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Development and Control of Soybean Aphid, *Aphis glycines*, in Heilongjiang Province

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The soybean aphid, *Aphis glycines* Matsumura (Homoptera: Aphididae), develops in the main soybean production areas in Heilongjiang Province, and is an important insect pest of soybeans. In the past two years, aphids developed earlier and infested more seriously.

Adult aphids and nymphs build up on top and tender leaves and young stems, and suck sap from soybean plants. Aphids cover all leaves and stems in heavy infestations. Soybean aphids can also feed on young pods. Serious infestation results in curled leaves, underdeveloped roots, yellow and stunted plants, reduced branches and pods, and decreased seed weights. Soybean plants will die if infested heavily in the seedling stage. Serious infestation by aphids can lead to 20-30% or over 50% yield reduction. Soybean aphids are also capable of transmitting soybean mosaic virus.

Soybean aphids overwinter on buds or in branch cracks as eggs in Heilongjiang Province. Once temperature goes up to 10℃ in the spring, fundatrices hatch from overwintering eggs, feed on sprouting buckthorn *Rhamnus* sp. and then reproduce 1-2 generations with thelytoky. When buckthorn begins to bloom, winged aphids develop on buckthorn, migrate to soybean fields and feed on soybean seedlings. The first generation developing from migrating aphids is apterous. Some aphids of the second generation become alatae and disperse resulting in patchy distribution in the fields. Winged aphids are usually visible after mid June in Heilongjiang Province. Increasing production of winged aphids results in aphid dispersal and migration in the fields. Aphid populations build up rapidly. After mid July, aphids produce a large number of alatae again and spread quickly resulting in rapidly increasing aphid density on each plant and serious damage if under suitable conditions. Normally from late July to August, aphid density decreases gradually because of soybean growing points ceasing to grow, higher temperature or heavier rain, and increasing natural enemies. From late August to early September, winged female sexuals develop and migrate to overwintering hosts and produce wingless viviparous females. Some aphids produce winged viviparous males on soybeans, which then migrate to the overwintering host. In mid to late September, female

and male aphids mate and lay overwintering eggs. Soybean aphids have strong capability of reproduction. Under suitable climatic conditions, nymphs will develop to adult aphids in 5 days, and about 15 generations can be developed in one year.

Soybean aphids develop earlier and have longer infestation period in some areas where buckthorn is widely distributed, such as Wuchang and Shangzhi. The number of overwintering eggs has a direct effect on aphid density in spring soybeans.

Development of soybean aphids is intensively related to climatic conditions. Overwintering eggs hatch, nymphs develop and adult aphids reproduce from late April to mid May. In this period, sufficient rain and well-grown buckthorn will lead to high survival and reproduction of aphids, whereas high mortality and low reproduction of aphids will result from insufficient rain or underdeveloped buckthorn. Soybean aphids peak from late June to early July. Aphid reproduction will benefit from high temperature and suitable humidity during this period. High temperature and humidity will be detrimental to soybean aphids. When mean temperature per 5 days is above 25℃ and relative humidity is up to 80%, a large number of aphids will die.

There are a number of natural enemies of soybean aphids. Increasing natural enemies will significantly depress aphid density. Common natural enemies include *Harmonia axyridis*, *Coccinella septempunctata*, *Hippodamia tredecimpunctata* and *Chrysopa septempunctata*.

Seed-coating chemicals can be used to prevent soybean aphids. The ratio of chemical to seeds is 1:75 by weight. Five percent Phorate granules (23 kg/ha) can also be applied with fertilizers when seeds are sown.

Chemical control is the main method to control soybean aphids in the fields. The following pesticides can be used: 10% wettable Imidacloprid powder, 200-300 g/ha, sprayed with water; 40% Dimethoate or Omethoate, 1.1-1.5 liter/ha, sprayed with water; 50% wettable Pirimicarb powder, 225-300 g/ha, sprayed with water; pyrethroid pesticides, 500 ml/ha, sprayed with water. All pesticides are sprayed with 450-600 liter water/ha.