Distribution of Stalk Boring Insects in Giant Ragweed in Indiana and Southern Michigan

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PURDUE WEED SCIENCE

Introduction

Giant ragweed (GRW) is one of Indiana's most problematic weeds (Nice et al. 2001). Glyphosate occasionally fails to control giant ragweed at commercially acceptable levels (Hoss et al. 2003). Previous research shows that control failures can be traced to several causes which include inadequate rates based on plant size, poor coverage due to dense populations, and additional emergence cohorts (Tharp and Kells 1999). Previous research also shows that GRW can serve as a host to several stalk boring insects (SBIs) such as European corn borer [*Ostrinia nubilalis* (Hüber)] (Dicke 1932) and the stalk borer [*Papaipema nebris* (Guenée)] (Decker 1931). Purdue University entomologists have also found celery leaftier [*Udea rubigalis* (Guenée)], cocklebur weevil [*Rhodobaenus quinquedecimpunctatus* (Say)], and the ragweed borer [*Epiblema strenuana* (Walker)] (Gerber and Obermeyer unpublished data). Johnson et al. (2004) showed antagonism can occur when large, stalk boring insect infested GRW plants are sprayed with lower rates of glyphosate.

Figure 1. Three common weeds found in Indiana soybean fields that had escaped glyphosate treatment. Note SBI tunneling in all three species.

To help us understand this phenomenon better, more information is needed on the different SBIs present in the GRW. Identifying the SBIs found in GRW plants will be helpful in understanding the biology of these insects, and aid us in making better GRW management decisions.

Objective

To identify SBIs to the family level in Indiana and southern Michigan giant ragweed found in soybean fields in early August.

Materials and Methods

In mid-August, four regions in Indiana (central, northeast, northwest, and southwest) and three regions in Michigan (central, southeast, and southwest) were sampled (Figure 2). Five sampling locations were selected in each region. Ten GRW plants were picked randomly in each field and dissected to investigate for evidence of SBIs.
If evidence of SBIs were found, insect tunnel length was recorded and a specimen was collected for identification. Insects were identified to the family level.

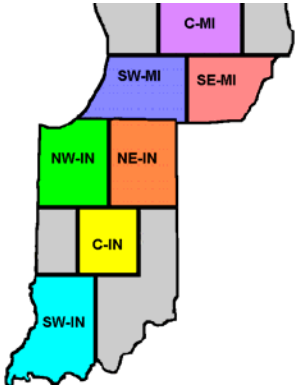

Figure 2. GRW sampling regions in Indiana and southern Michigan. Five soybean fields with escaped GRW were sampled in four regions of Indiana and three regions in Michigan.

Results and Discussion

Insects from three different orders were identified. These orders include coleoptera (beetles and weevils), lepidoptera (butterflies and moths), and diptera (flies). The insects found in this survey were dominated by lepidopteran and coleopteran species. In these three orders, six different families were identified. Three from the order coleoptera (Cerambycidae, Curculionidae, and Languriidae), two from the order lepidoptera (Noctuidae andTorticideae), and one from the order diptera (Agromyzidae).

Distribution

The average height of the GRW plants investigated was 117-cm with tunneling found in 63% of all the plants investigated and SBIs were found in 25% of the GRW plants investigated. The highest percentage of SBIs found in GRW were in central Indiana, and the lowest percentage of SBIs found in GRW plants was southeast Michigan (Table 1). In Indiana the family Curculionidae (Figure 3) comprised the largest proportion of the insects whereas in Michigan, the Noctuidae family up the largest proportion of insects found. The third most prevalent family was the Cerambycidae. According to Gerber and Obermeyer (unpublished data), the cocklebur weevil *Rhodobaenus quinquedecimpunctatus* (Say)] is one example of an insect in the Curculionidae family (Figure 4), the stalk borer [*Papaipema nebris* (Guenée)] is a member of the Noctuidae family (Figure 6), and the soybean stem borer [*Dectes texanus* (LeConte)] is an example from the Cerambycidae family (Figure 5). Other SBI families include Torticidae (Figure 7) and Languriidae (Figure 8).

Table 1. Average heights of GRW plants, average SBI tunnel length, and percentage plants with SBI found by sample region.

	C-IN	NE-IN	NW-IN	SW-IN	C-MI	SE-MI	SW-MI
Average height all plants (cm)	125	140	112	143	82	94	131
Average height of plants with evidence of SBI (cm)	125	142	110	145	70	94	135
Average tunnel length of SBI (cm)	13.1	23.1	18.4	24.2	7.4	13.8	18.2
Plants with SBI tunneling (%)	72%	79%	66%	68%	40%	35%	64%
Percentage of plants with SBI (%)	32%	26%	28%	26%	20%	10%	24%

Figure 3. Distribution of SBI families found in GRW as a percentage of all insects found in that region.

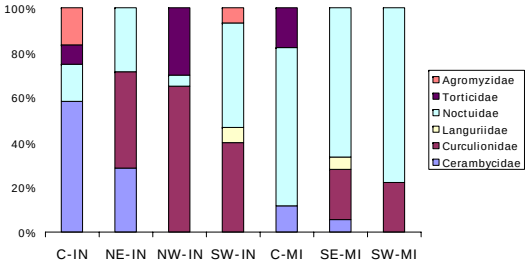

Figure 4. Curculionidae

Figure 5. Cerambycidae

Figure 6. Noctuidae

Figure 7. Torticidae

Figure 8. Languriidae

Conclusions

There was a fairly good relationship between plant height and percentage of plant with SBI tunneling (r=0.88). This could indicate that these plants were present when SBI oviposition occurred. Greater amounts of SBI tunneling in Indiana was likely due to a larger pest complex in Indiana than in Michigan (more families present in Indiana than in Michigan). Improved knowledge of SBIs found in GRW will help our understanding of the influence of SBIs on herbicide activity. Future research includes the identification of early season SBIs to the specie level to create a better understanding of this antagonism phenomenon.

References

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