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Occurrence and Distribution of *Aphis glycines* on Soybeans in Illinois in 2000 and Its Potential Control

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Fig. 1. *Aphis glycines* colonies on a soybean leaf.

During August of the 2000 growing season, *Aphis glycines* Matsumura, an aphid native to Asia, was found colonizing soybean plants in Illinois (Fig. 1) (1,2). Hundreds of aphids were observed on every leaflet on plants in some fields in northern Illinois. Within 3 weeks of the initial observation, *A. glycines* was found at lower population densities in most central and southern Illinois locations including the southernmost county in the state (Fig. 2). While conducting the aphid survey in Illinois, aphids were collected from about half the counties in the state. These collections will be used for molecular typing and virus transmission studies. By the end of the 2000 season, *A. glycines* was found in most states in the midwest, and coincidentally, it was reported for the first time in Australia (3).

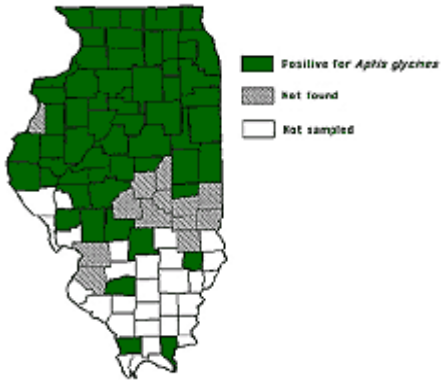

Fig. 2. Distribution of *Aphis glycines* in Illinois in 2000.

Fig. 3. Eggs of *Aphis glycines* on buds of *Rhamnus cathartica*.

In temperate regions, *A. glycines* has a complex life cycle involving two hosts. Sexual stages deposit eggs for overwintering on the primary host, *Rhamnus* spp. (buckthorn) (Fig. 3). In the spring, winged aphids fly from *Rhamnus* in search of soybean fields. On soybean plants, the aphid produces both wingless and winged adults, the latter contributing to geographic spread of the aphid. In the fall, winged individuals move back to *Rhamnus*. Both winged adults and eggs were observed on *R. cathartica* in the fall of 2000. In addition to *R. cathartica*, there are three native *Rhamnus* spp. and two introduced species that could potentially serve as overwintering hosts.

Many viruses present in the U.S. have the potential to be transmitted by *A. glycines* including *Soybean mosaic virus (*SMV*)*, one of the most common soybean viruses in Illinois. Our attempts to transmit SMV by *A. glycines* have been unsuccessful. However, not all strains of SMV are aphid-transmissible and further studies are underway to determine if different strains of SMV, as well as other soybean-infecting aphid-transmitted viruses, can be transmitted by *A. glycines*.

Natural enemies, including predators and entomophthoralean fungi, may be important in controlling *A. glycines*. High densities of lady bird beetles, including *Harmonia axyridis*, an exotic species from Asia, were observed in northern Illinois soybean fields. Observations and collections of *A. glycines* suggested that entomophthoralean fungi were causing localized epizootics. One aphid pathogenic fungus, *Pandora* sp., was isolated and is being further characterized.

Because *A. glycines* had not been previously documented in the U.S., no insecticides are registered in the U.S. for its control. An insecticide efficacy trial was established in a soybean field in Carroll County (northwestern Illinois) on August 26, 2000. At the start of the trial, there was an average of 45 aphids counted per leaflet. Plots were laid out in a randomized complete block with four replications. The treatments included two untreated controls and different rates of seven insecticides (Asana XL, Dimethoate 4EC, Lannate SP, Lorsban 4E, Penncap-M, Pounce 3.2EC, and Warrior T) registered for soybeans in the U.S. Aphids were counted at 3 and 10 days after applying treatments (DAT). The average density of aphids in the untreated control plots increased 2.7-fold by 3 DAT, but declined before 10 DAT as a possible result of natural dispersion, predators, or entomophthoralean fungi. Treatments of Dimethoate, Lannate, Lorsban, Penncap-M, and Warrior (0.025 lb a.i./acre) decreased aphids densities by more than 90% at 3 DAT. Additional studies are needed to determine the potential for limiting the growth of colonizing aphid populations and the effects of insecticides on nontarget organisms.

In addition to current research on *A. glycines*, further research is being planned to study the basic biology of the aphid including monitoring its movement, the impact it has on yields, its importance as a vector of soybean viruses, and potential management strategies.

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