DISTRIBUTION OF THE APPLE MAGGOT, *RHAGOLETIS POMONELLA* (DIPTERA:TEPHRITIDAE)IN OREGON

M.T. ALINIAZEE and R.L. WESTCOTT[1]

Department of Entomology
Oregon State University
Corvallis, OR 97331

ABSTRACT

Data from a four-year (1981-1984) distributional study suggest that, in Oregon, the apple maggot *Rhagoletis pomonella* (Walsh) is established in the interior valleys (especially the Willamette Valley) along the Columbia River Gorge and at isolated locations along the Oregon coast. An analysis of the general distribution pattern and some earlier records suggests that the apple maggot may have been in Oregon for nearly four decades.

INTRODUCTION

After the chance discovery of the apple maggot *Rhagoletis pomonella* (Walsh) (Diptera:Tephritidae) near Portland, Oregon in 1979, a number of questions arose regarding the distribution and pest status of this insect in the Pacific Northwest. It was obvious that the entire western apple growing area, from British Columbia to California, was threatened by this maggot find. An initial survey to delimit the distribution was started by the Oregon Department of Agriculture (ODA) in 1980 and the results of early surveys were discussed by AliNiazee and Penrose (1981), and Westcott (1982). A review of the apple maggot situation in the western United States was presented by AliNiazee and Brunner (1986). Reported here is the current distribution of the apple maggot in Oregon.

METHODS

The distribution studies were conducted by employing Zoecon's Pherocon® AM standard traps and periodic inspection of host fruit for larval finds. During 1980, trapping studies were mostly confined to a small area in Portland, but eventually expanded to other areas, especially in the northern Willamette Valley.

During 1981 an urban grid system was employed in and around larger inland towns and the coastal cities of Astoria, Coos Bay and Brookings, providing a maximum density of 4 traps/mi^2. Transects were run in the Willamette Valley along portions of Interstate 5 and highways to the west, from Wilsonville south to Eugene; along I-5 from Eugene to Grants Pass; and along the coast, all at a rate of 1 trap/mi^2. However, in practice this rate was greatly reduced in some areas due to lack of hosts. In southwestern Oregon, from Grants Pass southward, the rate was increased to 2/mi^2. In eastern Oregon, major cities in Klamath, Malheur, Umatilla, Union and Wasco counties were trapped using the urban grid system. Approximately 70 traps were placed in native hawthorns, *Crataegus* spp., from Wasco county to Umatilla and Baker counties, to test the hypothesis that a hawthorn race of apple maggot might be native to the state.

During 1982 the grid trap density was increased to 10 traps/mi^2. Western Oregon areas chosen for trapping included previously untrapped or scantily trapped localities in the vicinity of I-5, from Eugene southward, and in Coos and Curry counties. In eastern Oregon, the trapping studies were conducted for the first time in the major cities of Crook, Deschutes, Grant and Jefferson counties, and again in Malheur, Union, Umatilla, and Wasco counties.

In 1983 efforts were largely confined to areas where the presence of apple maggot is of concern to commercial production of apples. In 1984 a similar trapping program was continued. The rediscovery of apply maggots in Hood River and the first detection near The Dalles, Oregon, effected an increase in trap density in these general areas.

RESULTS AND DISCUSSION

Fig. 1 shows the current distribution of the apple maggot in Oregon. Although different symbols are used for each year, the progression of detections should not be interpreted to reflect the dispersal rate of *R. pomonella*, either natural or artificial. Rather, it is a reflection of changing trapping patterns and density. Nevertheless, these data suggest that apple maggot is now well established throughout the interior valleys of western Oregon and parts of southern Oregon. It is also found in the Columbia River Gorge and, disjunctly, along the coast; the latter strongly suggesting fly dispersal by movement of infested fruit.

Although apple maggot has been recorded from Oregon only since 1979, its widespread and sometimes abundant occurrence in western Oregon and some adjacent areas in Washington suggests an earlier time of establishment. Distributional studies conducted during 1980 and 1981, even, provided a clear picture of this, when a high percentage of positive trapped sites and observed fly abundance in the northernmost Willamette Valley (partic-

[1]Professor of Entomology, Oregon State University, Corvallis, OR 97331, and Survey Entomologist, Oregon Department of Agriculture, Salem, OR 97305, respectively. Oregon Agricultural Experimental Station paper no. 7978

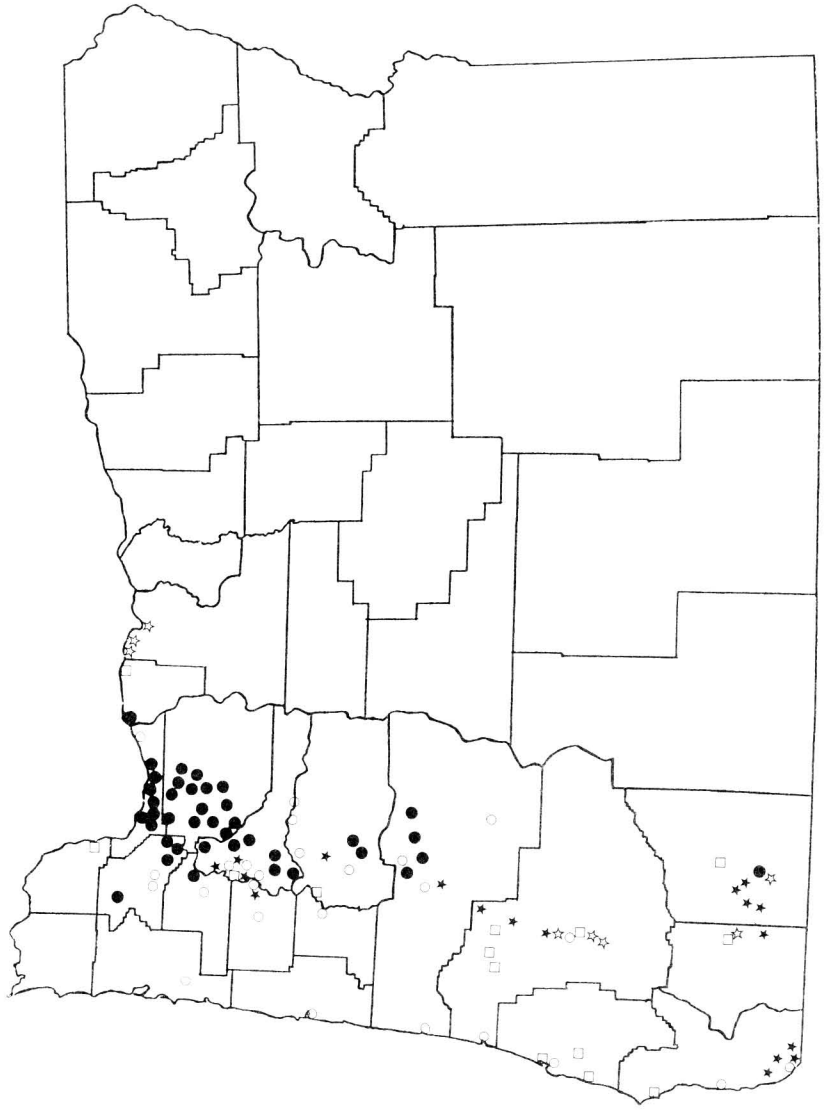

Fig. 1. Present distribution of apple maggot in Oregon. Solid circles, 1980; rectangles, 1981; hollow circles, 1982; solid stars, 1983; hollow stars, 1984.

ularly the greater Portland area) strongly suggested this region as the point of origin. Given the large human population in this region and the ease with which infested apples may be transported *via* the automobile, this fly population does not necessarily stem from one source.

It is difficult to ascertain how long the apple maggot has been in Oregon. A close examination of Oregon Department of Agriculture (ODA) records shows that in September 1947, a California border quarantine station intercepted some apples, allegedly from a backyard tree in Portland, which were claimed to be infested with apple maggot. Shortly thereafter, all remaining apples from the alleged site were inspected and no evidence of apple maggot was found. During 1948 ODA personnel placed traps in the suspected host and in apple trees on 33 nearby properties (40 traps total). Two flies identified as *R. pomonella*, apparently by Alan Stone, were recorded. However, Stone considered the snowberry maggot, *R. zephyria* Snow to be a synonym of *R. pomonella*, and a snowberry bush infested with *R. zephyria* was found across the street from a site where one of the flies was captured. The specimens in question cannot be located.

From an area "approximately ½ mile x 1 mile" around the suspect host from 1947, 1174 apples were examined.

All were negative except one report as follows: "One apple contained tunnels that might have been made by apple maggots. No maggots found. No evidence of codling moth at the core." In our opinion this report, although submitted as "definitely negative in regard to finding of apple maggots" does not completely rule out the presence of apple maggots at this site in southeast Portland. Indeed, this report coupled with the fact that this area is currently heavily infested with apple maggot, and given the difficulty of detection of an incipient infestation even with methods available today, would seem to raise more questions.

Another important fact relates to a specimen in the ODA collection which had been misidentified as *R. zephyria*. This specimen was collected on a yellow sticky board trap in 1951 near Rowena, in the Columbia River Gorge area of Wasco county, and has been determined by one of us (R.L.W.) to be *R. pomonella* (with an ovipositor length of 1.15 mm). In our study, apple maggot was first detected in this area during 1984, the fourth year of sampling.

The widespread distribution of *R. pomonella* in Oregon (Fig. 1), the earlier record as discussed above, and the abundance and excellent host/parasitoid synchrony of opiine parasitoids (AliNiazee 1985) which probably shifted over to *R. pomonella* from *R. zephyria*, suggest that apple maggot has been in Oregon for many years.

REFERENCES CITED

AliNiazee, M.T. 1985. Opiine parasitoids (Hymenoptera:Braconidae) of *Rhagoletis pomonella* and *R. zephyria* (Diptera:Tephritidae) in the Willamette Valley, Oregon. Can. Entomol. 117: 163-166.

AliNiazee, M.T. and R.L. Penrose. 1981. Apple Maggot in Oregon: a possible new threat to the Northwest apple industry. Bull. Entomol. Soc. Amer. 27: 245-246.

AliNiaze, M.T. and J.F. Brunner. 1986. Apple maggot in the western United States: a review of its establishment and current approaches to management. J. Ent. Soc. Brit. Columbia. 83: 49.

Westcott, R.L. 1982. Differentiating adults of apple maggot, *Rhagoletis pomonella* (Walsh) from snowberry maggot, *R. zephyria* Snow (Diptera:Tephritidae) in Oregon. Pan Pacific Entomol. 58: 25-30.