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MULCH TYPES AFFECT GROUND BEETLE (CARABIDAE) ABUNDANCE AND SPECIES COMPOSITION IN HIGHBUSH BLUEBERRIES

Interim Research Report E2009-44

BACKGROUND

The importance of ground beetles (Coleoptera: Carabidae) as biological control agents in healthy, diverse agroecosystems is becoming readily apparent (Kromp, 1999). Many ground beetles are significant predators of common pests in all types of crops. Sensitivity of ground beetles to human practices in agroecosystems, such as pesticide use and cultivation, may limit biological control effectiveness. However, increased natural habitat and food sources through well-managed hedgerows and shelterbelts as well as raised earth 'beetle banks' can enhance ground beetle diversity and abundance (Holland and Luff 2000).

Highbush blueberries (*Vaccinium corymbosum* L.) benefit from thick mulching; pine needles are effective at inhibiting weed growth and other composts increase moisture retention and fertility. It is unknown how various mulches and composts affect ground beetle diversity and abundance.

RESEARCH OBJECTIVE

Will ground beetles be affected by different mulches and composts in an organic highbush blueberry field?

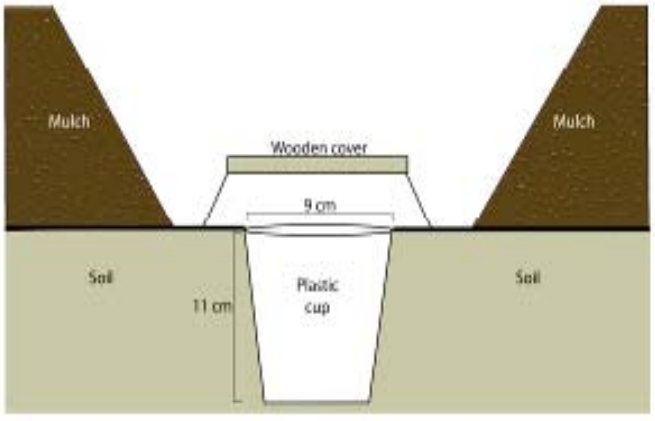

Figure 1: Placement of a plastic cup and wooden cover as a 'pitfall trap' in 20 cm thick mulch. Mulch angle not greater than 45°.

METHODS

On June 14, 2007 mulches were thickly applied by-hand (20 cm depth) in small plots (4.5 x 1.5 m) to a single row in an organic highbush blueberry field in the Annapolis Valley, near Kentville, NS. Plots were arranged in a randomized complete block design with four replications; each plot was at least 10 m apart with 25 m between replications. Mulches were pine needles (uncomposted, from Sherwood Forest Campground, Coldbrook NS), Bowater (composted biosolids from Liverpool, NS), farm (composted sawdust and horse manure from Nova Agri Inc.). There was an unmulched plot for comparison purposes.

'Pitfall traps' were plastic cups (9 cm top diameter x 11 cm height) sunk into ground with rims flush to soil surface. Cups were partially filled with water, salt (preservative), and dish-soap (surfactant). In mulches, mulch was removed around the cup (Fig.1). Traps had wooden covers and in 2008 were protected from rodents and birds with hardware cloth cages. Traps captured beetles for five, one-week periods from July to September in 2007 and 2008. Captured beetles were saved and identified to species (final species count yet to be determined for 2008).

Figure 2: Clockwise from top-left: unmulched Control, Pine needle mulch, Bowater compost mulch, and Farm compost mulch.

RESULTS AND CONCLUSIONS

In 2007, 486 beetles encompassing 31 species, were captured, while 701 beetles were captured in 2008. *Pterostichus melanarius* (Illiger) made up 35.8% of the total in 2007 and 45.3% of the total in 2008 of all beetle captures. *Harpalus pensylvanicus* (DeGeer) was 25.7% of the total in 2007 and 17.7% of the total in 2008 of all beetle captures.

Pine Needles significantly reduced captures of all Carabidae in 2007 compared to control plots. Yet, in 2008 fewer captures were not significant compared to control plots.

Bowater mulch significantly reduced captures of all Carabidae in 2007, but not in 2008 when compared to control plots. Captures of *H. pensylvanicus* were significantly increased in Bowater mulch compared to control, pine needle, and farm mulched plots in 2008.

Farm mulch did not significantly alter captures of all Carabidae in 2007 or 2008 compared to controls, but captures were significantly greater in both years compared to pine needle mulch.

P. melanarius captures were significantly greater in farm mulch compared to all other mulches in 2008 and compared to Bowater mulch in 2007.

BOTTOM LINE...

Small mulch plots indicate that ground beetles avoid pine needles and may prefer Bowater biosolids or composted manure/sawdust compared to unmulched plots. Such a preference may be especially true for *Pterostichus melanarius* and *Harpalus pensylvanicus*, the two most abundant species in this study.

CREDITS

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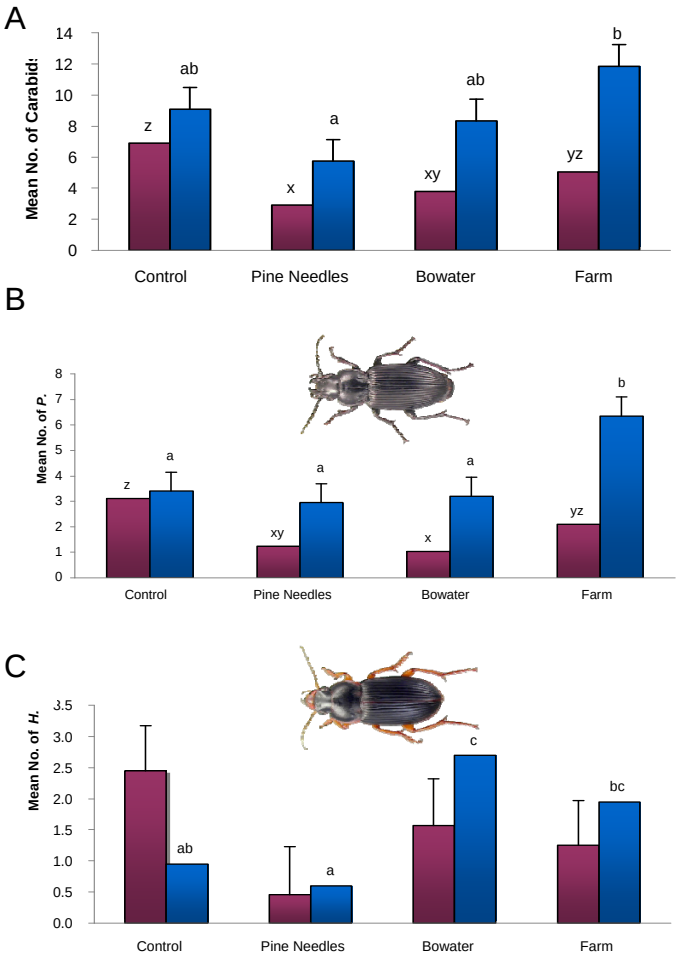

Figure 3: Number of captures for A.) all Carabidae, B.) *Pterostichus melanarius* (Illiger), and C.) *Harpalus pensylvanicus* (DeGeer) in pitfall traps placed in small mulch plots during five, one week periods in July-September 2007 (purple) and 2008 (blue) at an organic highbush blueberry field near Kentville, NS. Mulches were uncomposted pine needles, composted Bowater biosolids, composted farm sawdust/horse manure mulch, and an unmulched control. Significant differences between captures of beetles in mulches for each year are indicated by different letters above mean.

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