Soybean Aphid Resistance to Pyrethorid Insecticides: Rethinking How We Manage Soybean Aphid

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Soybean aphid is the most significant insect pest of soybean in Minnesota. Management programs for this pest have relied on use of foliar applications of insecticides, mainly pyrethroids and organophosphates. However, the recent development of soybean aphid resistance to pyrethroid insecticides threatens the economic and environmental sustainability of soybean production.

With support from the Minnesota Soybean Research and Promotion Council, we have developed an efficient laboratory bioassay to assess the level of insecticide resistance in soybean aphid populations (Figure 1). Briefly, the interior surfaces of small glass vials are coated with a concentration of insecticide that should kill 99% of a population of aphids susceptible to insecticides. Soybean aphids collected from the field are then transferred to the vials and their survival is checked after 4 hours. If more aphids survive than expected, then we have an indication of resistance in a population. We have used these laboratory bioassays over the last two years to document pyrethroid (lambda-cyhalothrin and bifenthrin) resistance in soybean aphid populations from Minnesota, Manitoba, North Dakota, South Dakota and Iowa.

In response to the challenge posed by insecticide-resistant soybean aphids, we developed a set of recommendations for growers and agricultural professionals. First, treat fields only when needed. Doing so will reduce the selection pressure for further development of resistance. Fields should be scouted on a regular schedule and the economic threshold (250 aphids per plant) should be used to determine when to apply insecticides. Second, if a field needs to be treated, make sure the insecticide application is performed correctly (effective insecticide, proper nozzles, spray volume and pressure, and favorable environmental conditions). After insecticide applications, scout fields again after 3-5 days to ensure the product provided the level of control expected. Third, if a field needs to be retreated due to a failure, alternate to a different insecticide group for the follow-up application. For example, if a field was treated with a pyrethroid and a follow-up insecticide application is needed, then an insecticide from different insecticide group, such as an organophosphate, should be selected. These recommendations are explained in more detail a recent multi-state extension publication, https://www.ag.ndsu.edu/publications/crops/management-of-insecticide-resistant-soybean-aphids

Until aphid-resistant soybean varieties and other management tactics become more widely available, management of soybean aphid will continue to rely on scouting and threshold-based application of insecticides. There are few insecticide groups available (labeled) for management of soybean aphid. This short list of insecticide groups is under threat of getting even shorter due to development of pest resistance to insecticides and potential regulatory actions. The agricultural community must work together to preserve the effectiveness of and continued access to these products for protection of soybean and other crops from pests.

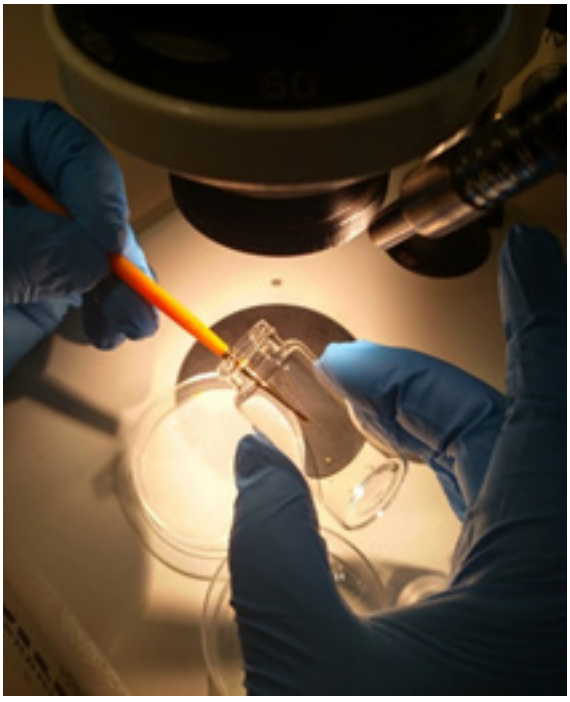

Fig. 1: Soybean aphids being transferred to an insecticide-treated vial for laboratory bioassay for assessing insecticide resistance.