Summer Cover Crop Influence on Fall Vegetable Production

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Ray Kruse, graduate student
Ajay Nair, assistant professor
Department of Horticulture

Introduction

One of the major challenges confronting vegetable growers is to manage weeds in a sustainable way. Herbicides often are the primary tools to manage weeds but growers are interested in utilizing sustainable and environmentally conscious tools for weed management. Cover crops are gaining popularity and recognition as a tool that can manage weeds, build organic matter, suppress erosion, and improve soil quality and health. The goal of this project was to evaluate four cover crops for weed suppression and their effects on yields of fall vegetables. The four cover crops studied were buckwheat (cool-season broadleaf), cowpea (warm-season broadleaf), oats (cool-season grass), and sorghum sudangrass (warm-season grass).

The control treatment for the study was a no-cover crop plot left fallow for one to two months to simulate what industry was practicing between an early spring and a fall vegetable crop. The study also investigated the effect of planting date on vegetable crop growth and yield. Two planting dates, planting immediately or after one week of cover crop termination, was tested.

Materials and Methods

The entire plot was tilled on June 12, 2014. Cover crops were seeded the same day using a drop spreader (Gandy®) and lightly tilled in to incorporate cover crop seeds. The control plots were tilled at this time and not tilled again until cover crop termination. Solid set irrigation was installed and used as needed to supply water to the cover crops in early July. At the beginning of August, above ground biomass was collected using 50 cm × 50 cm quadrat from two locations within each treatment across all four replications. Biomass was sorted into three groups consisting of cover crop, broadleaf weeds, and grass weeds. The cover crop and weed biomass was dried and weighed. On August 5, cover crop plots were flail mowed and tilled to a depth of approximately 6 to 8 in. Raised beds with plastic mulch were laid and the first half of each treatment plot was planted the same day with two crops, cabbage (cv. Caraflex) and lettuce (cv. Adriana). On August 13, the second half of the plot was planted. The experimental design was a split plot with four replications. The whole plot factor was the cover crop and planting date was the subplot factor.

Fertigation was applied using 21-5-20 fertilizer to achieve a goal of 72 lb of nitrogen/acre of irrigated bed space. Transplant health was graded on a visual scale two weeks after transplanting. Lysimeters were installed for analysis of leaching soil nitrate. Soil samples were taken three times during the growing season. Lettuce was harvested mid-September. Cabbage was harvested at the end of October. Both crops were separated into marketable and non-marketable categories.

Results and Discussion

The use of irrigation was not preferred, but the late summer's dry conditions combined with the coarse sandy soil texture of the plot would otherwise not permit the cover crops to grow until their termination date. Weed suppression by the cover crops was observed in all of the treatments relative to the control (Figure 1). Only oats, sorghum sudangrass, and buckwheat were statistically significant at reducing weeds. All of the plots had more grass weeds than broadleaf except for sorghum sudangrass. The crop that suppressed the most weeds compared with the control was sorghum sudangrass. Something that is not represented in the information was that the buckwheat treatment had volunteer buckwheat plants that came up after cover crop termination. Hand weeding was necessary to suppress the volunteer cover crop regrowth between the individual cabbage and lettuce plants.

Lettuce yield was highest in early-planted cowpea when compared with control (Figure 2). There was a yield decrease when comparing the grass cover crop treatments to the control treatment. The yield decrease was less when lettuce was planted directly into the terminated grass cover crop treatments as opposed to waiting a week to plant the lettuce. Due to uneven growth among treatments, plots including the early-planted buckwheat, cowpea, control, and the late-planted cowpea were harvested two weeks ahead of all other treatments.

The cabbage produced more when planted into a broadleaf cover crop compared with the control (Figure 3). Out of all the treatments, cabbage after cowpea yielded the highest marketable yield. The grass cover crop treatments seemed to have lower yield when compared with the control. The early- or late-planted cabbage treatments had little effect on the yield except for the control plot.

Acknowledgements

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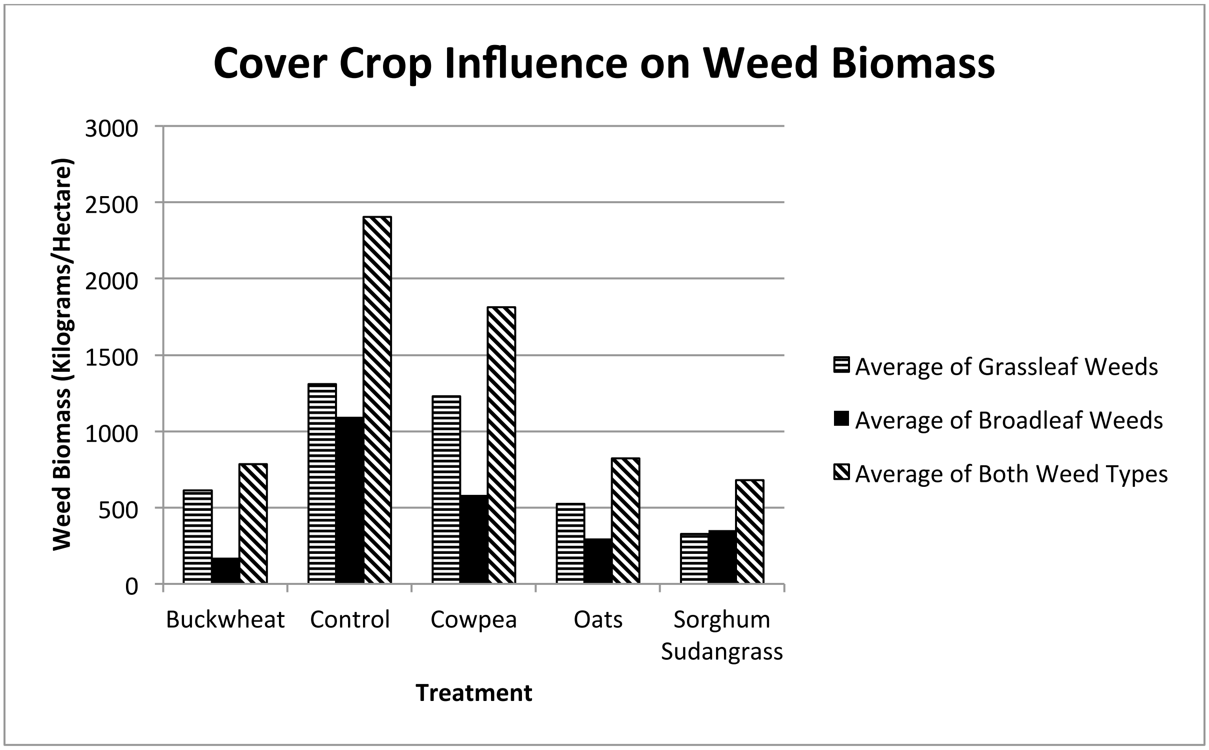

Figure 1. Effect of cover crop on weed biomass. Average of both weed types is the combined biomass of broadleaf and grass weeds.

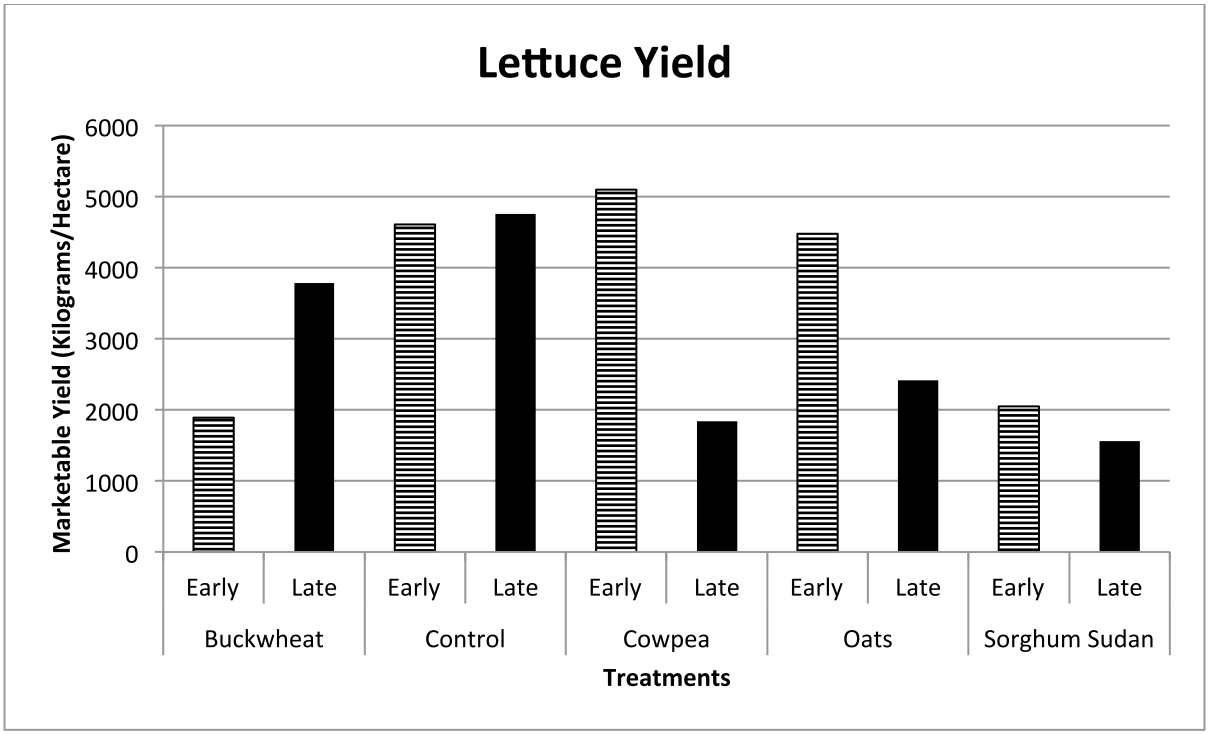

Figure 2. Effect of cover crop on marketable lettuce yield. Early and late represent two lettuce planting dates (immediately or one week after cover crop termination).

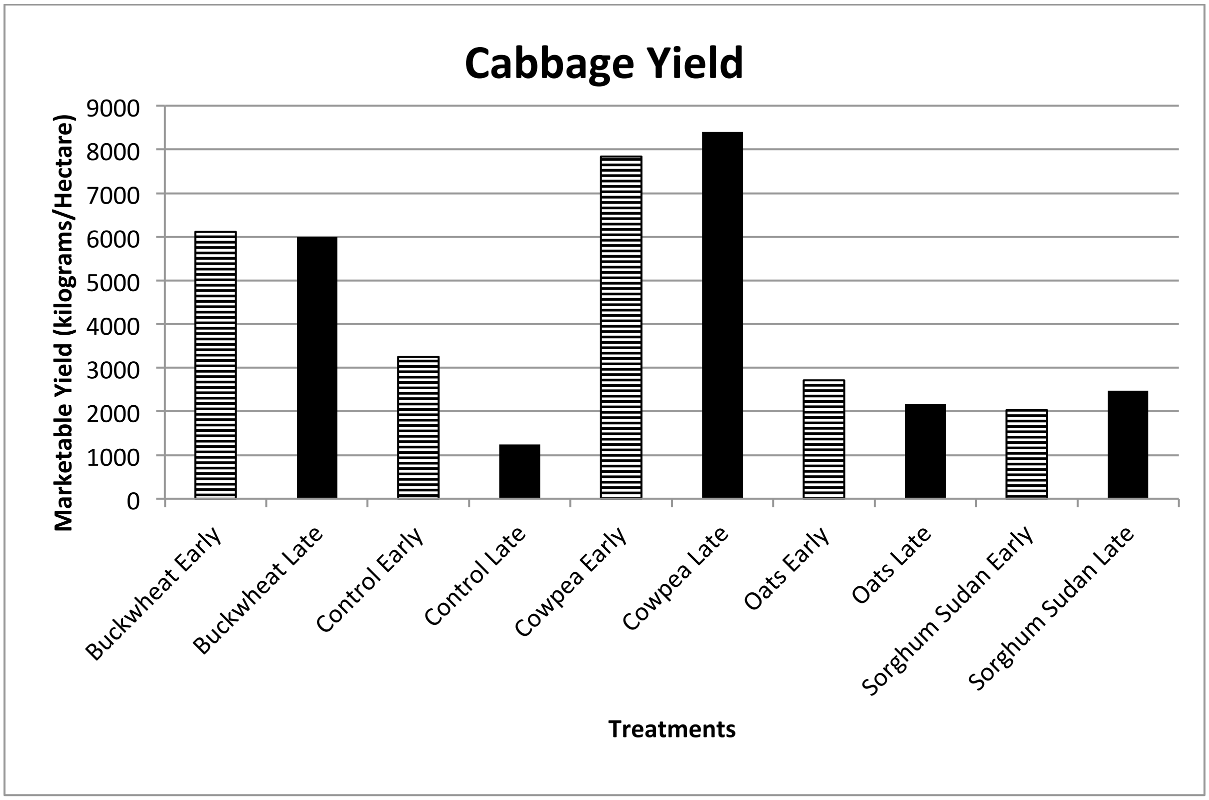

Figure 3. Effect of cover crops on marketable cabbage yield. Early and late represent two cabbage planting dates (immediately or one week after cover crop termination).