Effects of Different Living Mulches on Weed Control and Biodiversity of Ground Beetles in a High-density Apple Orchard

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Introduction

- Using living mulch as a part of orchard floor management in fruit tree production aims to be more sustainable in weed suppression than using non-biodegradable plastic mulch or applying chemicals.
- Living mulch can effectively attract beneficial insects like ground beetles.

Objectives

- Evaluate the influence of living mulches on weed suppression and ground beetle biodiversity in a high-density apple orchard.

Methods

- Location: East field of KPU Farm, Richmond, BC
- Orchard layout: 60 apple trees in total, consisting of 4 varieties (Gala, Empire, Sunrise, Fuji), 15 trees per variety, were planted in an 80-meter row at 1.25-meter spacing on April 24 and 26, 2023.
- Design: Randomized Complete Block Design with 4 replicates and 5 treatments.
    I. Control – Bare
    II. Bark Mulch
    III. Alyssum
    IV. Micro clover
    V. Nasturtium
- Plot size: 2 x 4 m
- Dependent variables: Ground beetle abundance, Shannon Index of biodiversity, weed coverage, ground cover (%).

Alyssum living mulch suppresses weeds during orchard establishment but does not affect ground beetle biodiversity.

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Results

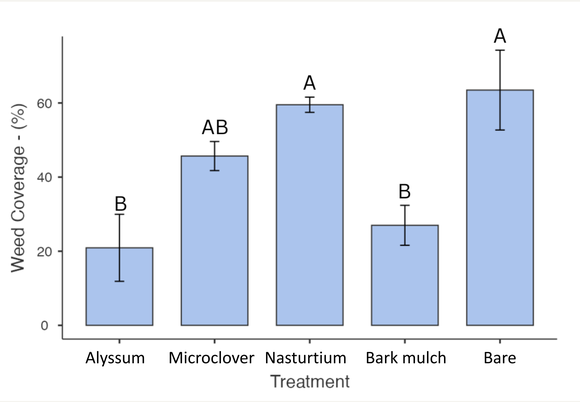

Figure 1. Weed cover by mulch type, early in the living mulch establishment phase. Error bars denote standard error. Bars labelled with the same letter do not differ significantly (Tukey test, α = 0.05).

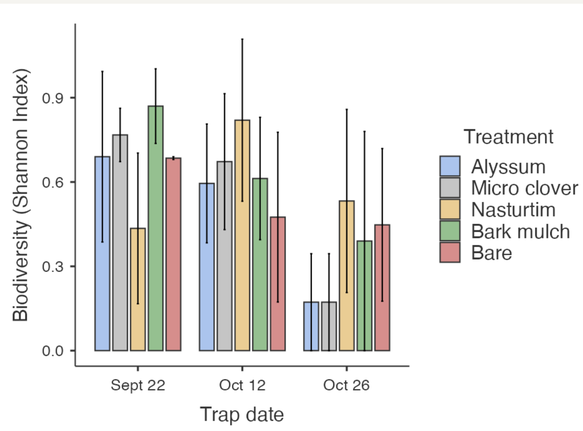

Figure 2. Biodiversity of ground beetles trapped in pitfall traps, according to Shannon Index. Means grouped by trap collection date and mulch type. Error bars denote standard error. No significant differences detected among treatments (α = 0.05).

Conclusion

- Alyssum and bark mulch can effectively suppress weed growth in the early stages of orchard establishment.
- Different living mulch types had no significant effect on ground beetle biodiversity.