

White-fringed Beetles, Graphognathus spp.

(Coleoptera: Curculionidae)<sup>1</sup>

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**INTRODUCTION:** Graphognathus leuocoloma leuocoloma (Boheman), the white-fringed beetle, was first collected in North America near Svea, Florida in 1936 (Buchanan 1939). This species and three others (G. minor (Buchanan), G. peregrinus (Buchanan), G. fecundus Buchanan) comprise the white-fringed beetle complex in North America (Buchanan 1947, Warner 1975). White-fringed beetles are considered serious pests of many agricultural crops (Young et al. 1950) and have recently become pests of young pines planted on converted croplands in the South.

**DESCRIPTION:** Adult female (males unknown) light to dark gray or brown, with a lighter band along the outer margins of the wing covers, and two paler longitudinal lines on each side of the thorax and head, one above and one below the eye; length ca. 12 mm (Fig. 1). Flightless; underwings rudimentary, inner margins of outer wings fused together. Egg ca. 0.9 mm long X 0.6 mm wide; newly laid egg white, turning light yellow after 4-5 days. Mature larva ca. 12 mm long; creamy yellowish-white; C-shaped with a strong thoracic swelling (Fig. 2). Pupa ca. 12 mm long; color creamy-white (Buchanan 1939, Young et al. 1950, Anderson 1938).

**DISTRIBUTION:** Originally from South America (Argentina, Peru, Chile, Uruguay), white-fringed beetles are now widely distributed throughout the southern United States (AL, AK, FL, GA, LA, MO, MS, NC, SC, TN, TX, VA) and occur in New Zealand (Buchanan 1939, 1947; Warner 1975).

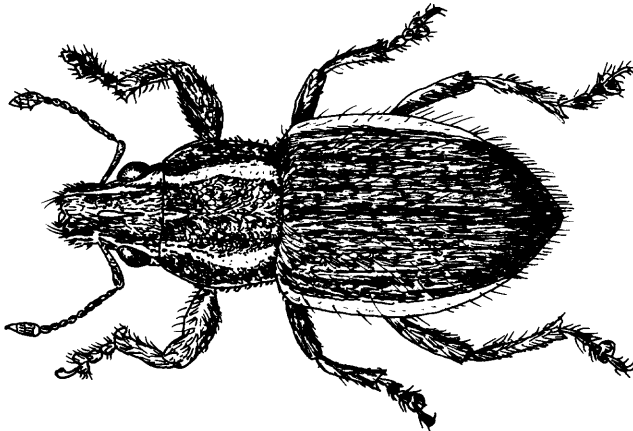


Fig. 1. Adult female white-fringed beetle, Graphognathus sp. (after Buchanan 1939).

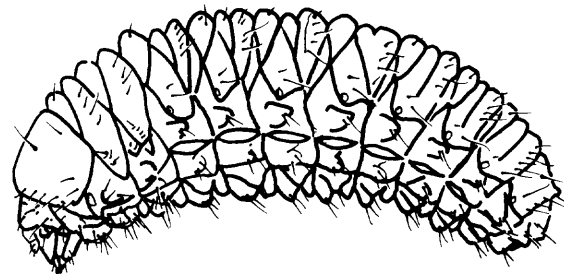


Fig. 2. Larva of a white-fringed beetle, Graphognathus sp. (after Anderson 1938).

**HOST PLANTS:** White-fringed beetles have been associated with over 385 plant species. The most common hosts are cotton, peanuts, okra, velvetbeans, soybeans, cowpeas, sweet potatoes, beans, and peas (Young et al. 1950; Johnson and Tappan 1987). Adults seem to prefer plants with large, broad, smooth leaves; larvae feed on agricrop plant roots, newly germinated acorns and nuts, and the roots of woody plants (e.g., peach, pecan, tung, willow) (Young et al. 1950) and pines.

**BIOLOGY:** Adult beetles (univoltine) emerge from the soil from May to October and feed on foliage. Oviposition (parthenogenetic reproduction) occurs 5-25 days after emergence. Egg masses (11-14 eggs) are laid on plant stems, roots, soil, and where they contact the soil onto hay, firewood, lumber, and farm tools and machinery. Eggs hatch 11-100+ days after oviposition (summer eggs average 17 days; winter eggs average 100 days). Larvae feed on roots, tubers, and underground stems as well as dead plant material and complete their development in the soil. White-fringed beetles overwinter as larvae.

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Pupation occurs from late April to late July in cells constructed by the larvae; however, some larvae spend a second year feeding on plants in the soil before they pupate. Most pupal cells are 5-15 cm below the soil surface; however, cells have been found at a depth of 36 cm. In the summer months, the pupal stage lasts ca. 13 days; in cooler months it is longer (Young et al. 1950).

**SURVEY AND DETECTION:** The results of root feeding by white-fringed beetle larvae can range from scattered areas of a few dead or dying plants within a field to nearly all plants being damaged. Examine roots of affected plants: larval feeding appears as small to large amounts of decortication or partial to complete removal of tap roots(s), below-ground portions of the stem, and some lateral roots. Sample for larvae during the months of August through May by removing ca. 0.3 m<sup>3</sup>/soil (ca. 15 cm deep) and sifting through soil sieves 8, 16, 24, 40-mesh/2.5 cm screens).

**CONTROL:** Considerable federal and state control efforts have been directed toward suppression of white-fringed beetles. Quarantine regulations were enacted soon after discovery of the beetles, yet the pests continued to spread. In 1940, ca. 409 acres of crops were damaged by white-fringed beetles in Florida, and by 1944 over 4,000 acres were damaged (Brown 1951). Various insecticides have been employed or tested to control white-fringed beetles (e.g., DDT (Brown 1951), carbaryl (Gross and Harlan 1975), diflubenzuron (Henzell et al. 1979), cryolite (Brown 1951), dieldrin, aldrin, and chlordane (Boutwell and Watson 1978)). The IFAS Insect Control Guide (Johnson and Tappan 1987) lists only SEVIN 4 EC (XLR) for control of adult beetles. Cultural practices include: (1) planting oats or other small grains, which are much less preferred by the beetles due to their fibrous root systems; (2) limiting acreage planted to summer legumes (e.g., peanuts, soybeans) and placing leguminous crops on a 3-4 yr rotation. The persistence of white-fringed beetle populations in an area of land is noteworthy and speaks for the difficulty of achieving control. In some parts of Florida, pine plantations on converted agricrop land (particularly with soybean, peanut, cotton cropping histories) have failed, not only on land with no fallow period between agricrop and pine, but also up to 3-4 years after the last agricrop planting.

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