

Living Mulch demonstration meeting

August 29, 2014, Penn Yan NY

Cornell Vegetable Program

Introduction

Although plastic mulch benefits vegetable farmers by conserving moisture and heating the soil, it presents several sustainability issues in regard to soil and water protection and production economics. The use of herbicides and cultivation impairs environmental sustainability, while cultivation and hand-weeding impair social and economic sustainability due to a high labor requirement and fuel costs. A living mulch sown between the plastic beds could be a powerful strategy that efficiently mitigates these issues.

For several years the Cornell Vegetable Program has worked with winter grains such as rye between rows of plastic beds. However, rye seemed to decrease crop yield, as well as break down too early to control late season weeds. A number of studies and colleagues suggested the inclusion of clover into the system. These benefits include:

- Late season weed control.
- Grains provide adequate shade to allow the clover to establish and early season weed control (on its own clover will not provide early season weed control).
- Clover as a legume can provide some of the nitrogen the grains require, potentially decreasing nutrient competition with the vegetable crop.
- Clover may attract less lepidoteran pests than grains.

To continue our research in 2014 we established 4 living mulch treatments between rows of peppers (cv: Revolution) on a cooperating farm in Penn Yan, NY. The living mulches are rye, barley, rye+barley and clover+barley. Our seeding rates were 150 lbs/ac for grains and 20 lbs/ac for the Dutch White clover. Seeding occurred immediately after plastic was laid, prior to pepper transplant. Fertility and pest management per grower standards. To measure the effect of the living mulch we collect data on yield, weed growth and crop nutrient levels.

Observations to date

Our observations to date in 2014 support the inclusion of clover in the living mulch. For example when included with both barley and rye, the clover plots had much less weed growth than the grains alone (figure 1). Barley in particular has been ineffective at reducing weed growth. Rye+Clover has given the best weed control, although we are noticing a trend of increased weeds in all plots as the season progresses.

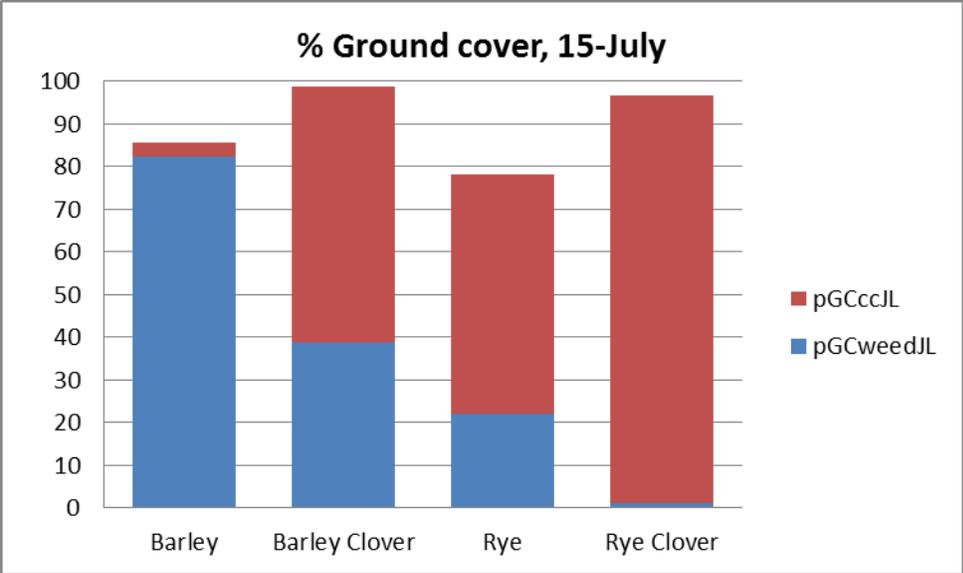


Figure 1. Percent ground cover divided between weeds and 4 living mulches.

Yield differences also support the inclusion of clover, which when combined with rye yielded nearly twice as much as rye alone (Table 1). There are however no significant differences in number of fruit per plot, indicating the living mulch may influence fruit size.

Table 1. Weight of peppers per plot and number of fruit per plot amount 4 living mulches.

Mulch	WtPlot	NoPlot
Barley	22.1 AB	44
Barley/Clover	23.9 AB	50
Rye	15.1 B	32
Rye Clover	29.0 A	56.7
<i>p value .05</i>	<i>0.0457</i>	<i>NS (.0748)</i>

We should note that the cooperating grower is allowed at the initiation of the trial to select their standard weed control treatment. In this case a composted dairy manure was applied to clean row middles. Yield was much higher in these plots (Table 2), likely due to increased soil moisture and nutrients. It is in short not a fair comparison to living mulch. We can however observe that rye+clover shares a grouping with compost in both terms of weight per plot and fruit number per plot.

Table 2. Yield of peppers with living mulch and compost treatments.

Mulch	WtPlot	NoPlot
Barley	22.1 BC	44.0 BC
Barley/Clover	23.9 BC	50.0 BC
Rye	15.1 C	32.0 C
Rye Clover	29.0 AB	56.7 AB
Compost	39.5 A	75.3 A
p value .05	0.011	0.0246

Conclusions

Living mulch can provide very good weed control in plasticulture vegetables. Among the combinations we've examined so far this year rye+clover seems to emerge as our top choice. The use of composted dairy manure is intriguing, but may not be practical on a larger scale and presents food safety concerns.

We are also conducting this work on a farm in Seneca County with onions as our vegetable crop. Yield data will be collected soon, but initial weed control data again favors clover treatments.

The Cornell Vegetable Program thanks NESARE and the cooperating farmers for their support of this project.