# EVALUATION OF GREEN PEACH APHID ACTIVITY AND THE OCCURENCE OF BEET WESTERN YELLOWS VIRUS IN SUGARBEET FIELDS

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## INTRODUCTION

In the Yakima Valley, the green peach aphid (GPA), Myzus persicae (Sulzer), overwinters primarily in the egg stage on peach trees (a nonhost plant of beet western yellows virus [BWYV]). The GPA was found to overwinter also in the summer forms on weeds in warm spring-fed drainage ditches (6). The degree of success for the overwintering of GPA in the drainage ditches is dependent upon the availability of hoary cress, Cardaria draba (L.) Desv., (a host plant of BWYV) and upon the severity of the winter (4).

When compared to the 4 previous winters in the Yakima Valley, the winter of 1977-78, just prior to this study, was considered very mild, with the lowest monthly average temperature of 0.6 C. As expected, in the spring of 1978 the GPA successfully survived in all known overwintering sites of hoary cress along the deep drainage ditch under study. As the population of GPA began to increase, an unusually wet spring caused a fungus epizootic that decimated the GPA population in the drainage ditch. Dr. R. S. Soper, USDA-AR, identified the fungus as Entomophthora aphidis (pers. comm.). Thus the early source of BWYV vectors from the drainage ditch was destroyed. Taking into account the loss of the GPA at a key reservoir site, we conducted a field study to determine the relationship of GPA activity on sugarbeet plants in early season and the occurrence of BWYV.

## MATERIALS AND METHODS

Green peach aphid activity and the occurrence of BWYV were studied in 7 commercial sugarbeet fields in the Yakima Valley. The fields ranged from 1 to 17 miles apart.

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About 50 feet into each field, 50 sugarbeet plants were tagged by selecting every fifth plant per row. This was repeated for every fifth row for a total of 10 rows. We checked the tagged plants weekly from May 1 to June 30 for GPA by inspecting all plant surfaces above the ground. Tamaki et al. 1978 (5) indicated that substantial losses in yield from BWYV occurred when plants were infected on May 22 but not in late June. Visual foilage symptom readings for BWYV were made in this study on tagged plants into August, however.

In each field, a yellow pan filled with water was used to attract and catch the winged GPA (1). Formaldehyde (20 ml) was added to each pan to prevent or delay growth of algae and bacteria. The aphids were removed twice a week and stored in alcohol for a later count and species determination.

## RESULTS AND DISCUSSION

During the 2nd week of May, the first winged GPA were caught in yellow pans in 5 of 7 fields for a total of 16 GPA trapped (Table 1). For the next 5 weeks, yellow pans at all locations caught fewer GPA. During the 3rd week of June, the catch was substantially increased, and for the first time all pans in each of the 7 fields caught aphids. Weekly aphid activity, based on yellow pan trappings, peaked during the first week of July.

The number of tagged plants newly infested with GPA is shown in Table 2. By the 4th week of May, 6 of 7 fields had 1-7 plants that were presently or had previously been infested with GPA. From the last week of May through the 3rd week of June, the greatest infestation of GPA occurred on sugarbeet plants previously unrecorded as to GPA presence. However, there was no correlation between the number of GPA trapped weekly in the yellow pans and the number of tagged plants infested each week.

At the end of June, when aphid counts on tagged plants were terminated, about 51% of the plants had been infested with GPA at one time or another. Foliage symptoms for BWYV were read visually each week from the 50 tagged plants in each field, and most of the symptoms appeared in mid-August. We were surprised

Table 1. The number of winged green peach aphids caught in a yellow pan in each sugarbeet field, 1978 in the Yakima Valley, Washington.

| | | No. of GPA caught/pan by field and week | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Field number | | | | | | | |
| Month | Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total |
| May | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 3 | 2 | 1 | 0 | 0 | 2 | 8 | 16 |
| | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| | 4 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 4 |
| | 5 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 3 |
| June | 1 | 3 | 0 | 2 | 2 | 0 | 0 | 0 | 7 |
| | 2 | 9 | 0 | 0 | 0 | 1 | 0 | 0 | 10 |
| | 3 | 26 | 24 | 5 | 30 | 22 | 2 | 15 | 124 |
| | 4 | 81 | 14 | 16 | 143 | 277 | 8 | 12 | 551 |
| July | 1 | 117 | 47 | 25 | 412 | 183 | 8 | 9 | 801 |
| | 2 | --[a] | -- | -- | -- | -- | -- | -- | -- |
| | 3 | 174 | 68 | 71 | 30 | 83 | 16 | 30 | 472 |
| | 4 | 34 | 7 | 26 | 12 | 10 | 6 | 8 | 103 |
| August | 1 | 24 | 15 | 3 | 13 | 1 | 0 | 0 | 56 |
| | 2 | 5 | 6 | 4 | 4 | 2 | 2 | 0 | 23 |
| | 3 | 0 | 0 | 1 | 0 | 4 | 0 | 1 | 6 |
| | 4 | 0 | 1 | 5 | 3 | 10 | 1 | 0 | 20 |
| | | 478 | 187 | 160 | 651 | 593 | 45 | 85 | 2199 |

[a] Data missing.

that only 4 of 16 plants that showed disease symptoms had a history of GPA presence before the end of June (Table 3).

In the past, a sampling plan based on the number of GPA per plant was used to aid in the timing of treatment or the

Table 2. The number of sugarbeet plants newly infested with green peach aphid from weekly observations on 50 tagged plants/field in 7 commercial fields, 1978.

| | | Number of new plants infested/field by week | | | | | | | | Total GPA winged aphids in yellow pan traps |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Field number | | | | | | | | |
| Month | Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total | |
| May | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 16 |
| | 3 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 4 | 3 |
| | 4 | 3 | 3 | 2 | 1 | 0 | 2 | 2 | 13 | 4 |
| | 5 | 6 | 13 | 12 | 3 | 7 | 1 | 4 | 46 | 3 |
| June | 1 | 5 | 9 | 7 | 1 | 7 | 1 | 9 | 39 | 7 |
| | 2 | 2 | 1 | 8 | 4 | 4 | 1 | 6 | 26 | 10 |
| | 3 | 1 | 2 | 6 | 3 | 6 | 5 | 9 | 32 | 124 |
| | 4 | 0 | 0 | 3 | 7 | 3 | 0 | 3 | 16 | 551 |

Table 3. The census of the green peach aphid (GPA) and the incidence of beet western yellows virus (BWYV) disease symptoms on tagged plants in 7 commercial sugarbeet fields, 1978.

| | Data from 50 tagged plants/field | | |
|---|---|---|---|
| Field number | With GPA | With disease symptoms | Plants showing disease symptoms with GPA present |
| | (Through June) | (Through August) | |
| 1 | 17 | 0 | 0 |
| 2 | 32 | 1 | 1 |
| 3 | 38 | 2 | 1 |
| 4 | 19 | 4 | 0 |
| 5 | 27 | 2 | 0 |
| 6 | 12 | 5 | 0 |
| 7 | 33 | 2 | 2 |
| Total | 178 | 16 | 4 |

development of a practical insecticide program (3). In 1979, Tamaki et al. (4) reported the separation of nonviruliferous and viruliferous GPA from winged GPA captured in the field in order that a more accurate evaluation of GPA potential for spread of BWYV could be developed.

## CONCLUSION

The data in this study showed no correlation between the number of plants with GPA or the number of GPA trapped in yellow pans and the number of plants showing symptoms of BWYV. Winged GPA are known to alight and depart even on preferred host plants (2); therefore, a plant can be inoculated with BWYV by a transient vector. The economic injury levels of the GPA as a vector of BWYV based only on the number of plants infested with GPA or the number in pan traps, thus may be misleading, especially when the overwintering source of GPA on virus containing-host plants is destroyed.

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