Northern NY Agricultural Development Program
2004 Project Report

Expansion of Vegetable Production in Northern NY

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Background:
This project seeks to identify strategies to improve the sustainability and profitability of vegetable production in NNY, to provide opportunities for NNY farmers to diversify crops. Past research included cultivar evaluations (pumpkin, winter squashes, garlic and melons) and comparisons of organic and plastic mulches for pumpkins and melon production. In 2003, we continued our evaluation of organically grown bicolor sweet corn cultivars, at the Cornell Baker Research Farm in Willsboro, NY. This represented the third year of the experiment. In 2004, the trial was lost due to wet conditions in the spring.

Vegetable growers in the Northeast rely on black plastic to enhance early growth and yield of many crops including cucurbits, peppers and tomatoes. The challenge with using agricultural plastics is the increasing costs and challenges of disposal. While black plastic mulches are relatively inexpensive, biodegradable paper and starch based mulches could be tilled in at the end of the season, reducing labor hours for pick up as well as disposal costs. Alternative mulches are still in the early stages of development, yet the quality has improved tremendously in the last six years. We compared starch based mulches to black plastic for effects on growth and productivity of muskmelons at the Baker Research Farm in Willsboro, NY. Muskmelons are very responsive to the higher soil temperatures and uniform moisture created by black plastic mulches.

Methods:

Organic Sweet Corn Cultivar Evaluation

All practices used in this experiment met requirements for organic production as outlined by the National Organic Program. In 2001 and 2002, we evaluated seven cultivars of sweet corn at this same location (three early- 'Fleet', 'Sweet Chorus', 'Trinity' and three late- 'Mystique', 'Sweet Rhythm', 'Sweet Symphony'). In 2003, 'Temptation' was added as an early mid season cultivar (72 DTH). Untreated seed of 'Fleet' and 'Ecstase II' were no longer available this year. Composted poultry manure (3 t/a, NOFA NY approved material) was broadcast and incorporated at the time of plowing. The sweet corn was seeded on June 21, 2003, 4" apart in rows spaced 30" apart. Additional fertility was provided by banding ProGrow (25 lbs. of N, 15 lbs. of P_2O_5, 20 lbs. K_20 per acre, North Country Organics) at planting. The plants were thinned to an in row spacing of 8" on July 7. No treatments for insect pests were applied.

The corn was harvested when at least 50% of the primary ears were mature, on August 26, 28, 29 and September 2, 3. One 20' section in each plot was harvested and primary ears were weighed and counted. Ten ears were weighed with and without their husks, and ear length and tip fill were rated.

Alternative Mulch Products 2003 and 2004

Three Mater-Bi mulches (Novamont SpA, Italy) and Green Plastic (Symphony, Inc.) were compared to black plastic mulch in the 2003 experiment at the Cornell Baker Research Farm. In 2004, only Mater-Bi was compared to black plastic. Mater-Bi is a new generation of bioplastics derived mainly from corn starch. A large portion of the fertilizer (60 lbs. N, 60 lbs. P_2O_5, and 60 lbs. K_2O per acre) was broadcast and incorporated before planting. Black Embossed Plastic (1.1 ml.) was used as the standard mulch in our experiment. The mulches were applied on May 30 with a raised bed mulch layer (Model 2600, Rain Flo, PA) along with drip tape (approximately 6" from the center of the bed). Raised beds were formed (6' apart on center, 3" high and 10' apart on center) and a single line of drip tape was buried (2" deep). The melon plants were drenched with Admire 2F (Imidacloprid, 0.02 ml/plant) 24 hours before transplanting for cucumber beetle control.

The melons cv 'Athena' were transplanted 2 feet apart by hand on June 12, 2003 and June 18, 2004. In 2004, we added a Charentais melon, 'Figaro,' that has excellent eating quality. Starter fertilizer was applied to each plant. Irrigation was applied through the drip system based on moisture block readings. Additional fertilizer was added through the drip system resulting in a total of 120 lbs. of N, 120 P_2O_5, and 120 K_20 per acre applied in the growing season. On July 7, 2003 and July 13, 2004 five uniform, consecutive plants were harvested from each plot and fresh and dry weights were recorded. Melons were harvested from the data plants when mature (at full slip). Fruit were graded into two

size classes: large (3 lbs. and greater) and medium (2 lbs. to 2.99 lbs.) and length and width of

the fruit recorded. Fruit were harvested nine times in 2003 (August 18, 20, 22, 25, 27, 29, and September 2, 5, 10) and on September 13, 2004. Statistical analysis was conducted on all data using a $P<0.05$ for significance.

Results:

Overall most sweet corn cultivars (Table 1) produced many marketable ears in this experiment. Most mid season cultivars were mature 5 days earlier than the predicted times provided by the seed companies. The later maturing cultivars had higher marketable yields compared to the early cultivars as expected. 'Sweet Chorus' produced the shortest ears among the early cultivars and 'Trinity' had the lowest yield by weight (6.6 tons/A). Cultivars from the mid/late maturing group produced the largest ears in the trial (7.6 to 8.4 in.). The marketable yield of this group was similar, although 'Delectable' produced the most tons per acre (9.4 tons/A) which is 0.5 tons/A more than last season. The 'Sweet Breeds' from Harris Moran ranked highest during the last two years of trials. Most cultivars had acceptable tip fill. 'Sweet Chorus' may have problems with tip fill. Seven cultivars from 2002 were repeated this year. Most cultivars produced significantly more tons per acre this year compared to last year. 'Precious Gem' made great yield improvements this year. It produced 9.1 tons/acre which is about 3.7 tons/acre more than last year.

Overall, the mulches supported good yields in Willsboro (Table 2). The mulch treatments produced similarly. Growers must decide if higher material costs can be justified based upon labor and disposal savings with a biodegradable mulch. In 2004, Mater-Bi and black plastic supported good yields of both 'Athena' and 'Figaro' (Table 3). Charentais melon ('Figaro') production can be challenging in the Northeast and growing them on black plastic will increase total yields.

Conclusions/Outcomes/Impacts:

Over several years of study, we have established that organic sweet corn can be successfully produced in the NNY region. The cultivars available all displayed excellent horticultural characteristics. Our losses to insect pests were minimal. This was especially promising given the challenge with treating organic sweet corn for ear worms. This suggests that growers in NNY may consider this crop in organic systems and may have a comparable advantage over other parts of the state. An organic sweet corn experiment in 2004 in Freeville NY had 95% worm damage to ears.

We also demonstrated successful melon production using biodegradable mulches. While these mulches may cost more up front, the savings in labor for pick up and disposal should compensate. While the formulations of these mulches is continues in research, some commercial material will be available for purchase in 2005. This information will be made available via extension newsletters.

Outreach

In 2003, a ½ day workshop was conducted with as part of a grower meeting hosted by Beth Spaugh, in Clinton County. Discussion focused on the planned research for that summer and a twilight meeting. The evening twilight meeting was held at the time of installation of the melon experiment. Our primary goal was to demonstrate the mulch layer, and offer this for trial at neighboring farms. Few growers had made investments in this type of equipment, yet the potential improvement in management was made clear. The sweet corn field was included in other tours hosted by the farm manager, Mike Davis.

Research results were summarized and also posted to the Commercial Vegetable web page at http://www.vegetables.cornell.edu/.

Next steps

We would like to continue our efforts with vegetable production in the NNY. Primary areas of future interest are in development of protected cultivation strategies, such as using high tunnels or greenhouses, to diversify crops and extend the season. This effort would focus primarily on demonstration and education. Some new research is needed on management of some of these unheated greenhouses, to optimize choice of coverings as well as passive heat retention strategies.

Acknowledgments:

Beth Spaugh, formerly with Clinton County CCE

Northern New York Agricultural Development Program:

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Thirty-three farmers serve on the Program board led by Co-Chairs Jon Greenwood of Canton (315-386-3231) and Joe Giroux of Plattsburgh (518) 563-7523. For more information, contact Jon, Joe or R. David Smith at 607-255-7286 or visit www.nnyagdev.org # # #

Table 1. Yield, tipfill, and average ear weight of eight sweet corn cultivars grown organically in Willsboro, NY 2003.

Cultivar	source	Predicted days to harvest	Actual days to harvest	Marketable [1] doz/acre	Marketable [1] tons/acre	Avg ear wt. (oz)	Avg cob wt. (oz) [2]	Avg ear length (inches)	Tipfill (1-5) [3]
Early									
Sweet Chorus	Harris	67	66	26136	7.5 d	9.4 dc	6.7 e	7.4 c	2.5 a
Trinity	Johnny's	68	68	26136	6.6 e	8.4 dc	5.7 f	6.8 e	2.0 ab
Temptation	Seminis	72	73	26136	8.0 cd	10.1 bcd	7.0 de	7.0 d	1.3 c
Mid/late									
Mystique	Johnny's	74	69	26136	8.3 bc	11.2 abc	7.6 cd	8.4 a	1.3 c
Sweet Rhythm	Harris	74	69	26136	8.8 abc	10.0 bcd	7.8 bc	7.6 b	1.2 c
Sweet Symphony	Harris	76	73	26136	8.4 bc	10.8 abc	7.8 bc	7.7 b	1.4 c
Precious Gem	Harris	80	74	26136	9.1 ab	11.8 ab	8.2 ab	8.4 a	1.4 c
Delectable	Johnny's	80	74	26136	9.4 a	12.4 a	8.6 a	8.4 a	1.6 bc

[1] Numbers within a column followed by the same letter are not significantly different from each other ($p<0.05$).
In columns without letters there were no differences among values.

[2] Average cob weight represents ears with the husk removed.

[3] Tipfill ratings 1-5, 1 = excellent and 5= poor.

Metric conversion: 1 lb. = 2.2 kg. and 1 oz. = 28.35 grams.

Table 2. Early yield, total yield and fruit size of melons grown on five mulches at Willsboro, NY- 2003.

Treatment [1, 2]	Yield				Average Plant Yield		Average Fruit		
	Early [3]		Total [4]						
	no./A	wt.(T/A)	no./A	wt.(T/A)	no.	wt.(lbs.)	Length(in.)	Width (in.)	wt.(lbs.)
Black Plastic	2,015	5	6,970	15	3.2	13.8	7	6	4.3
Mater-Bi-A	2,124	5	6,207	13	2.9	12.2	7	6	4.3
Mater-Bi-B	1,470	3	5,924	12	2.7	11.3	7	6	4.1
Mater-Bi-C	1,307	3	5,064	11	2.3	10.1	7	6	4.4
Symphony	1,470	3	6,098	13	2.8	12.0	7	6	4.3

[1] Results from all treatments were not significantly different from each other ($p < 0.05$).

[2] Transplants were established on June 12, 2' in row spacing and 6' between row spacing.

[3] Early yield includes harvest on August 21 and 25.

[4] Total yield was calculated as the sum of yields on August 21, 25, 28, September 2, 5, and 12.

1.0 ton/acre = 2.47 t/ ha , 1000 fruit/acre = 2471 fruit/ha, 1.0 lb = 0.45 kg, 1.0 inch = 2.54 cm.

Table 3. Total yield, plant yield and fruit size of two melon cultivars grown on two mulches at Willsboro, NY- 2004.

Treatment [1, 2]	Total [3] Yield		Average Plant Yield		Average Fruit		
	no./A	wt.(tons/A)	no.	wt.(lbs.)	Length(in.)	Width (in.)	wt.(lbs.)
Cultivar							
Athena	6,556	12 a	3	11.4 a	6.6	5.7	3.8 a
Figaro	6,861	8 b	3	6.9 b	5.1	4.7	2.2 b
Mulch							
Black Plastic	6,708	10 a	3	8.9 a	5.8	5.2	3.0 a
Mater-Bi	6,686	10 a	3	9.4 a	5.9	5.2	3.0 a

[1] Results from all treatments were not significantly different from each other ($p < 0.05$).

[2] Transplants were established on June 18, 2' in row spacing and 10' between row spacing.

[3] Total yield was calculated as the sum of yields on September 13.

1.0 ton/acre = 2.47 t/ ha , 1000 fruit/acre = 2471 fruit/ha, 1.0 lb = 0.45 kg, 1.0 inch = 2.54 cm.