Cornell Cooperative Extension
Eastern NY Commercial Horticulture Program

HUDSON VALLEY FARM HUB

Local Sweet Potato Slip Production and Variety Trial

2024 Annual Report

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April 15, 2025

Summary

Cornell Cooperative Extension vegetable specialists Chuck Bornt, Teresa Rusinek and Ethan Grundberg conducted a trial at the Hudson Valley Farm Hub (HVFH) evaluating 12 sweet potato varieties including commercially available lines from Jones Family Farms located in Bailey, North Carolina and experimental lines from Louisiana State University and North Carolina State University. The trial was designed to identify varieties that could be produced in eastern NY that produce the highest quality roots within the size class of 0.75 – 1.25 pounds and reduce the number of smaller roots that are difficult to market. A second component of this trial was to evaluate the local production of slips of two varieties, Covington and Averre, in the greenhouse range located at HVFH for cutting and directly planting in the field compared to those slips that were sourced from Scott Farms in North Carolina.

Key Research Findings from the 2024 Trials:

- Local slips were successfully raised in the greenhouse from locally sourced roots. Averre produced approximately 74 usable slips per square foot while Covington produced slightly less at 54 slips per square foot.
- Two specialty sweet potato varieties, Purple Splendor and Purple Majesty, that are purple skinned and purple fleshed were identified in the variety trial with highly desirable root characteristics including size, color, and excellent sweet potato shape.
- Locally produced slips of Covington and Averre, produced nearly 1.0 pound more "Large Root Weight" per plant compared to the yield from commercially sourced slips, but also more "Fingerling roots" per plant compared to commercially supplied slips.
- The variety trial also identified a maroon skinned, white/buttery yellow fleshed variety, LA 21-260, that produced higher marketable yields with better shaped and larger roots compared to the standard of that type, Murasaki.

I. Background

Part 1: Sweet potato slip production

Attempts to produce local sweet potato slips at HVFH have failed in previous years due to the inability to supply a consistent, even flow of bottom heat to the beds because of the incompatibility of the heat mats and the electrical system in the greenhouse. In 2024, we moved into the older greenhouses at HVFH to allow us to maximize the use of our heat mats as the electrical system is more compatible with the type of heat mats being used. The ability of a locally produced slip would ensure a more consistent supply of slips as local producers would not be relying on southern slip producers. Growers could cut their own slips when they were ready to plant and when conditions were most favorable. Improved plant survival may also be increased, leaving fewer skips in the fields. The costs associated with locally

produced slips may also be offset by the transportation costs associated with purchasing southern slips. The number of planted roots and the timing of emergence was tracked along with the number of slips produced by the bed system. These slips were planted in the field at the HVFH and root yields, size and overall quality were compared to slips purchased from Jones Family Farm, located in Bailey, North Carolina.

Part 2: Variety trial

Of the 13 sweet potato varieties evaluated in 2023, the highest yielding with the most acceptable root qualities were reevaluated along with several new lines selected and sent to us by breeders at North Caroliana State University (NCSU) and Louisiana State University (LSU). Most of the varieties trialed are commercially available, but 4 were experimental lines from breeders at LSU and Vineland Research Station in Canada and two of the lines were recent releases that will be readily available starting in 2025. Slips were purchased from Jones Family Farms located in Bailey, North Carolina except for those noted above that were supplied by university breeders. During this trial, we evaluated the varieties for overall yield (number and weight) of marketable roots and root characteristics such as shape and skin and flesh color.

II. Materials and Methods

Trial Design and Results

Variety Trial: Plots were planted adjacent to the main HVFH sweet potato block in raised beds covered with black plastic mulch. Fertilizer spreading and field preparation, including forming raised beds with black plastic mulch, were completed by HVFH staff. The trial was arranged in a small plot randomized complete block design with four replicates with the exception of 3 treatments: LA 19-20 and LA 21-260 only had two replicates while Radiance only consisted of one replicate due to a shortage of slips for these experimental lines from LSU. The varieties can be found in Table 1 along with their source.

Table 1: Variety list, slip source, and root characteristics

Variety	Slip Source[1]	Skin Color	Flesh Type
Averre	LSU	Orange	Orange
Beauregard	Jones Family Farms	Orange	Orange
Covington	Jones Family Farms	Orange	Orange
LA 18-100	LSU	Orange	Orange
LA 19-20	LSU	Maroon	Orange
LA 21-260	LSU	Maroon	White
Purple Splendor	NCSU	Purple	Purple
Radiance	LSU	Orange	Orange
Murasaki	Jones Family Farms	Maroon	White
NC17-0101	NCSU	Maroon	White
Purple Majesty	NCSU	Purple	Purple
Vermillion	Jones Family Farms & LSU	Orange	Orange

[1]LSU – Louisiana State University, Dr. Don Labonte; NCSU – North Carolina State University, Dr. Craig Yencho and Ken Pecota; Jones Family Farms, Bailey North Carolina



Slips were planted into raised beds on 6.5' centers with black plastic mulch, using a double staggered row with a spacing of 12" between plants and 12" between the rows, on June 7, 2024 (Figure 1). Stand counts were performed on June 20, 2024 and can be found in Table 2. Plots were harvested on October 8, 2024 using a Willsie sweet potato harvester with the assistance of HVFH employees. Individual plots were placed in plastic harvest totes, placed on pallets, and moved to the storage facility. Tubers were cured in the HVFH storage facility and remained in the storage facility until they were graded on November 11, 2024.

Marketable roots were those that were consistent with a typical sweet potato shape and size and had no visible rot symptoms or other deformities that were deemed too severe to market (broken roots due to harvesting, rodent damage, malformed roots etc.). Roots were then graded into 1 of 3 marketable sizes: Fingerling with a size range of 4 - 8 ounces; Large with a size range of 8 - 12 ounces and Jumbo with a size range of greater than 12 ounces. The number of roots and weight per acre as well as the average root size for each category can be found in Table 2. The number of roots and weight of roots per plant can be found in Table 3. Full descriptions and details of each variety including shape, skin and flesh color and other characteristics of the roots can be found in Appendix 1.

Figure 1: Sweet potato slips planted in a double staggered row in plastic mulched raised beds with 12" spacing between plants and between rows.

Table 2: Number of plants per acre, number of roots, weight of roots harvested and the average size of roots for 12 sweet potato varieties.

Variety	Average Number Plants per acre[1]	# Fingerling Roots	Weight Fingerling Roots (lbs.)[2]	Average Fingerling Root Size (ozs)	# Large Roots	Weight Large Roots (lbs.)[2]	Average Large Root Size (ozs)	# Jumbo Roots	Weight Jumbo Roots (lbs.)[2]	Average Jumbo Root Size (ozs)
Averre	13,400	32,495	10,553	5.20	28,810	26,264	14.59	2,345	5,796	39.54
Beauregard	13,266	44,220	11,189	4.05	40,033	34,740	13.88	4,188	9,916	37.89
Covington	12,864	28,475	7,219	4.06	28,475	22,730	12.77	4,020	8,241	32.80
LA 18-100	12,730	31,323	7,940	4.06	31,658	24,673	12.47	3,350	7,655	36.56
LA 19-20	12,730	24,455	6,097	3.99	37,185	27,906	12.01	670	1,307	31.20
LA 21-260	13,266	32,495	9,548	4.70	34,505	31,792	14.74	335	737	35.20
Murasaki	13,400	31,490	8,157	4.14	25,460	21,407	13.45	503	1,156	36.80
NC17-0101	13,266	52,260	11,625	3.56	34,170	24,556	11.50	335	888	42.40
Purple Majesty	13,400	34,338	9,296	4.33	23,618	20,670	14.00	2,513	5,980	38.08
Purple Splendor	12,060	55,443	15,494	4.47	30,653	25,427	13.27	1,005	2,245	35.73
Radiance	13,400	26,130	8,375	5.13	35,510	34,572	15.58	6,700	16,214	38.72
Vermillion	9,792	24,623	5,712	3.71	8,878	5,997	10.81	0	0	0.00

[1]The number of plants per acre is based on a double staggered row using 12" between each plant and between the rows on each plastic mulched raised bed at 6.5' centers. Stand counts were taken on June 20, 2024, 13 days after planting.

[2]Size Categories: Fingerling = 4 - 8 ounces; Large = 8 - 12 ounces; Jumbo= greater than 12 ounces.

Numbers in "RED" are the highest for that particular column.

Table3: Yield of roots by size category and weight per plant for 12 different sweet potato varieties.

Variety	Number Fingerling Roots per Plant	Weight of Fingerling Roots per plant	Number of Large Roots per plant	Weight of Large Roots per plant	Number of Jumbo Roots per plant	Weight of Jumbo Roots per plant
Averre	2	0.79	2	1.96	0.2	0.43
Beauregard	3	0.85	3	2.63	0.3	0.75
Covington	2	0.56	2	1.76	0.3	0.64
LA 18-100	2	0.62	2	1.94	0.3	0.60
LA 19-20	2	0.48	3	2.19	0.1	0.10
LA 21-260	2	0.73	3	2.43	0.0	0.06
Murasaki	2	0.61	2	1.60	0.0	0.09
NC17-0101	4	0.88	3	1.86	0.0	0.07
Purple Majesty	3	0.69	2	1.54	0.2	0.45
Purple Splendor	5	1.28	3	2.11	0.1	0.19
Radiance	2	0.63	3	2.58	1.0	1.21
Vermillion	2	0.58	1	0.61	0.0	0.00

[2]Size Categories: Fingerling = 4 - 8 ounces; Large = 8 - 12 ounces; Jumbo= greater than 12 ounces.

Numbers in "RED" are the highest for that particular column.

Local Sweet Potato Slip Production





Figures 2 and 3: A single layer of sweet potato roots placed into crates for slip production and covered up with additional potting mix.

On April 19, 2024, Covington and Averre sweet potato roots were purchased from Samascott Orchards in Kinderhook, NY and brought to HVFH. Roots were then placed in plastic harvest crates that were 14 inches wide by 24 inches long and 6 inches deep. A layer of potting mix about 2 inches deep was placed in the bottom of the tote and a single layer of sweet potato roots were laid in the bottom of the crate (Figures 2 and 3). The average number and weight of roots used per crate can be found in Table 4. The roots were then covered with approximately 3-4 inches of the same potting mix, watered lightly and placed on a heating mat with a thermostat set to 90^{O} F(Figure 4). Crates were watered routinely by HVFH staff. In total, five crates of Covington and two crates of Averre were bedded. On May 13, 2024, any slips that were growing were removed to even up and encourage more slips to be produced by the mother roots. On June 7, 2024, slips were cut from each crate (Figure 5) and graded into two categories: Large slips were those that had a minimum of 4 nodes and at least 10 inches long; Medium slips were those that had a minimum of 2 nodes and between 6-10 inches long (Figures 6 and 7). Slips less than 6 inches were discarded. The average number of slips cut from each treatment and the number of slips per square foot can be found in Table 4.



Figure 4: Sweet potato bedding crates laid out in the greenhouse set on a heating mat April 19, 2024.



Figure 5: Slips ready to be cut on June 7, 2024.



Figure 6: Slip grading: Medium slips to the left and large slips on the right.



Figure 7: A pile of freshly cut slips ready for the field to be planted.

Table 4: The average number roots and weight used for bedding and the number of slips cut from bedding crates.

Variety	Average Number of Roots in Crate	Average Total Weight of Roots in Crate	Average # of Large Slips harvested per Crate	Average # Large Slips per Square Foot	# Small/Medium Slips Harvested per Crate	# Small/Medium Slips per Square Foot	Total # Slips per Square Foot	Average # Slips per Bedded Root	Average # Slips per Pound of Root
Covington	30	36.2	85	36	44	19	54	4	4
Averre	27	33.5	113	47	64	27	74	7	5

On June 7, 2024, the slips produced in the HVFH greenhouse and slips of the same varieties purchased from Jones Family Farms of North Carolina (Covington and Averre), were planted adjacent to the main HVFH sweet potato block. Slips were planted into raised beds on 6.5' centers with black plastic mulch, using a double staggered row with a spacing of 12" between plants and 12" between the rows. Fertilizer application and field preparation, including making raised beds with black plastic mulch, were performed by HVFH staff. The trial was arranged in a randomized complete block design with four replicates. Stand counts were taken on June 20, 2024 and can be found in Table 5.

Plots were harvested on October 8, 2024 using a Willsie sweet potato harvester with the assistance of HVFH staff. Individual plots were placed in plastic harvest totes, placed on pallets and moved to the storage facility. Tubers were cured in the HVFH storage facility and remained in the storage facility until they were graded on November 11, 2024. Marketable roots were those that were consistent with a typical sweet potato shape and size and had no visible rot symptoms or other deformities that were deemed too severe to market (broken roots due to harvesting, rodent damage, malformed roots etc.). Roots were then graded into 1 of 3 marketable sizes: Fingerling with a size range of 4 - 8 ounces; Large with a size range of 8 - 12 ounces and Jumbo with a size range of greater than 12 ounces. The number of roots and weight per acre as well as the average root size for each category can be found in Table 5. The number of roots and weight of roots per plant can be found in Table 6

Table 5: Yield of sweet potatoes from locally grown slips vs. commercially purchased southern slips.

Variety	Average Number Plants per acre[1]	# Fingerling Roots	Weight Fingerling Roots (lbs.)	Average Fingerling Root Size (ozs)	# Large Roots	Weight Large Roots (lbs.)	Average Large Root Size (ozs)	# Jumbo Roots	Weight Jumbo Roots (lbs.)	Average Jumbo Root Size (ozs)
Averre	13,400	32,495	10,553	5.20	28,810	26,264	14.59	2,345	5,796	39.54
Averre NY	13,132	38,693	10,435	4.32	42,193	37,604	14.26	2,848	6,382	35.86
Covington	12,864	28,475	7,219	4.06	28,475	22,730	12.77	4,020	8,241	32.80
Covington NY	13,132	52,093	12,898	3.96	44,388	31,423	11.33	838	1,441	27.52

[1]The number of plants per acre is based on a double staggered row using 12" between each plant and between the rows on each plastic mulched raised bed at 6.5' centers. Stand counts were taken on June 20, 2024, 13 days after planting.

[2]Size Categories: Fingerling = 4 - 8 ounces; Large = 8 - 12 ounces; Jumbo= greater than 12 ounces.

Numbers in "RED" are the highest for that particular column.

Figure 6: Yield of roots by size category and weight per plant for locally grown slips comopared to those purchased from commercial southern suppliers.

Variety	Number Fingerling Roots per Plant	Weight of Fingerling Roots per plant	Number of Large Roots per plant	Weight of Large Roots per plant	Number of Jumbo Roots per plant	Weight of Jumbo Roots per plant
Averre	2	0.79	2	1.96	0.2	0.43
Averre NY	3	0.80	3	2.88	0.2	0.49
Covington	2	0.56	2	1.76	0.3	0.64
Covington NY	4	0.99	3	2.41	0.1	0.11

[2]Size Categories: Fingerling = 4 - 8 ounces; Large = 8 - 12 ounces; Jumbo= greater than 12 ounces.

Numbers in "RED" are the highest for that particular column.

III. Results and Discussion

Variety Trial:

For the traditional orange skinned, orange fleshed varieties, Beauregard, one of the oldest varieties grown in the region, continues to produce the highest yields of "Large" category roots (37,600 lbs per acre, Table 3), with decent overall root characteristics such as shape and appearance. However, this variety also produces some of the highest "Jumbo" and "Fingerling" roots which is why the variety has fallen out of favor with many growers. Covington, an improved Beauregard type, has become the standard for most NY growers producing over 34,000 lbs of "Large roots", while reducing the number of "Fingerlings" and "Jumbo" roots. This is important because the fingerlings and jumbo roots are much less desirable and are often harder to market. However, there could be a use for these roots if growers decided to produce their own slips or a portion of their own slips. There were also several experimental lines in this trial that showed promise not just for yield, but also for overall root appearance. LA 19-20, an experimental line from LSU, produced the lowest number of "Fingerlings" and "Jumbo" roots while producing over 27,000 pounds of "Large" roots, third highest overall. This variety was also unique in that the skin was a maroon-purple color instead of the traditional orange or coppery color with dark orange flesh. It is similar to an older variety called Carolina Ruby, which was grown in NY, but yields were too low and growers replaced it with more traditional orange skin/flesh varieties. Adding this variety to a crop plan would be an excellent opportunity to offer more than just the standard sweet potato. The dark maroon skin is attractive as is the very dark orange flesh. Radiance, which is a release from joint efforts of LSU and the Vineland Research Station in Canada, also had very good yields and root quality was acceptable. However, the university breeders only supplied enough plants for one replication so it is more difficult to conclude how this variety will do commercially. In addition, there have been issues with obtaining commercially needed quantities of slips for this variety. In past variety trials, Radiance has not performed very well and I would not recommend growing it at a commercial level in NY yet.

This variety trial allowed us to see side by side the two new purple skinned, purple fleshed varieties, Purple Majesty and Purple Splendor. Each variety did well, producing over 20,000 pounds of marketable "Large" roots, but Purple Splendor produced over 55,000 pounds of "Fingerling" roots, making the overall size of this variety smaller compared to Purple Majesty. Both varieties are overall very attractive in shape and their dark purple, almost black flesh is strikingly attractive and very firm. Purple Majesty is larger, making it more ideal for the fresh market, but does have a little bit of texture to the skin whereas Purple Splendor is slightly smaller, but tends to have a smoother skin appearance. I would not hesitate to grow either one of these but would caution to start with a small amount of acreage in order to introduce it to your markets and gather a following for them.

This variety trial was also trying to identify a maroon skinned, white fleshed variety to replace Murasaki, the standard variety grown in this class. Murasaki produces a very dense canopy, is later to mature, and usually produces smaller roots compared to many of the standard orange fleshed varieties. For these reasons, many growers no longer grow Murasaki but would consider growing something similar if the yield and size could be improved. The white fleshed varieties are highly sought after in certain ethnic markets, especially in the Korean markets, because of their higher dry matter flesh and ability to hold their shape when cooked.

We evaluated three white fleshed/maroon colored skin in this variety including the standard, Murasaki. In this trial, both LA 21-260 and NC17-0101 outyielded the standard, Murasaki, by nearly 10,000 pounds/acre in the "Large" root category. Both had a decent sweet potato shape and whitish-buttery colored flesh. However, NC17-0101 produced the second highest amount of "Fingerling" sized roots in the entire trial with over 52,000 pounds. This is unacceptable in

our marketplace and in conversations with the breeder, this line has been removed from their trials and will no longer be evaluated for commercial release. On the other hand, LA 21-260 produced an excellent root with decent overall size and desirable characteristics and, if made commercially available, I would highly recommend this variety as an alternative to Murasaki based on the 2024 trial data.

Local Sweet Potato Slip Production

In 2024, we were able to produce on average 64 slips per square foot of bed (averaging both varieties used in this trial). When comparing the yield of roots of locally grown slips to slips purchased and shipped from North Carolina, local slips produced on average 10,000 pounds more (34,500 pounds "Large" roots, Table 7) compared to purchased slips (24,500 pounds "Large" roots). Locally grown slips also produced some of the highest number of "Fingerling" roots compared to southern slips, which could be a challenge to grower adoption of local slip production. However, there are some growers that have devleoped a market for these "Fingerling" sized roots by selling them in 3 – 5 pound mesh bags. If these markets can continue to be devleoped, using locally produced slips could prove even more profitable for local growers.

The ability of growers to be able to produce their own slips or even part of their acerage may become more increasingly important as cliamte change continues to be problematic for many of the slip producers in the southern region of the United States and weahter patterns that also hinder the planting of those slips once they arrive on farms here in NY. The quality of the slips decline quite rapidly the longer they have to be held before planting out in the field. Most southern slip producers also dicate when slips will be shipped, which can be as late as the second week in June. The ability of growers to cut and plant their own slips 2-3 weeks earlier could also improve the overall size of roots that are produced while reducing the number of "Fingerlings". That coupled with increasing transportation costs could make it a great alternative plan for growers in NY. More information will need to be gathered on the costs of production of locally grown slips compared to souther purchased slips.

Acknowledgments

This work would not be possible without the support of Jeff Arnold, Rosa Villegas, and the vegetable production team at the Hudson Valley Farm Hub. A special thanks to ENYCHP vegetable research support specialist Natasha Field for their assistance in harvesting, grading, and managing data collection and input. Further acknowledgement needs to be made to Dr. Don Labonte at LSU and Dr. Craig Yencho and Ken Pecota from NCSU for supplying the experimental lines from their breeding programs.

Appendix 1: Comments and descriptions of 12 sweet potato varieties and 2 varieties of locally produced slips.

Variety	Slip Source[1]	Comments
Averre	LSU	Unfortunately nearly every rep had a fair amount of soft rot in the bins, especially the larger roots - medium orange to slightly reddish coppery colored skin - roots are elongated but thick, not thin by any means - decent bulbous shape overall - nice dark orange flesh
Averre NY	HVFH	Big - fat and long, but decent shape, just really big - medium orange skin with slight texture, no visible Black rot - medium orange flesh, slight white marbling throughout, hard to cut, very firm flesh - however, decent amount of soft rot was pulled out of almost all the bins and reps - - I would say fairly uniform overall
Beauregard	Jones Family Farms	Decent overall appearance - mostly elongated, but still a decent bulbous appearance to it - lot of big sweet potatoes in this variety - medium orange pinky to cooper colored skin
Covington	Jones Family Farms	Decent size - skin is coppery colored to pinky orange color -smooth and clean, nice looking overall appearance - roots are elongated, but decent bulbous middles - fairly uniform - flesh is light orange with slight white marbling
Covington NY	HVFH	Roots are definitely elongated in shape, but not thin, rather thick - some have a slightly twisted shape, but not bad - but still with some bulbous ones, medium orange skin, nice color, mostly smooth, nice decent medium to dark orange flesh - acceptable overall even considering that they are a bit elongated
LA 18-100	LSU	Fair amount of soft rot in this variety - reddish orange - light orange pinky colored skin, smooth - most roots are decent - size is very good even the "Fingerlings" are good size - elongated shape, but not terrible - flesh is medium orange - ok but too much rot
LA 19-20	LSU	Really, really nice looking - excellent overall sweet potato shape and excellent size - dark maroon colored skin and dark orange flesh - similar to Carolina Ruby in appearance, but better shape
LA 21-260	LSU	Dark maroon/purply skin with white/buttery colored flesh - decent shape, decent size, pretty good overall. One of the highest in med/large category size - very nice looking in the bin
Murasaki	Jones Family Farms	Dark maroon skin, smooth with a white to light buttery yellow white flesh -really nice shape mostly bulbous, decent size - some almost too big, some the right shape, and some long and thin - variable
NC17-0101	NCSU	A little bit variable, but overall not terrible - Muraski type with purply reddish maroon smooth skin and off-white to buttery colored flesh - overall size is a bit small and shape tends to be a bit elongated, especially on smaller ones - larger roots have better shape - potentially better yielding compared to Murasaki and definitely better shape
Purple Majesty	NCSU	Really, really nice dark purple skin, excellent shape and size - slight texture to the skin, but variable as some have a heavy texture (almost like an elephant hide), but overall not bad and acceptable - like it a lot, flesh is dark, dark purple, hardly any white marbling - really nice typical sweet potato shape - not bad overall, just the skin texture - really, really dark purple flesh with just a little bit of white marbling - super firm as well - really took a lot to cut it - love the shape - would recommend growing for sure
Purple Splendor	NCSU	Majority of roots have a very nice shape with an overall slightly elongated appearance, but still a decent typical sweet potato shape - skin is dark purple, almost black with a little bit of texture - flesh is a strikingly dark purple with some slight white marbling - very attractive - overall fairly uniform shape and size - very nice and would recommend growing
Radiance	LSU	Large roots, almost too big? Reddish orange/coppery colored smooth skin, dark orange flesh, decent sweet potato shape - 4 out of 5 of the largest roots were split - so far the only variety we've seen this in this trial
Vermillion	Jones Family Farms	Overall, poor - dark maroon skin with slight texture - some are really nice bulbous shaped, others are long and thin - flesh is dark orange and attractive

[1] **LSU** - Dr. Don Labonte, Louisiana State University; **NCSU** - Dr. Craig Yencho and Kenneth Pecota, North Carolina State University

Jones Family Farms, Bailey, North Carolina;

Appendix 2: Pictures of 12 Sweet Potato Varieties.



Covington



Averre



Murasaki



Vermillion



LA 18-100



Beauregard



LA 19-20



LA 21-260



Radiance



Purple Splendor



NC 17-0101



Purple Majesty



Covington - NY



Averre - NY