An Evaluation of Wool as an Alternative Mulch in *Brassica* Crops

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Introduction

Organic agriculture utilizes soil ground covers, mulches, more frequently than conventional agriculture due to the few herbicides and pesticides that can be used to suppress weed growth in the field. The use of mulching increases the soil water retention, reduces weed growth, and can provide nutrients into the soil as decomposition occurs (Lenka).

Mulching allows a greater economic yield of a field by providing shelter from weed growth surrounding the crop, allowing the plants to grow larger or more efficiently. The use of a mulch must produce more of an economic benefit than would be lost by allowing the plants to grow and compete for nutrients and water without a mulch application. Finding the best mulch aids farmers in making sound financial decisions that will result in the most economic benefit from their fields.

Mulches can be organic such as hay, wood chips, and wool or inorganic such as plastic sheeting or pellets. The inorganic mulches work well at suppression of weeds and water retention but fall short of providing soil nutrients due to lack of decomposition. Juhos demonstrated that wool was a suitable organic mulch that provided water retention while decomposing into macronutrients, particularly nitrogen.

The purpose of this experiment is to evaluate the efficiency of using wool as a mulch in organic brassica systems as compared to hay mulch and no mulch.

Hypothesis

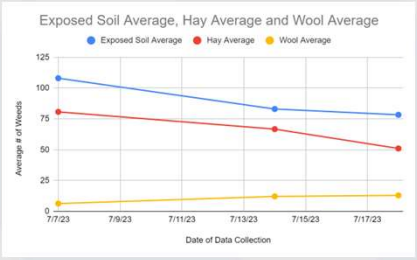
Exposed soil with no ground cover will have the highest number of weeds and dried weed weight while hay will minimize the weed growth and wool will have the greatest weed suppression.

Methods

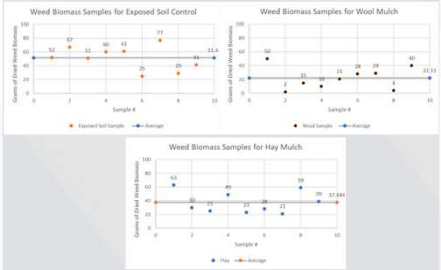
The 54 by 10 foot plot was divided into 9 individual plots that were each 6 by 10 feet. There were 3 treatments: no mulch, hay mulch, and wool mulch. The treatment plots had three rows of cabbage with a 2 foot spacing between rows and an 18 inch spacing between plants. Each of the treatment plots were replicated three times, and the placement of the plots were randomly assigned by a random number generator. The mulch would be laid about 4 inches thick for hay and wool.

The data collection was conducted in a 1 square foot area done three times in each plot. The square foot was randomly placed, and the weeds were counted within by counting the number of stems coming from the ground. At the end of the experiment, a biomass sample was collected utilizing the same method, but the weeds were clear cut, dried, and then weighed.

Results



Average # of Weeds Within the 9 Samples Taken per Trial



Average Weight of Dried Weed on 7/25/23 within 1 ft^2 samples taken three times per plot

Conclusions

- The wool showed significant weed suppression compared to the hay and exposed soil in both the number of weeds and the biomass of the weeds
- The exposed soil control had the most weed growth with 80-100 weeds per square foot and an average biomass of 51.44 grams per square foot
- The hay mulch had between 50-75 weeds per square foot with an average biomass of 37.44 grams per square foot
- The wool mulch had the least amount of weed growth with between 5 and 15 weeds per square foot with an average biomass of 22.11 grams per square foot
- The dominate weeds across the treatments: Chenopodium (Lambs quarter), Amaranthus graecizans (Pigweed), Grasses

Discussion

In this experiment, wool acted as the mulch that had the greatest weed suppression. Likewise, wool had the best growth of the cabbages, likely due to the increased availability of light, better water retention in the soil, and/or increased nutrient availability. The color of both the weeds and the cabbages were of a darker and more full color than the surrounding plots. This color shift may be an indication that the increased soil temperature caused by the wool allowed for more nutrient availability because of decomposition of the compost that was applied at the end last season or of the wool itself. Wool acted as a superior mulch than hay or no mulch.

The Hay was marginally more effective than the exposed soil, but was likely not effective enough to justify the economic cost of buying and laying the hay as opposed to laying nothing. If you were to apply Hay as a mulch, you would likely be weeding the plot a similar amount to if you had applied nothing.

Literature Cited

Juhos, Katalin, et al. "The Effect of Wool Mulch on Plant Development in the Context of the Physical and Biological Conditions in Soil." *Plants*, vol. 12, no. 3, Feb. 2023, p. 684. *Crossref*, https://doi.org/10.3390/plants12030684

Lenka Pavlů, Radka Kodešová, Miroslav Fér, Antonín Nikodem, František Němec, Radek Prokeš, "The impact of various mulch types on soil properties controlling water regime of the Haplic Fluvisol," *Soil and Tillage Research*, Volume 205, 2021, ISSN 0167-1987, https://doi.org/10.1016/j.still.2020.104748.

Disclosure

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