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Tillage Reduction in Winter Squash Production

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You might recall the article [“Continuing to Reduce our Tillage”](#) from the 27, May OFS Newsletter. At that time, we introduced you to the process of terminating a rye and vetch cover crop with a flail mower, creating a thick mat of crop residue to transplant directly into with *Delicata* winter squash. The cover crop “mulch” acts as a weed barrier, retains soil moisture and temperature, and provides a nice clean surface for the fruit to develop and mature. Since half of the block was in raised beds, which had been under a caterpillar tunnel over the winter, and the other half was “flat-farmed” – we decided to do a comparison demonstration between the two sides of the block. After removing the high tunnel, we waited until early June for the cover crop to put on more biomass and show signs of flowering. We then terminated the rye and vetch with a flail mower to create the thick mulch mat and covered the entire block with a tarp. After about three weeks, we removed the tarp and transplanted the squash, one 100’ row per bed (four beds on each side) at a spacing of 24”, then installed drip irrigation lines down each side of all eight rows, watering all rows at the same rate ~ twice per week for 90 minutes.



Flat-farmed (left) and raised beds (right) of rye and vetch during tunnel removal.



Late May, rye and vetch cover crop has grown well over six feet tall on both sides.



After signs of flowering, the cover crop was terminated with a walk-behind flail mower.



After flail mowing, the entire block was covered with a tarp the first week of June.



Delicata winter squash plants ready to be transplanted on the first day of July.



By July 26th, flat-farmed (left) and raised beds (right) showed very little weed pressure.



Harvesting in mid-October, we counted and weighed all fruit from each side of the block.

So, what did we find out? Well let's first revisit our goals. Rotating our tillage as we do with cash and cover crops helps give our plots much needed rest. Tillage can be very destructive to our resident microbial communities which is detrimental to our soil health – so we at least avoided tillage for two full growing seasons. Although we didn't measure cover crop biomass (because we wanted to use it all for the mulch), it was much greater in the raised beds that spent the winter under a high tunnel. This was very evident when it came time to flail mow the rye and vetch. It took us three times as long to terminate the raised beds as compared to the flat-farmed beds. Another goal was to create a protective weed barrier, because of the mulch, any necessary weeding had to be done by hand rather than mechanically. Overall, the mulch provided an excellent weed barrier, however, neither side was entirely perfect, and some hand weeding was necessary during fruit development. The time it took to hand weed the flat farm beds was three times as long as that of the raised beds – simply due to the much thicker mat of mulch. So, there is a trade-off here, time is money, but so also is the extra gasoline it took to terminate the cover crops in the raised beds. To justify the trade-off, we need to look at the bottom line. Interestingly, the flat farm beds, with lower cover crop biomass (a thinner mat of mulch), with the same number of transplants and equal irrigation, produced more (Fig.1.) and larger (Fig. 2.) marketable fruit. Keep in mind, this was a side-by-side demonstration, not subject to statistical scrutiny, but there is a trend here. Also, it's difficult to put a price on the future reduced weed seedbank and increased additional organic biomass inputs to the soil under the raised beds. Perhaps this side of the block may be more productive for the next crop.

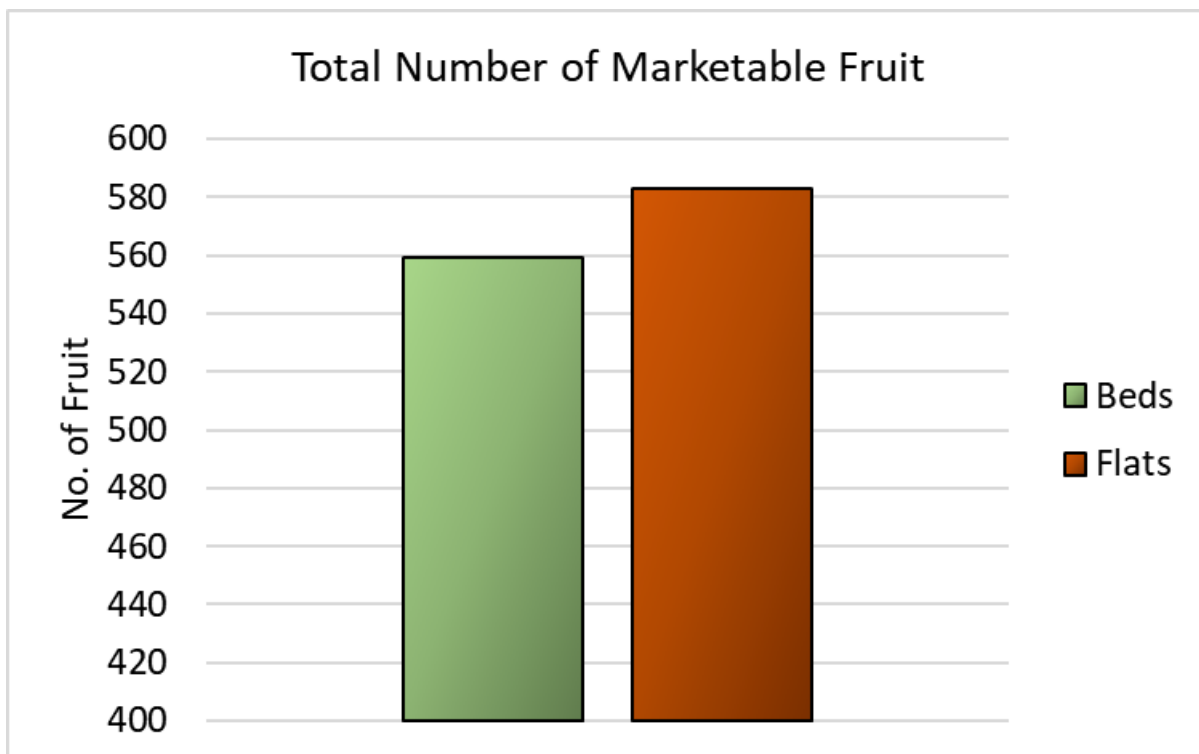


Fig. 1. Total number of marketable fruit in four beds of raised (left) and flat-farm beds (right).

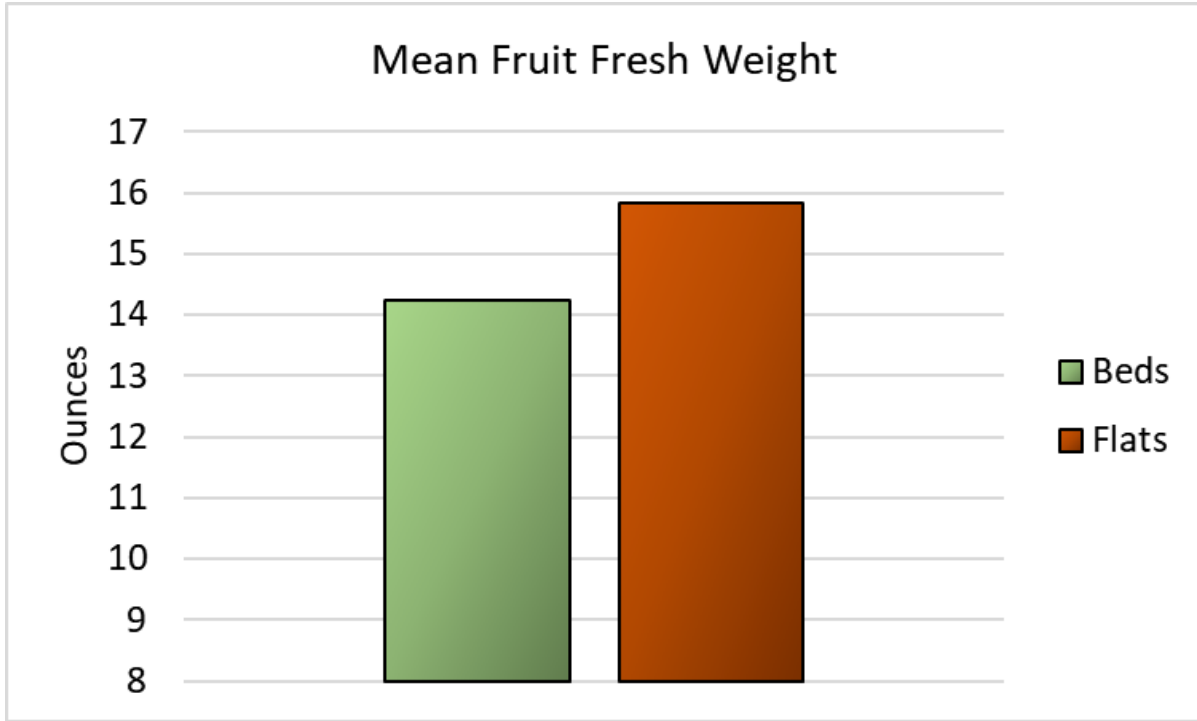


Fig. 2. Mean fresh weight of fruit in four beds of raised (left) and flat-farm beds (right).



Getting ready for market - harvested Delicata winter squash curing in the greenhouse.

- All photos by Andrew Corbin