

Yield Loss Associated with Sugarbeet Root Maggot Damage

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ABSTRACT

The sugarbeet root maggot (*Tetanops myopaeformis*) was first recognized as a problem in the Red River Valley in 1947 and continues to be the major insect pest of sugarbeets 50 years later. The primary control method has been the use of planting-time insecticides directed toward reducing larva populations in sugarbeet fields. The effectiveness of insecticides in reducing populations is hindered by the mobility of the adults and the ability of a number of weed species to serve as hosts. This report summarizes the variability in effectiveness of commonly used control measures and examines the relationship between visual damage ratings and yield loss attributable to root maggot damage. Forty-two insecticide trials conducted over a 10-year period at five locations provided a large sample of environments for observation.

Root yields for individual trials ranged from 10.5 at Crookston in 1991 to 27.5 tons / acre at Hillsboro in 1994. The lowest yielding treatment among all treatment and environment combinations was 3.0 tons / acre for an untreated control at Crookston in 1992. With two exceptions, both at St. Thomas in 1991, the untreated control was the lowest yielding treatment in all trials. The Lorsban at planting time plus Counter post-emergence treatment at Hillsboro in 1994 produced 28.9 tons / acre, the highest yield observed. Damage severity was rated on a 0 (no damage) to 5 (severe damage) scale. The average damage rating when no insecticide was applied was 3.3, compared to 1.7 for the most effective treatment in each environment. Differences in observable damage were reflected in corresponding yield differences. Root yield differences between the most effective control measure and no control ranged from 2.8 to 15.3 with an average yield difference of 8.8 tons / acre or a yield reduction of 42% when the absence of control is compared to the most effective control.

The magnitude of the yield loss associated with a given level of visual root damage was dependent upon factors other than maggot feeding. The yield loss associated with each increment increase in damage rating ranged from 7.0 tons / acre at St. Thomas in 1991 to near zero for four of the 42 trials. In a combined analysis, the average percent yield reduction associated with specific damage ratings were; 2 = 8%, 3 = 23%, 4 = 51% and 5 = 92%. Corresponding yield losses for a near average crop (18 tons / acre) would be approximately 1.4, 4.1, 9.8, and 16.6 tons / acre, respectively. Yield losses for damage ratings below 1.4 were not measurable; indicative of the sugarbeet's ability to compensate for low levels of stress.

No commercially viable alternatives to insecticides are currently available to growers. Development of root maggot resistant hybrids and / or utilization of biocontrol agents perhaps would provide more consistent control than insecticides and are being explored.

Although commonly used insecticides do not always prevent significant economic loss, they almost always provide some reduction in visible damage and a corresponding yield benefit. A 0.4 ton / acre increase in yield will cover the cost of the insecticide. This relatively low cost and ease of application justifies the widespread use of insecticides, even in areas where sugarbeet root maggot damage is infrequent. An occasional year with substantial maggot pressure will more than compensate for a number of years when insecticides provided little benefit. The insecticides also may be beneficial in controlling minor insect pests.