



# Bringing Home the Bacon: Flash-grazing Hogs for Post-harvest Organic Orchard Floor Management



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## Introduction



Prior to the industrialization of agriculture, hogs were used for weed and pest management in fruit orchards. Organic tree fruit growers are rediscovering the benefits hogs bring to their orchards. Our objective was to determine the impacts of post-harvest flash-grazed hogs in cherries, apples, and pears. Post-harvest timing allows grazing in accordance with GAP and NOP standards.

### We expected hogs to reduce:

- Left over fruit on the orchard floor
- Pest insect and diseases harbored by left over fruit
- Weeds

## Methods

We conducted the study in organic cherry, pear, and apple orchards in Leelanau Co., MI. There were six grazed and six ungrazed plots in the cherries and pears, and three grazed and three ungrazed in the apples. Plots (paddocks) were 24.7 x 24.7m (81'), 0.06 ha (0.15 acre).

Hog plots were fenced with electric polyrope, 1.22m (48") step-in poly fence posts, and 1.83m (6') metal t-posts at the corners. The fence of each plot was electrified by a Zareba 6-volt solar electric fence controller.

Twelve Yorkshire piglets were bought in May 2010, trained to electric fencing, and raised on pasture until post-harvest. Their diet was supplemented with a grain mixture. The hogs were kept as a single group and rotated through the hog plots; they spent 2 d in each hog plot. They were about 72.6 kg (160 lb) when introduced to the orchards. Beginning date for hog rotations were: Cherry-July 28, 2010; Pears-August 11, 2010; and Apple-August 28, 2010.

We collected ground cover readings from three 20 m (65.6') transects at 1 m intervals using a Daubenmire frame, for total of 20 quadrats per transect. We collected fruit from four randomly selected quadrats along each transect to determine biomass. The fruit was also placed over vermiculite in sealed pans to collect any emerging insects. Insects were identified and counted. All measurements were made both before and after hog grazing events. Data analyzed with paired t-tests.



Figure 1: Electric rope fencing

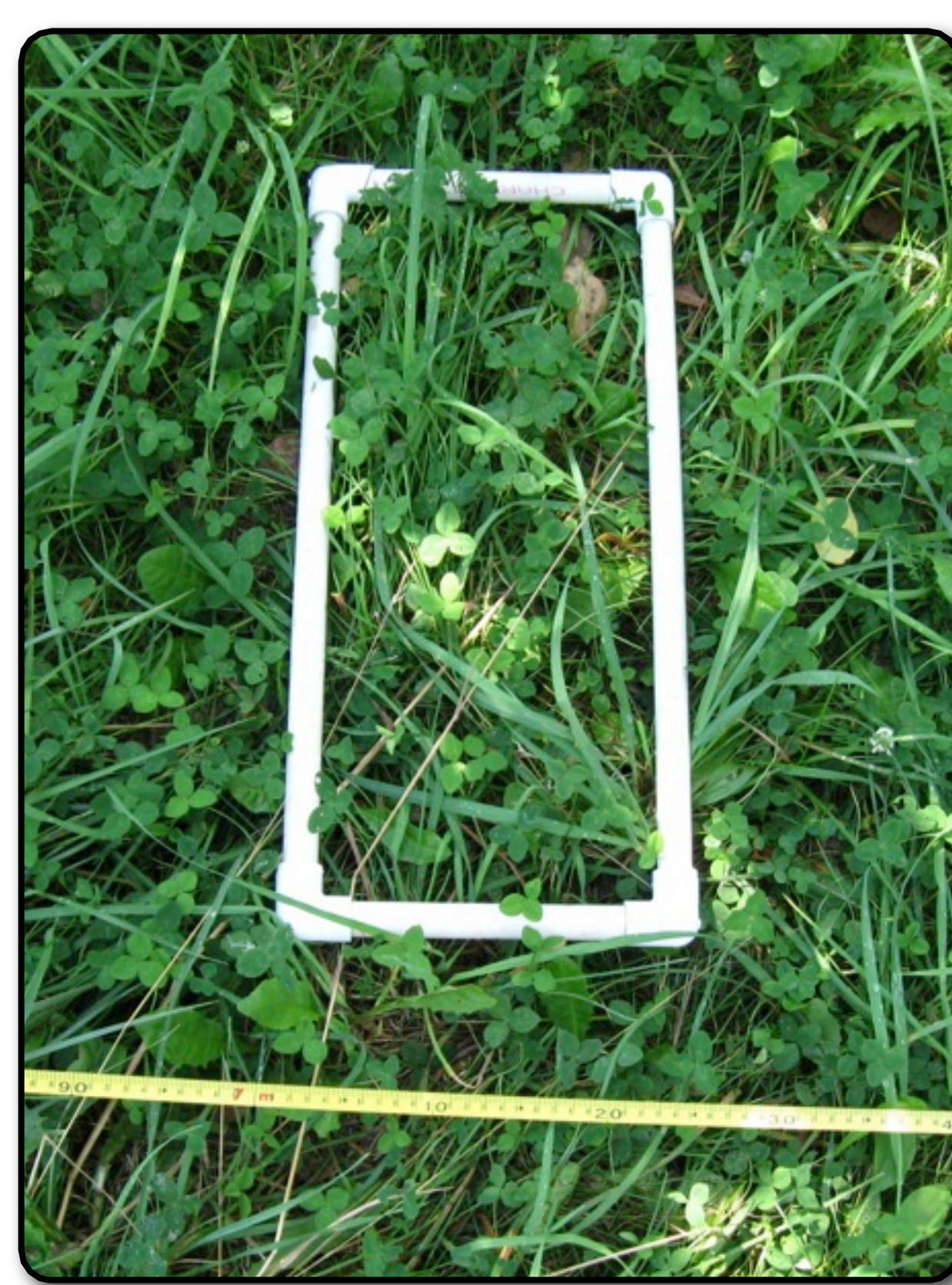


Figure 2: PVC Daubenmire frame and tape measure along transect

## Cherries

### Change in Percentage Ground Cover in Cherry Orchard

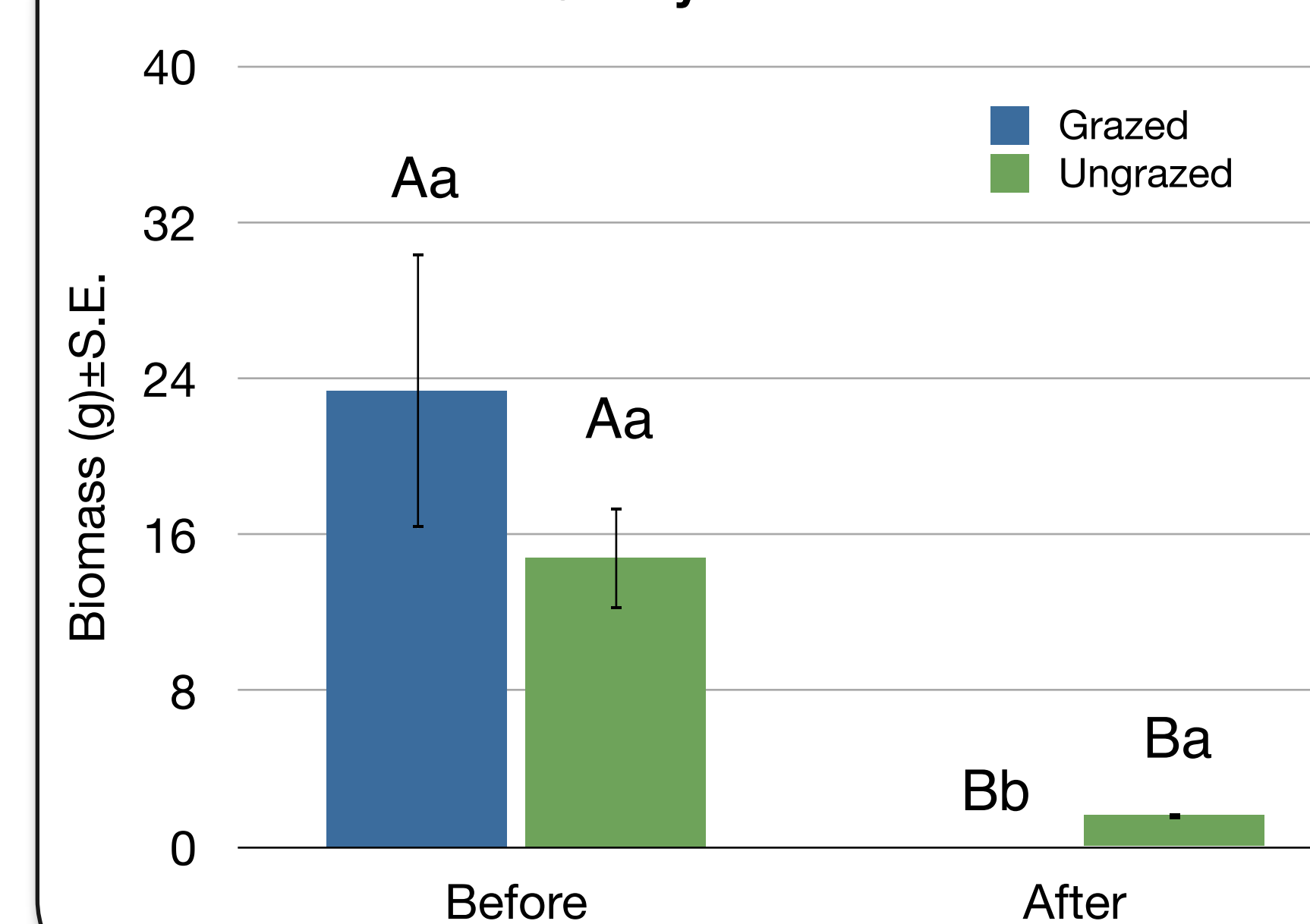


- An average of 61 non-pest beetles (all life stages) was found in fruit from all plots before hogs, and no insects were found in dried fruit from control plots after hogs. The beetles were common staphylinid and dermestid detritivores.

**Figure 3:** Change in ground cover percentages in cherry hog and control plots before and after the hogs grazed.

Hogs significantly increased the amount of bare ground and significantly decreased grass. In control plots, forbs increased and grass decreased.

### Cherry Fruit Biomass



**Figure 4:** The wet biomass of fruit in cherry hog and control plots before and after hogs grazed. Hogs completely removed all fruit in experimental plots. Fruit biomass decreased greatly in control plots as well due to decay and possibly insect consumption.



## Pears

### Change in Percent Ground Cover in Pear Orchard

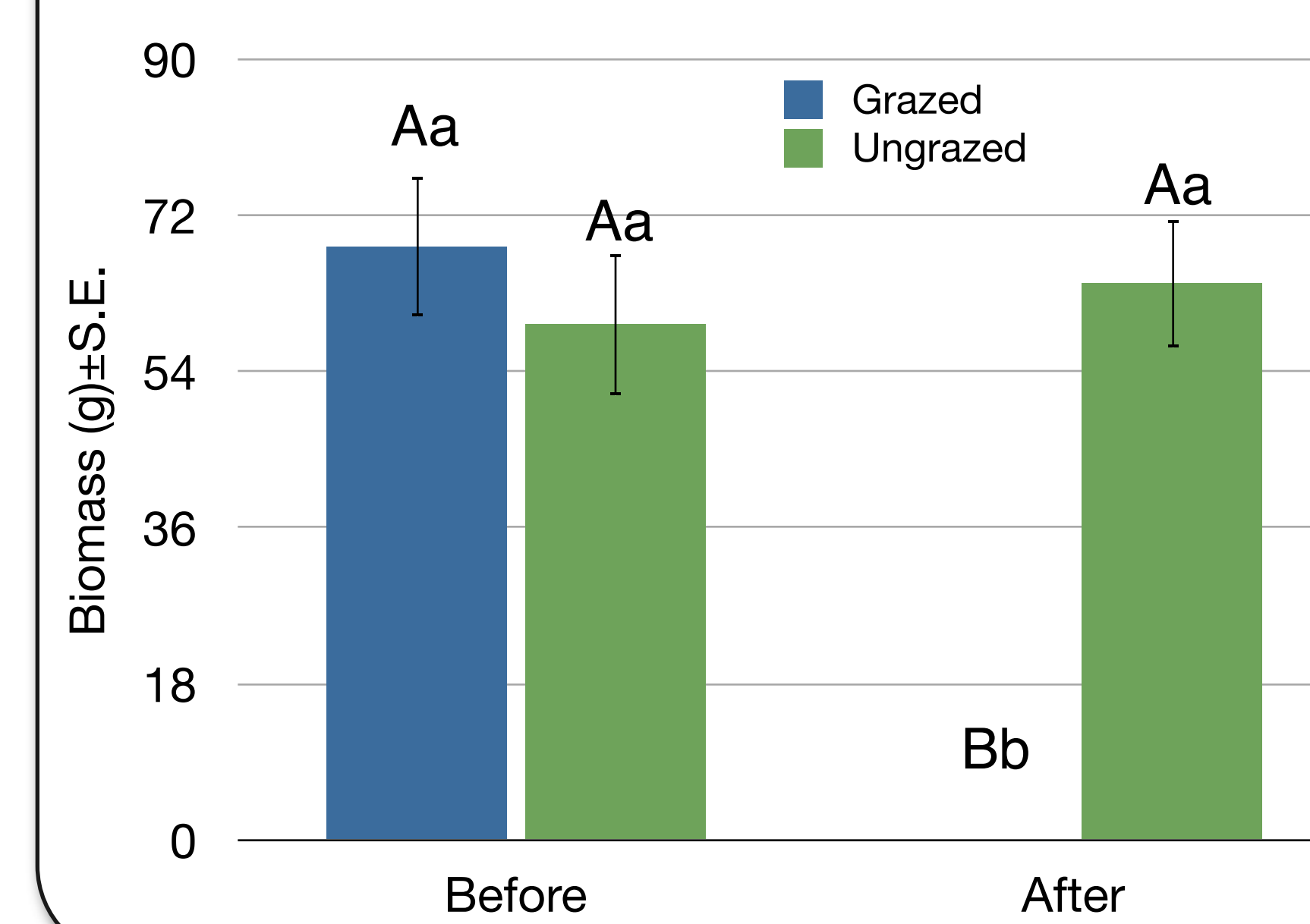


- An average of 4 Oriental Fruit Moth and 1 Codling Moth were found in fruit from all plots before hogs, and an average of 3 OFM and no CM were found in fruit from control plots after hogs. Staphylinid and dermestid beetles were also found in all plots at similar levels found in cherries.

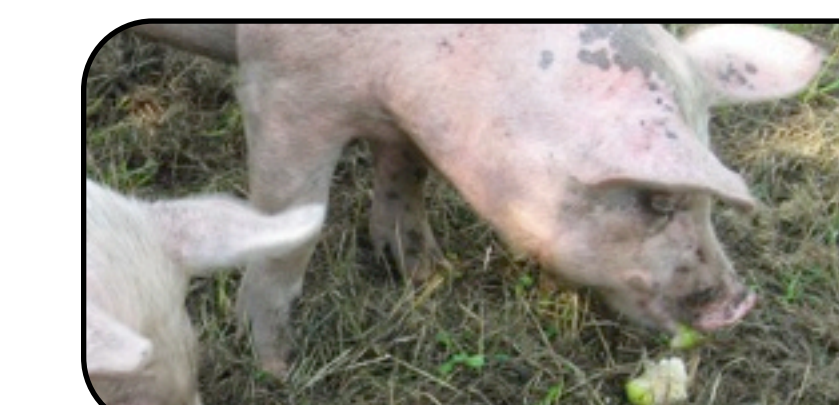
**Figure 5:** The change in ground cover percentages in pear hog and control plots before and after the hogs grazed.

Hogs significantly increased the amount of bare ground and significantly decreased grass. In control plots, forbs increased and grass decreased.

### Pear Fruit Biomass



**Figure 6:** The wet biomass of fruit in pear hog and control plots before and after hogs grazed. Hogs completely removed all fruit in experimental plots. Fruit biomass remained unchanged in control plots.



## Apples

### Change in Percent Ground Cover in Apple Orchard

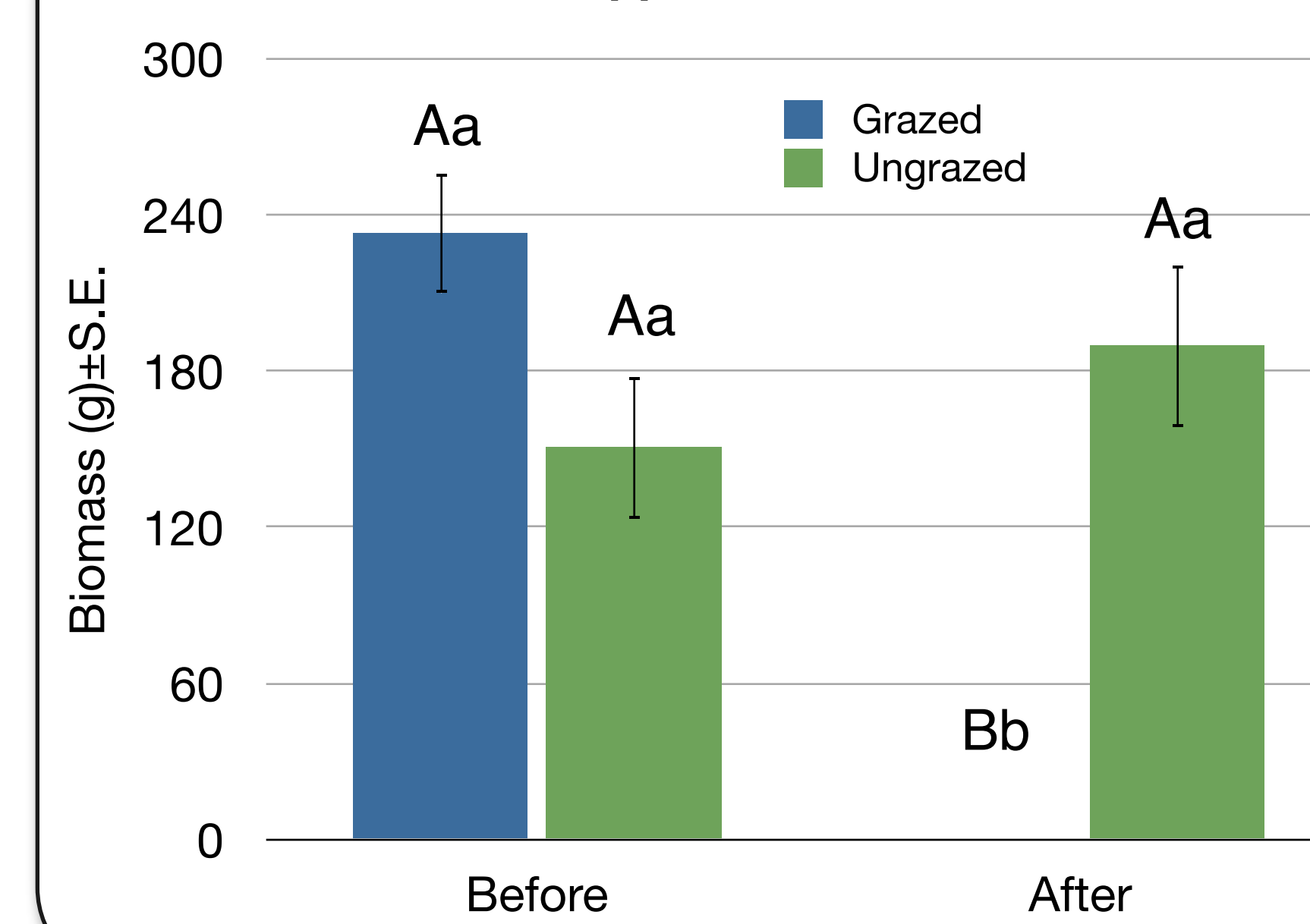


- An average of 6 Oriental Fruit Moth and 1 Codling Moth were found in fruit from all plots before hogs, and an average of 4 OFM and no CM were found in fruit from control plots after hogs. Staphylinid and dermestid beetles were also found in all plots at similar levels found in cherries.

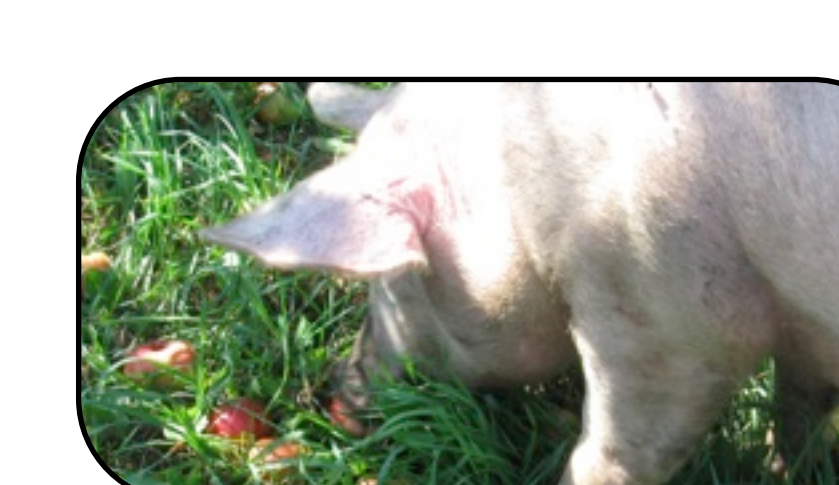
**Figure 7:** The change in ground cover percentages in apple hog and control plots before and after the hogs grazed.

Hogs significantly increased the amount of bare ground and significantly decreased grass. In control plots, forbs increased and grass decreased.

### Apple Fruit Biomass



**Figure 8:** The wet biomass of fruit in apple hog and control plots before and after hogs grazed. Hogs completely removed all fruit in experimental plots. Fruit biomass remained unchanged in control plots.



## Conclusions

- Grazing hogs is an effective strategy to remove all leftover fruit on the ground in cherry, pear and apple orchards post-harvest (Fig. 4,6,8).
- Hogs greatly impact the ground cover in orchards by rooting and consuming grasses and weeds; the pattern of impact is consistent across orchard types (Fig. 3,5,7).
- Post-harvest grazing of hogs has the potential to suppress codling moth and oriental fruit moth populations in apples and pears.
- The 160 lb hog size may only be appropriate for older well established orchards with large trees due to the intensity of rooting (Fig. 9&10).



Figure 9: Ungrazed control pear plot.



Figure 10: Hog grazed pear plot.