feeding injury has also been observed in Merion bluegrass but little or no damage has been observed in rye, blue, or bent grasses or in fine fescues bordering heavily infested orchardgrass fields. Wheat following heavily infested orchardgrass can also be damaged but billbugs are unable to complete development on this host. Eggs may be deposited on non-host plants, but larvae fail to complete their life cycle on all but orchardgrass.

Control

Biological - A fungus, Beauveria sp., is present in a small percentage of late maturing larvae and adults collected in winter/and early spring, but is not present in these stages during the summer. Attempts to increase the incidence of disease have been unsuccessful to date. Chemical - Larval feeding damage during the summer has little or no affect on yield of the current seed crop because orchardgrass is near maturity by July. Larval control is difficult to achieve since most of the development is completed within stems and crowns. Penetration or translocation of insecticides is adversely affected by the dry, dormant condition of orchardgrass during most of the larval period.

When adults are active and feeding in April an application of Diazinon granules at the rate of 3 lbs. active ingredient per acre will control the pest. Applications should be made during a period of good weather in mid-April but periods of heavy rainfall should be avoided. Insecticide granules mixed with fertilizer are not recommended since granule sizes may vary and the dosage will not be evenly spread over the field.

Notice - Applications of most persistent chlorinated hydrocarbons are not registered for use on grass seed crops and are, therefore, illegal. Residues can be detected in straw, seed, and seed screenings. The resulting residues in plant materials are magnified and easily detected in livestock tissues if used as feed.

Prepared by James A. Kamm, USDA, ARS; and Robert R. Robinson, Extension Entomologist, Oregon State University.
Billbugs have been a problem in Oregon orchardgrass fields since 1965. Serious feeding damage caused by billbug larvae results in failing stands and reduced yields. The outbreak is correlated with the increased acreage planted in the Willamette Valley from 1957 to 1965. Orchardgrass is an ideal host for this pest since both adults and larvae find it suitable for development.

**Life History**

Adult billbugs, snout beetles or weevils (Fig. 1), overwinter in the top 2 to 4 inches of plant debris on the soil surface or in crowns of orchardgrass. Adult feeding does not begin until March, even though green plant material is available during the winter months. Adults can be found at the base of leaves and stems feeding in a vertical position with their heads pointed downward. Feeding holes are later seen 6 to 10 inches above crowns as leaves grow and expand (Fig. 2).

Adults with well-developed wings make short flights 2 to 3 feet above ground. Flight normally occurs in the late afternoon during May and October. Walking is the usual method of dispersal as reflected by an infestation spreading from a localized area throughout a field in the course of a few years. Adult activity increases sharply in mid-April and remains high until mid-June. By mid-July adults are very scarce.

Mating starts in early May and by mid-June most eggs have been deposited in orchardgrass. Females usually deposit 1 or 2, milky white, smooth, glossy, oval eggs (Fig. 3) in stems and crowns just above the roots. Many eggs are also deposited at the base of plants between stems or inside leaf sheaths. The female produces an average of 16 eggs during her lifetime.

Eggs hatch in 1 to 3 weeks depending on temperature. Larvae (Fig. 4) which develop from eggs deposited in stems, feed within the stem until stem size restricts their growth. Exit holes are then chewed through the stems and development is completed by feeding on the roots in the crown region. Larvae from eggs laid on leaf sheaths feed briefly on leaves and stems prior to moving to the roots.

Pupation, the resting stage between larva and adult (Fig. 4), starts in early August in plant crowns or several inches below the feeding zone in the soil. New adults from these pupae begin emerging in mid-August and most have emerged by mid-October. Large numbers of adults can be observed in crowns on warm fall days.

Field burning stimulates some adults to seek winter shelter in plant debris along fence rows or other areas covered by brush. Some adults burrow into charred crowns and others remain below ground for winter protection.

**Damage**

Larval damage during July and August affects the next season's seed crop more than the current crop because larval feeding weakens or destroys the crowns (Fig. 5). Root pruning can be so severe by the end of August that crowns can be completely separated from roots with a slight tug. The severity of larval feeding damage may cause either part or all of the plant to die. Failing stands are not uncommon and yields have been reduced 50% or more in some fields.

Adults can feed on many species of grass plants but larvae are more host specific. Development can be completed on Potomac, Sterling, Pennlate and Latar varieties of orchardgrass and old bent grass lawns. Larval...
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