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Development and Control

The English Grain Aphid on Wheat

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Five aphid species may infest wheat plants in Idaho. The need for control measures depends upon conditions for development of both aphid populations and wheat crops. The English grain aphid is the only one of these that commonly infests heads and is the species of major importance and the main subject of this report. However, the rose grass aphid can occur in mixed infestations with the English grain aphid, and when significant numbers are present, should be considered in control decisions. The rose grass aphid develops only on leaves and is, therefore, not as damaging as the English grain aphid.

Life Cycle

The English grain aphid feeds on many wild and cultivated grasses, but wheat is the favored host. The life cycle of the aphid is keyed to cereal crops. In the late fall, eggs are deposited on leaves of early planted winter cereals and wild grasses. The eggs can survive extreme winter conditions. Hatching occurs in about mid-April, and from that point on through the summer, all aphids are females that do not lay eggs but give birth to living young. Under favorable conditions, these nymphs can mature in about 6 or 7 days and give birth to 40 to 50 nymphs during a 7 to 14 day period. After several generations, winged forms are produced that fly short distances or up to several miles, depending upon how much their flight is aided by breezes. In this way, aphids disperse to spring planted wheat crops and late planted winter wheat crops and corn. In the fall, aphids from corn or grasses fly to and infest early planted cereals. After several generations, sexual forms are produced and eggs are deposited. Crops planted after about mid-October at low elevations in such places as western and northern Idaho and in late September to early October at higher elevations usually are not infested in the fall. By the time crops emerge in these locations, weather conditions are unfavorable for aphid flight and reproduction.

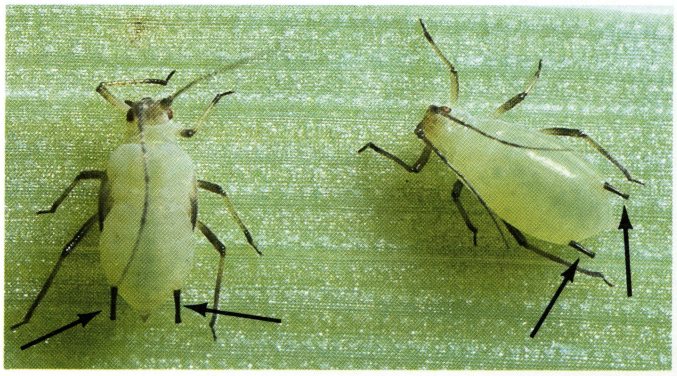

Fig. 1. Full grown, wingless English grain aphids on a wheat leaf. Arrows point to black cornicles that distinguish the English grain aphid from the rose grass aphid.

Identification

Fully grown, wingless English grain aphids vary in color from light to dark green and orange (Fig. 1). They are oblong in shape and about 1/8 inch long. The black cornicles (see arrow in Fig. 1) distinguish the English grain aphid from the rose grass aphid which is the other aphid on cereals with similar size, shape and color. Winged forms have a dark thorax and can be distinguished from other cereal infesting species by the alternating light and dark segments of their legs.

Population Development

Economic populations of English grain aphids develop more frequently on spring planted than winter planted wheat. The difference is at least partly because winter wheat is in an advanced stage of development when conditions for aphid development are most favorable. In a sense, winter wheat is able to ''outgrow'' the aphid infestations. Differences in population development that occurred in the 1983 season are typical (Fig. 2). In some years when aphid populations develop unusually early, winter wheat crops may require insecticide treatment.

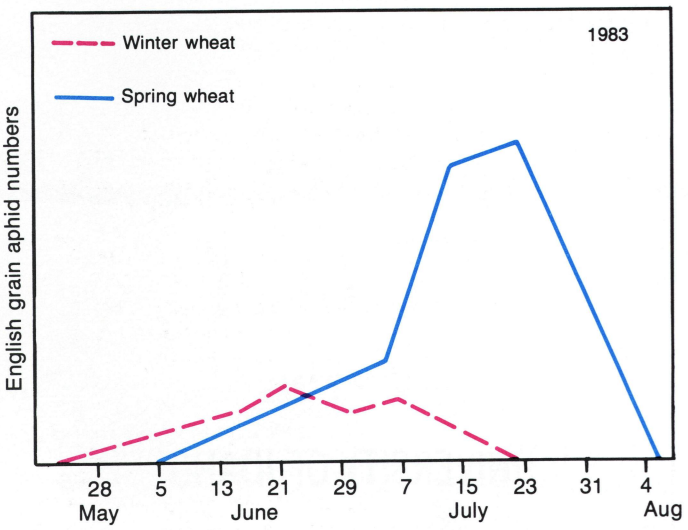

Fig. 2. Differences in English grain aphids population development in winter and spring wheats, 1983.

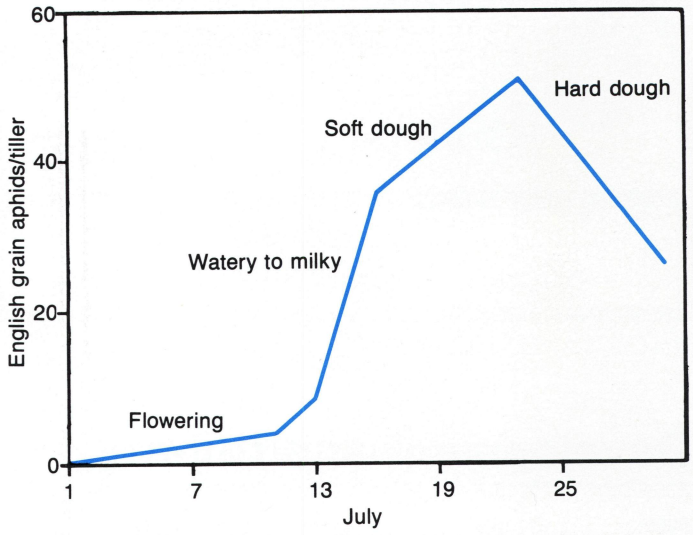

Fig. 3. Pattern of population development of English grain aphids, 1981.

Aphids usually reach detectable numbers in spring wheat during the last part of May or early June. Early infestations occur on the leaves, but heads are preferred for feeding, and as the plant matures, the aphids become concentrated on the heads. Since infestations are started by migrating winged aphids, highest numbers are usually on field margins. It is important, therefore, when making control decisions to include at least four samples of 10 tillers each from several parts of the field.

Development of the aphid population in relation to head development is important to damage potential. Heads are most susceptible to damage when infested early and almost immune when they reach the medium-to-hard dough stages. Consequently, early planted spring wheat is least susceptible, and late planted spring wheat is most susceptible to damage. As illustrated in Fig. 3, which shows the pattern of development in western Idaho in 1981, populations in wheat fields increase very rapidly about when first heads are emerging and decline suddenly as heads mature. At the peak of infestations, single heads may contain 200 or more aphids (Fig. 4). Aphids feed at the bases of individual developing kernels (Fig. 5) or on the main rachis that supports the kernels. Both of these sites are rich in nutrients destined for kernel production.

Various species of ladybird beetles, syrphid flies and occasionally other predators are often associated with cereal aphid infestations. Activity of these predators during early stages of population buildup may prevent aphid numbers from reaching economic threshold levels. However, when aphid populations are increasing rapidly during kernel development, predators cannot provide control, although they may reduce peak population levels.

Economic Levels and Control

The economic threshold level for insecticide treatments recommended for years in the Pacific Northwest was 25 aphids per tiller (essentially the head) before the dough stage. Our research has indicated that this threshold is too high for Idaho conditions because nutrients taken from the plants to produce the aphid infestation (more than 20 millon aphids per acre) are lost, and the wheat yield potential is reduced.

Our studies on aphid population development show that treatments are more effective if applied at an earlier stage of wheat head development. An insecticide treatment should be applied when two to four aphids per head or leaves of a tiller at the beginning of flowering are present, when eight aphids occur during the early stages of

Fig. 4. These wheat heads contain large populations of green to orange colored English grain aphids.

Fig. 5. Aphids feed at the base of developing wheat kernels.

kernel development (water stage) or when more than 10 to 20 aphids are counted during the milky ripe stage of development. When the infestation consists mainly of English grain aphids, the lower threshold levels for the particular stage of head development should be used while the higher levels would apply when the rose grass aphid is predominant. Similar adjustments of the threshold levels should be made for other proportions of the two species in mixed infestations. Treatments are not recommended during the medium or hard dough stage of head development.

Chemical Control

Systemic insecticides applied at planting have little or no effect upon aphids feeding in the heads of grain because the insecticide is no longer effective by the time the heads develop. The decision to treat should be made at flowering or at the water stage of the kernels and before the milk stage. Research in Idaho has demonstrated that if the grower waits until the milk stage to decide to treat, he could lose 3 to 5 percent of yield potential compared to a treatment at flowering. If the grower waits until the early dough stage, he could lose 5 to 10 percent of yield potential.

Control

Insecticide	Rate (lb active ingredient)	Days between application and harvest	Restrictions
Di-Syston EC	.75 lb	30 days	Do not graze or greenchop for forage. A second application can be made within 30 days after the first spring application
Di-Syston 15G	1 lb	30 days	Apply granules postemergence as a broadcast treatment when aphids first appear. Sprinkle irrigate granules into the soil after application. Do not graze or greenchop treated fields.
Cygon	.25-.375 lb	60 days	Do not graze within 14 days.
methyl parathion	.25-.75 lb	15 days	
parathion	.25 lb	15 days	
malathion	1.25 lb	7 days	
Systox	.125-.25 lb	45 days	Do not graze treated fields. Do not apply more than twice per season nor within 14 days of previous application.
Lannate	.225-0.45 lb	7 days	10 days for grazing or feeding.
Penncap-M	.25-.5 lb	15 days	Harvest and grazing.

Pesticide Residues

These outlines for use are based on the best information currently available for each chemical listed. If followed carefully, residues should not exceed the tolerance established for any particular chemical. To avoid excessive residues, follow suggestions carefully with respect to dosage levels, number of applications and minimum interval between application and reentry or harvest.

Trade Names

To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

About the Authors

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