Low Input Vine Crop Production Report (FNE01-388)

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Project overview: the intent of this project was to investigate alternative organic production techniques for vine crops; (focusing on pumpkins) utilizing in-row plastic mulch and a variety of between row treatments for comparison.

The experimental plot is approximately a two acre field located in Hatfield, MA, which had been fallow for an undetermined number of years prior to being planted in pumpkins, this being the third year. The rye cover crop from the prior fall was plowed under in early May, followed by a disking. Time was allowed for weed seeds to germinate followed by another round of disking. Plastic mulch was laid in rows on ten foot centers across the field using a Buckeye mulch layer pulled behind a tractor. It should be noted, that all aspects of this project were preformed by one person. This is important only from the point of view that the project was also looking at the viability of an individual using this system as a means to produce an alternative crop on the side or in addition to other crops without involving significant amounts of additional labor.

The crop was planted on the 14th and 15th of May, using six different varieties. The seeds were placed in holes punctured in the plastic at intervals of 18-24 inches and covered with soil. There had been a sustained warm period prior to planting, this was followed however by a cool and damp period which appears to have had a negative impact on germination. The poor germination appeared to be pretty evenly distributed across the field and seed varieties. (I was reluctant to blame the seed since it was purchased this season from a reputable supplier.) There were also some pesky crows in the area plucking seedlings out of the ground. Overall, the crow damage probably was not overly significant, although in certain areas the damage was considerable. Consequently, spot replanting was done approximately two weeks later in holes were no germination or growth was evident.

Another round of disking was done between the rows of plastic for weed suppression. An application of organic fertilizer was hand applied, placing a scoop, under the plastic around each plant hole. At the same time, stripped cucumber beetles and squash bugs were hand picked and destroyed. The squash bugs were at levels that I wouldn't consider threatening; the cucumber beetles were populous and damage was very evident and destructive. Also hand weeding was done at this time, in the space around the plants in the plastic.

In mid June, the space between the rows was rototilled again and in row applications of the cover/smother crops was made. From East to West in the field was: red clover, white clover, no treatment, and buckwheat. The buckwheat by far had the best effect on weed suppression. The crop grew upwards of three feet in height and was quite vigorous. The overall pumpkin crop in this zone was also superior. The buckwheat may have provided some negative competition with

the pumpkins, as the crop was concentrated in close proximity to the plastic strips. Both clover types didn't seem to thrive very well and the exact cause is unknown. It could have been a combination of poor germination and/or soil conditions. The clover seed was inoculated but under the conditions, probably did not fix a tremendous amount of nitrogen. Both clovers did provide better weed suppression than the control, which by the end of the summer was quite weedy, with the exception of the area covered by the plastic strips.

The effect of the cover crops as rot inhibitors was not very evident. Although there may have been a slightly better effect in the cover crops zones it certainly was not very dramatic and none of the particular cover crops seems to out perform the other in this regard.

Out of the varieties of pumpkins grown; Baby Pam, Rock Star, Howden, Racer, Rocket and Tom Fox, it appeared the earliest variety (Racer an 85 day variety) seemed to perform best, this could possibly be attributed to the erratic growing season, or it may indicate a good variety for this area. Further trials may shed some light on the subject. A number of different varieties does prove useful at sales time due the increased number of different sizes and shapes available for customers to choose from.

Conclusions:

Positives:

A marketable crop was produced using this model, which would have been drastically reduced had plastic mulch not been used to provide a buffer for the plants to become established without the need for time consuming hand weeding and hoeing.

Nectar was provided for the pollinating bees for honey production, difficult to quantify and probably not economically significant on this scale.

Crop was produced using organic methods, providing little negative environmental impact.

Addition of cover crop biomass to soil for increased soil fertility.

There was no outlay of time and capital for herbicide, insecticide or fungicide applications.

Most of the crop was sold at retail through roadside sales.

Negatives:

Increased costs of time and capital to purchase, lay, remove, and dispose of plastic mulch.

Insect damage was evident and perhaps to some degree probably economically relevant.

Guessing the overall production was probably slightly lower than a conventional system using numerous chemical treatments.

Pumpkin market was sluggish in the Northeast this season (due I guess to production levels and Sept. 11th fallout), this is not directly related to the project, but is a reminder of trying to match production levels with demand.

It was difficult, as I've heard others have discovered, to cultivated right up to the edge of the plastic mulch without either damaging the plastic or leaving a small strip where weeds get a foothold.

Now what?! Where to go from here?

It appears the row spacing could be reduce from 10 feet down to eight or six, if you could still get equipment through to cultivate, this should achieve greater yields per square foot.

This system would lend itself to the use of drip irrigation/fertigation under the plastic.

There is the possibility of reusing the plastic mulch for at least an additional season, if care is taken during cultivation and harvest work, for the same or a different crop. This would result in both material and labor savings, especially if drip lines were factored in, although the plastic mulch would not be as effective if the plant spacing where different.

There is also potential for intercropping between the rows with a short early season crop. Investigation would need to be done regarding market conditions for the desired crop and potential conflicts with work schedules.

It would be interesting to try using Zucchini- planted in certain locations- prior to the pumpkins, as a stripped cucumber beetle lure to try and reduce the population prior to pumpkin emergence. Also the substance Surround was recommended by the cooperative extension as an organic substance that could be applied to the pumpkin plants to deter the beetles, but it would not kill or eradicate them like a conventional insecticide.

Final thoughts!

In conclusion, I would say it appears this model has some merit. The main hurdle I have faced is keeping ahead of the weeds while maintaining a limited time commitment. The plastic mulch achieved the result of allowing the plants to become established with limited intervention, and without being to costly as to prove economically impractical. The addition of the organic matter from the smother/cover crop is certainly a benefit to the long-term structure of the soil. Also, the fact that a season extending or supplemental crop can be produced with limited inputs could prove valuable to many direct and/or roadside marketers. I feel this system could be improved by implementing some of my recommendations, which evolved from this year's experience and that individuals might easily adapt this model to their specific operation's, taking into account the unique aspects of their operations: available equipment, specific crops produced, and crop rotation schedules.