolleson. They were initiated in April and have continued year long.

Two logarithmic increases in the number of SPWF captured on traps were observed, one from late March through April and the other from late June until SPWF numbers peaked at the end of July. It is likely that the early exponential increase represents a rise in SPWF movement as temperatures increased while the second increase represents a real growth in the SPWF population due to development. In addition to SPWF, the bandedwing whitefly, Trialeurodes abutilonea (Haldeman), was also common on these traps. In fact, from the initiation of the network until mid June, bandedwing whiteflies outnumbered SPWF (Figure 1) underscoring the need to differentiate between these two species in making management decisions. In contrast to SPWF, bandedwing whiteflies seldom reach population levels at which control action is required.

As was the case of the overwintering survey, the sticky trap network served an educational as well as a research function. We emphasized to growers that trap catches represented patterns of insect movement rather than absolute numbers in their fields. The number of SPWFs caught was highly dependent on the type and quality of host plants nearby. For example traps near melon fields experienced a substantial increase in the number of SPWFs caught as the insects moved off of declining melon plants. The usefulness of the traps was also limited by overloading. In the second week of July, we began leaving traps out for only 24 hours instead of a week as we captured 47 SPWFs per square inch per day. By August, however, trap efficiency may have been diminished even over 24 hours as 250 SPWFs were caught per square inch per day. From this sticky trap network, growers became aware of these limitations in the use of sticky traps for detecting whitefly numbers. At the start of the trapping network, many of them had hopes that these traps could be utilized for triggering chemical control. As the season progressed, growers realized that traps are no substitute for infield sampling of whitefly numbers.

**Future Plans**

Next year there are plans to increase the uniformity of the initiation of whitefly treatments through the coordinated implementation of an action threshold. Starting mid-May, adult whitefly populations will be monitored weekly in participating growers' fields using the leaf turn method. Chemical control will be initiated once the agreed upon threshold is reached. Research by Ellsworth and Meade (1994) indicates that an appropriate threshold would be in the range of 4-8 adult whiteflies per leaf. All monitoring will be done in cooperation with the area PCAs, and the ultimate decisions to spray will be made by the growers and PCAs. Overwintering surveys and sticky trap networks for identification and early detection of whiteflies will continue.

To date this program has been primarily educational; little formal coordination of pest management efforts has taken place. However, participating growers consider this program to be worthwhile; note that communication levels have increased; and cite timely chemical control and plow down of harvested melons, elimination of weed hosts, and more informed and effective insect control as tangible results. Also, the flexibility of this approach to pest management will allow them to address other pest problems as they arise in the future. Since there are no up front costs, the focus can be changed to include other issues, for example an increasing Lygus problem, as needed. Furthermore, they anticipate that this cooperative effort will be an asset in the marketing of their cotton in the future in the face of regional discounting for stickiness.

**Acknowledgments**

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References


Table 1. Number of sweetpotato whiteflies (SPWF) found on different plant species in overwintering survey.

<table>
<thead>
<tr>
<th>Plant</th>
<th>#Samples</th>
<th># with SPWF</th>
<th>#Eggs/Leaf</th>
<th># Nymphs/leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clover</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Globe Mallow</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grasses</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lambs-quarters</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>.15</td>
</tr>
<tr>
<td>Lantana</td>
<td>1</td>
<td>1</td>
<td>60</td>
<td>.02</td>
</tr>
<tr>
<td>Little Mallow</td>
<td>25</td>
<td>1</td>
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<td>.01</td>
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<td>Mustards</td>
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<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Prickly Lettuce</td>
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<td>0</td>
</tr>
<tr>
<td>Prostrate Knotweed</td>
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<td>Roses</td>
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<td>1</td>
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<td>4.4</td>
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<td>Sowthistle</td>
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Figure 1. Mean number (± s.e.) of whitefly adults captured on sticky traps in the Laveen/Tolleson area of Arizona.