

EXCLUSION BARRIERS FOR MANAGEMENT OF BLACK VINE WEEVIL, *OTIORHYNCHUS SULCATUS*, IN FIRST YEAR STRAWBERRIES



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Introduction

Black vine weevil (BVW), *Otiorhynchus sulcatus* (F), thought to be a native of northern Europe but known in North America since 1835, feeds on a tremendously varied number of different plant species, including strawberry. While adults (Figure 1b), feeding mainly at night, cut characteristic notches in leaf margins (Figure 2a), economic injury is due to feeding by larvae (Figure 1a) on roots (Figure 2b). Small larvae feed mainly on smaller roots while larger larvae move to larger roots which may be girdled when BVW populations are high. Severely damaged plants wilt and may even die, thinning strawberry stands (Figure 2c) and ultimately reducing yields. In Ontario, the profitable life-span of strawberry fields heavily infested with BVW may decline from 3-4 years to two years or less.

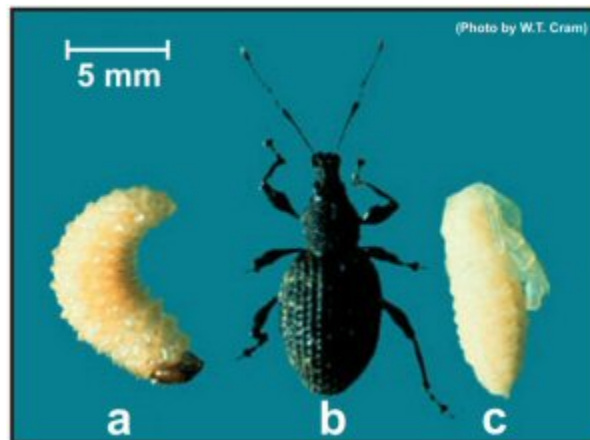


Figure 1: Life stages of black vine weevil: a - larvae; b - adult; c - pupa



Figure 2: Strawberry injury by black vine weevil: a - notches cut in leaves by adults; b - feeding by large larva on crown; c - plant stand in left rows reduced by larval feeding; beneficial nematodes applied to right rows previous year.

Objective

Adult BVW cannot fly but are very active walkers, moving readily from hedgerows or infested fields into newly planted strawberries. During the summer of 2005, a research project initiated by Agriculture and Agri-Food Canada under the Risk Reduction Strategies Initiative investigated the potential of exclusion barriers to reduce BVW immigration into newly planted fields in Ontario.

Methods

In early July exclusion barriers of two designs (Figure 3a) were established near Campbellville, ON, between an infested plantation scheduled for destruction and a block of strawberries (cv. Jewel) planted in May 2005. "Vernon" barriers consisted of linked 3 m lengths of extruded black plastic designed to capture BVW. "Sheet" barriers consisted of a 30 cm sheet of plastic (Polytarp - supersix®) with one edge buried 5-10 cm in the soil and the remainder supported vertically by stapling to 2 x 4.5 cm x 50 cm tall wooden stakes spaced 2 m apart down the length of the barrier. Collection pails (4 L ice cream pails), containing 2 L of saturated saline + 4 ml liquid soap, were located at both ends of each barrier (Figure 3b). Captured BVW were collected and counted each week (Figure 3c).



Figure 3: Exclusion barriers in field: a - "Vernon" barrier in background; "Sheet" barrier in foreground; b - collection pails; c - collecting captured insects.

Observations

Not until the 3rd collection after disking were significant numbers of BVW captured moving into the new strawberry planting. BVW numbers thereafter rose steadily until mid Sept. (Figure 4). By 19 Sept a total of 737 adult BVW had been collected moving around the "Sheet" barriers, an average of 20 BVW/m barrier. "Vernon" barriers were not as effective as "Sheet" barriers and tended to warp and lift from the soil due to solar heating.

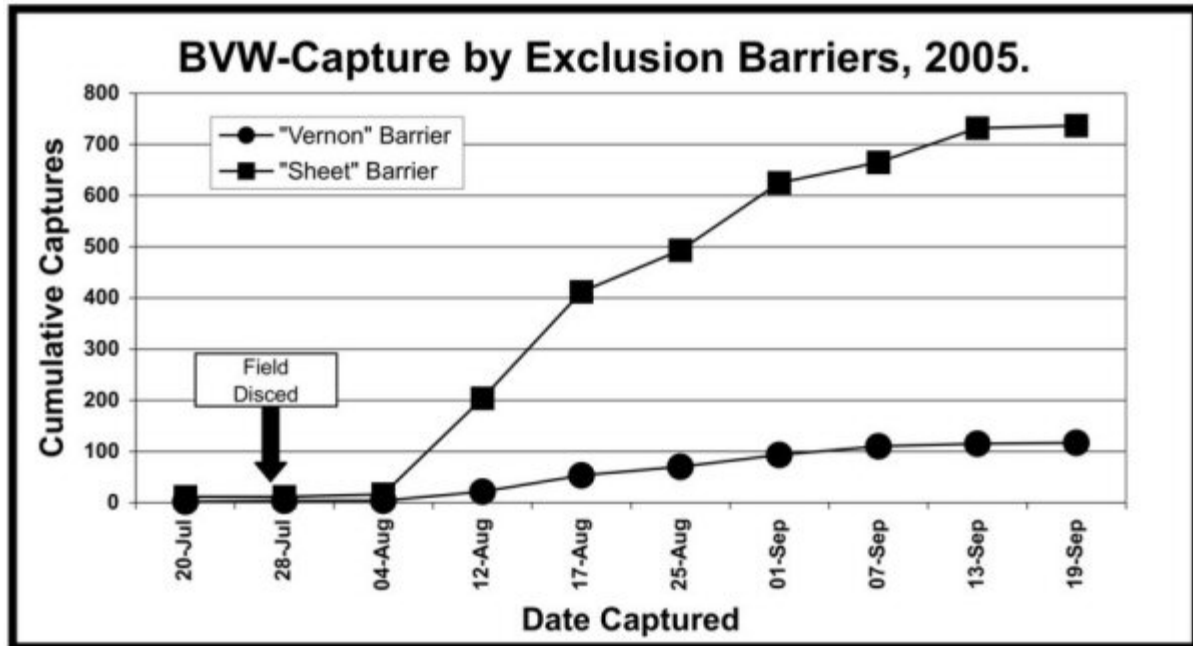


Figure 4: Cumulative capture of immigrating, adult black vine weevils by exclusion barriers, Campbellville, ON 2005.

Recommendation

Growers unable to plant new blocks of strawberries >500 m from a planting heavily infested with BVW should establish and maintain a continuous "Sheet" barrier between the infested field and the new block (Figure 5). While all immigrating BVW will not be excluded from the new block, each intercepted BVW represents a reduction of as many as 500 eggs in the new plantation.