



Effectiveness of Red Clover (*Trifolium pratense*) as a Living Mulch for Weed Suppression when Compared to Hay and Bare Soil



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Introduction

This study aims to help farmers select a mulch that will enable them to get the highest possible yields while reducing the need for frequent weeding. The proposed hypothesis was that red clover (*Trifolium pratense*) would have the greatest ability to suppress the weeds compared to hay and bare soil.

Beets face challenges when they must out-compete with weeds. ¹ Weed control for beets is essential during germination and early establishment when growth is slow. ¹ As such, this research project seeks to evaluate the effectiveness of red clover (*Trifolium pratense*) as a weed suppressant and its ability to enhance the overall yield of Chioggia beets (*Beta vulgaris*).

Mulching is a well-known technique that has proven effective in various aspects of agriculture. It promotes water retention in the soil, prevents weeds from competing with the crop for resources, maintains soil tilth, reduces nutrient leaching, and can add nutrients back into the soil if it is an organic material. ²

Figure 1. Average Number of Weeds per Mulch Over Five Weeks

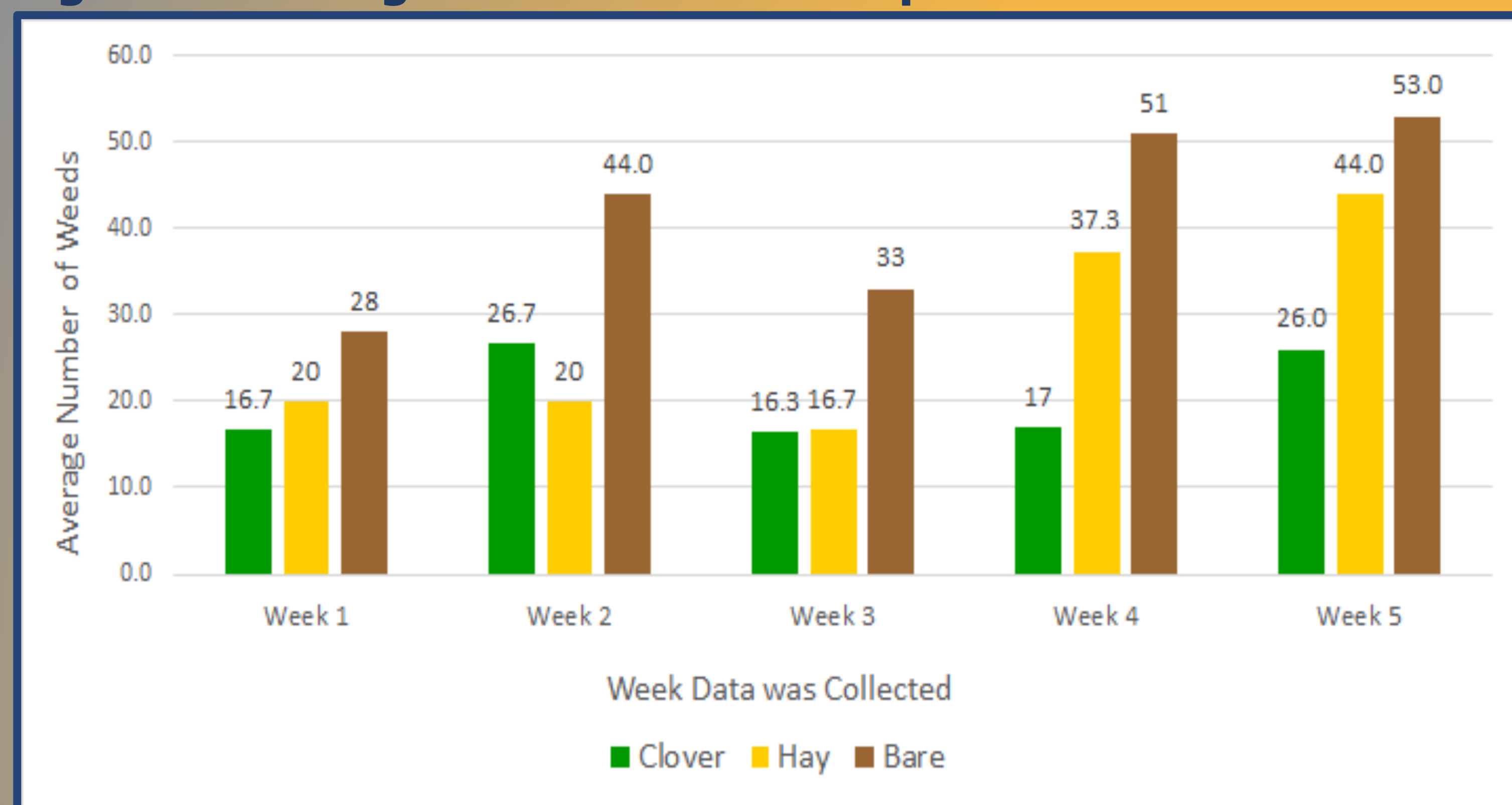


Figure 2. Average Weed Biomass for Each Mulch

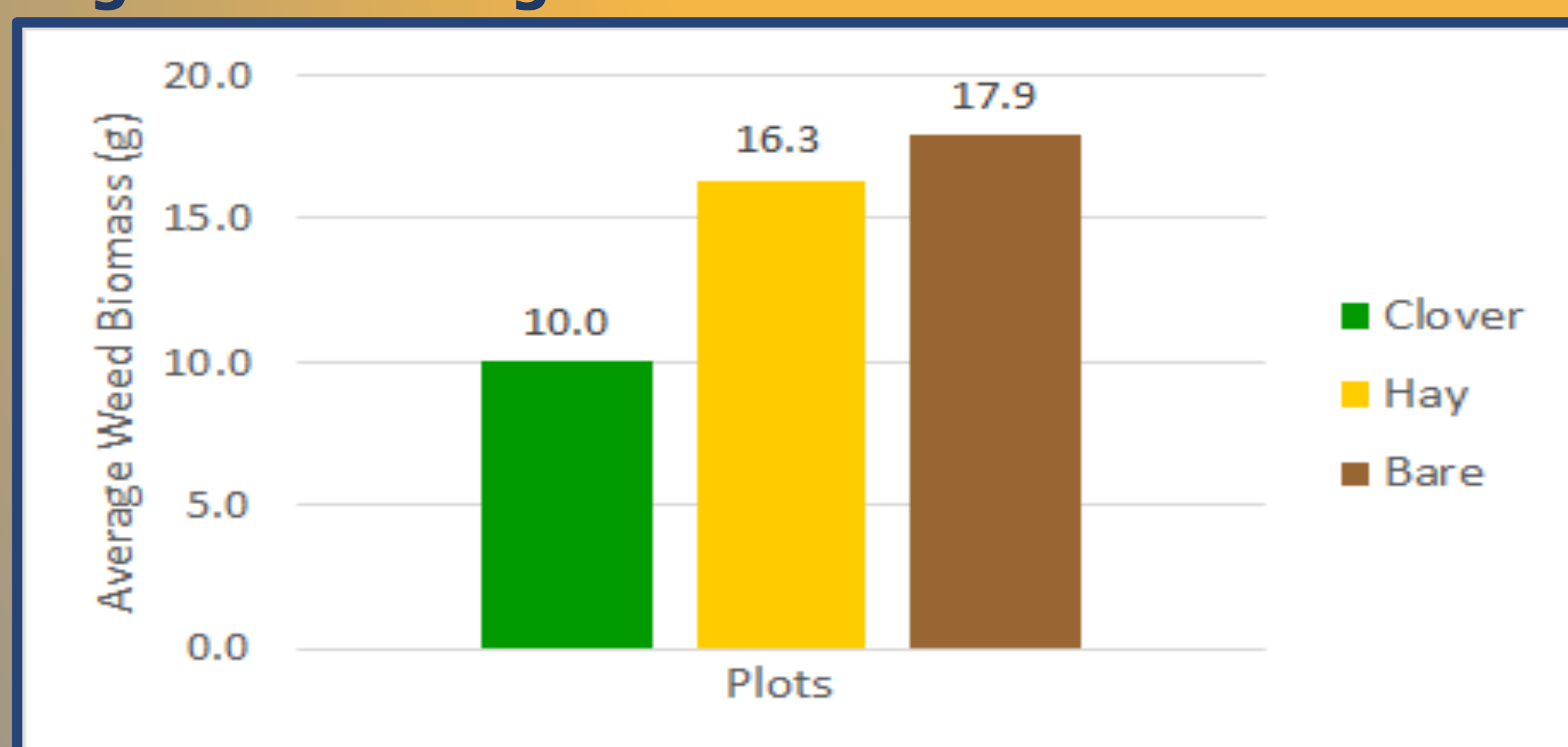


Figure 3. Leaf Size Comparison

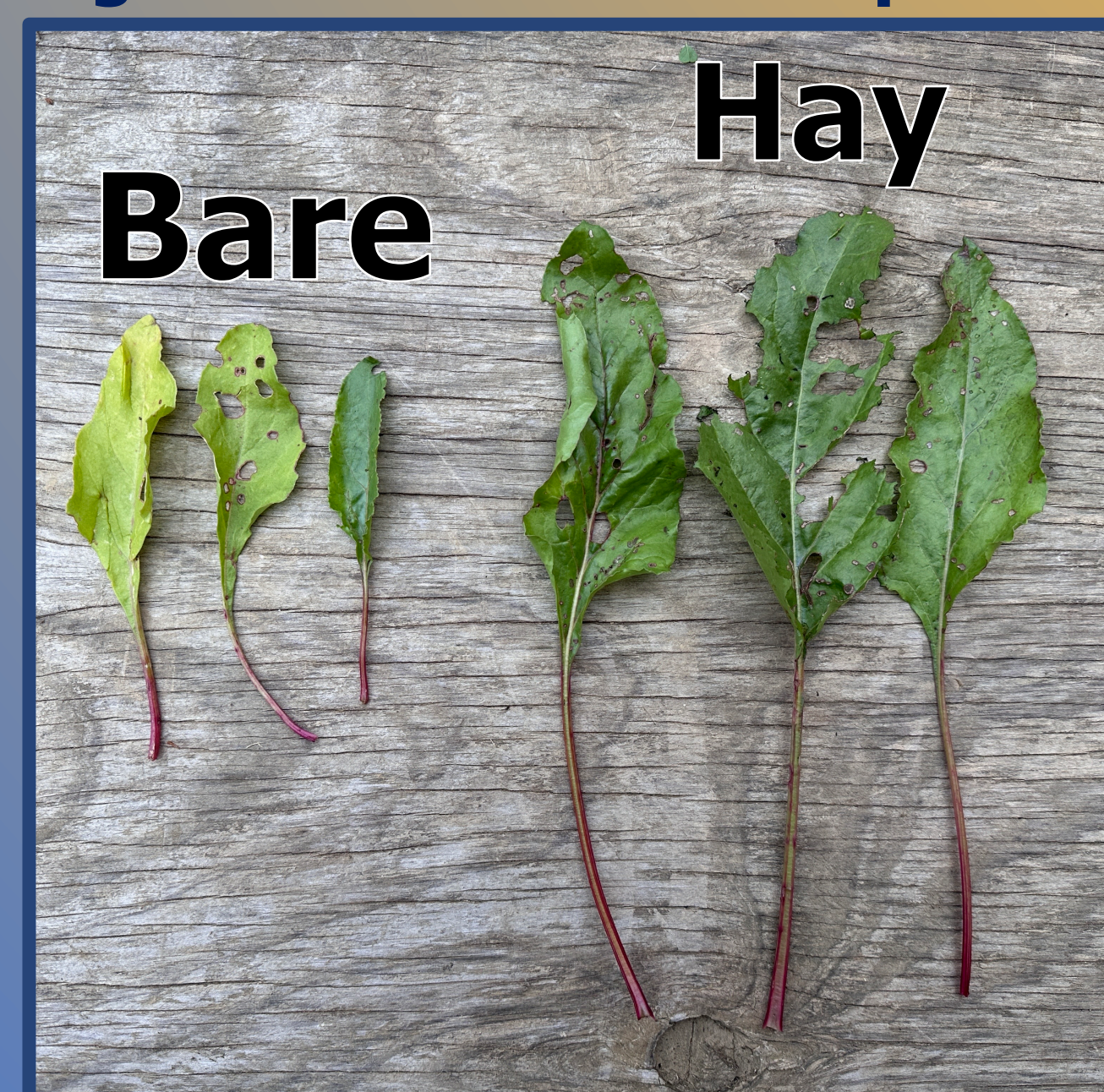


Figure 4. Clover Plot Weeds



Figure 5. Bare Plot Weeds

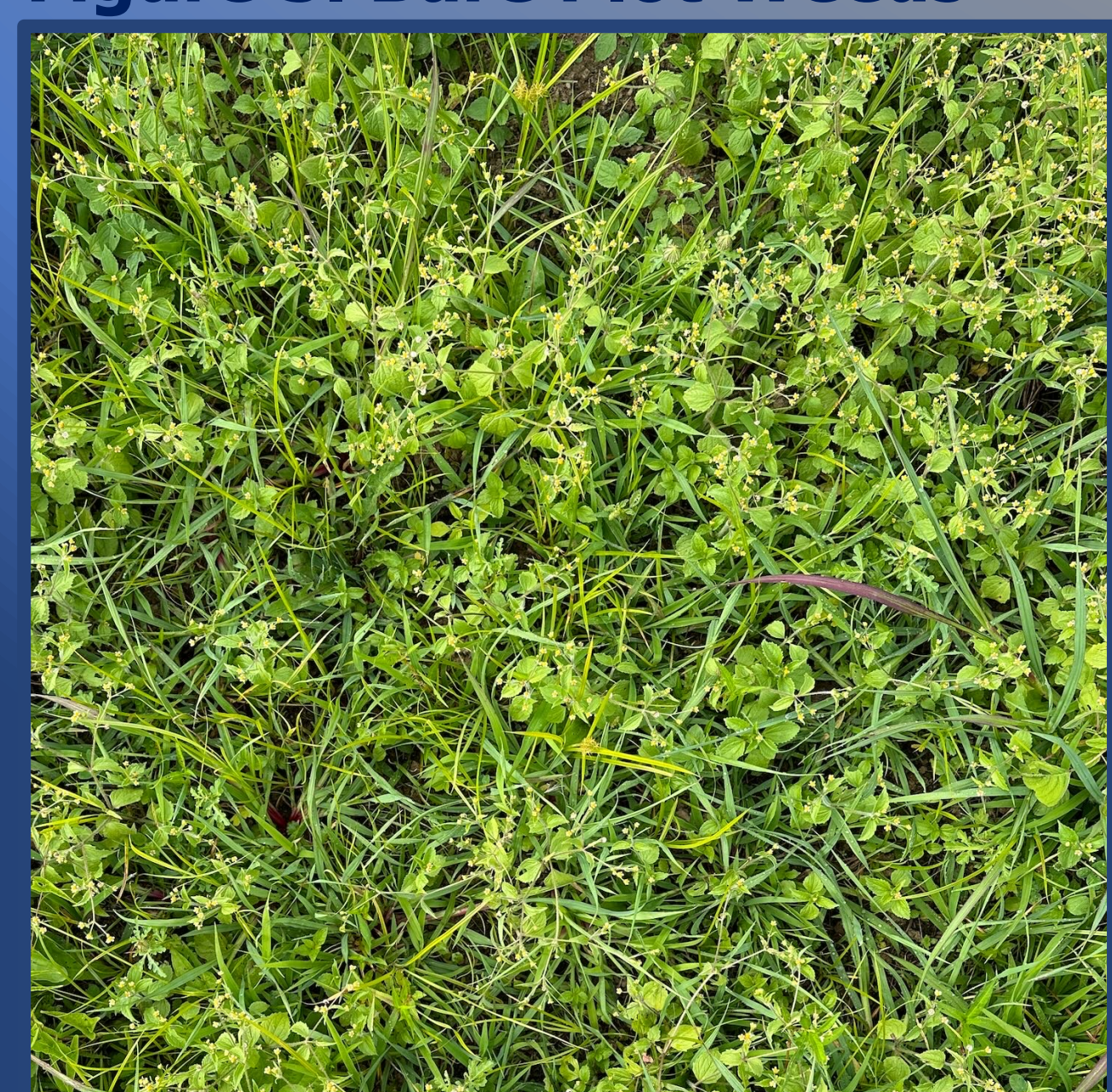


Figure 6. Hay Plot Weeds



Methods

Mulch Application

The hay was applied to about a 1-ft depth and settled to around 3 to four inches in the following days. The red clover was initially seeded to 2 grams of seed per plot May 17th. Each plot was 3x10 ft. There were 9 total plots with three plots per mulch type. The clover germination was slow due to the lack of rain. After two weeks, I heavily reseeded the clover plots to around 5 grams of seed per plot and watered with the sprinkler twice a week until clover germinated in all three plots.

Seed Starting

The beets were directly seeded once the clover germinated at least 50% throughout their plots around June 14th. Beets were in rows spaced 1ft apart, with the seeds spaced every 3 inches. The beet seeds were covered with soil for a 1-inch seeding depth.

Data Collection

To collect data, a 1 sq. ft cut-out was randomly thrown on each plot three times and the weeds are counted within that area. Data were collected every Friday for five weeks from June 30th to July 28th. At the end of the 5 weeks, the oldest beet leaf from the middle row of each plot was photographed for comparison.

Results

The clover plots were more successful at suppressing the weeds, and the bare plots did the worst (Fig. 1 & 2). The oldest leaves in the bare were smaller and more yellow in color than those in the hay plot (Fig. 3). There are no leaves from the clover plot because they got shaded out once the clover reached its full height. The leaves from the hay plots look like they have greater pest insect activity than the bare plot leaves. Different weeds come up in the different mulches (Fig. 4, 5, 6). The clover had leafy weeds, mainly gallant soldier (*Galinsoga parviflora*). The hay had grass weeds, mainly nutsedge (*Cyperus rotundus*). The bare plots have a variety of both leafy and grassy weeds.

Conclusion

These results show that even though mulching is not a popular method for beet production, it can be beneficial. For example, the hay leaves in *Figure 3* are significantly larger and greener. The greener color could be from the breakdown of the hay allowing for a slow release of extra nutrients. The size could be from the added nutrients or the excess water retention in the soil allowing the beets to go a shorter amount of time between rainfall.

If I were to do this experiment again, I would have started the clover as early in the season as possible and waited to sow the beets once the clover was fully established. After heavily reseeded and regularly watering the plots, the red clover took 8 to 10 weeks to reach its full height. Sowing the beets when the clover had only just germinated shaded out the beets once the clover got taller when it was fully established. By waiting for the clover to establish fully, I would have cleared a wider pathway on either side of where the seeds were sown. It would allow the beets time to outcompete the clover before it filled back in. Because the clover has a long start, it would be more applicable to late-season beet plantings for real-life situations.

To better test the living mulch's effectiveness for crop yield, I would use a white clover because its shorter size would reduce the possibility of shading out the crop. I would pick a crop like chard that is similar to beets but is not a root vegetable. The leaves on chard stand more upright and are larger, so it would be easier to visualize the crop yields and nutrient availabilities between the plots.

Sources

- ¹Drost, D. (2020, May). *How to grow beets in your garden*. Utah State University Extension. <https://extension.usu.edu/yardandgarden/research/beets-in-the-garden>
²Kopsell, D. (2016, August). *Garden Mulches*. University of New Hampshire Cooperative Extension. https://extension.unh.edu/sites/default/files/migrated_unmanaged_files/Resource007193_Rep10385.pdf