



“Sweetpotato commercial seed production:
greenhouse practices – experiences from
Louisiana State University USA, National Clean
Plant Network-Sweetpotato.

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1. Media, containers and nutrient mix used for screen house operations



1. Media, containers and nutrient mix used for screen house operations



- Media and containers
 - Metromix 360 – peat moss with low bark and perlite content – easy for sticking plants, good drying
 - [see website with specs](#)
 - Tables
 - 3 to 4 feet (90 to 120 cm) wide
 - Lined with ground cloth
 - Filled with Metromix to depth of 10-15 cm

- Nutrients
 - Applied by ‘fertigation’ from overhead automatic sprinkle system
 - Miracle Gro labeled as *Gro Bigger, Tomato and Flower*

<https://www.miraclegro.com/en-us>

	Miracle Gro		
	N	P	K
Grows Bigger	24%	8%	16%
Tomato	18%	18%	24%
Flower	18%	24%	16%

2. Irrigation/Fertigation Practice



- Irrigation:
 - Applied via overhead irrigation
 - 8 individual tables/zones per greenhouse
 - Water needs may vary based on
 - Plant age
 - Ratooning schedule
 - Plant spacing density
 - Variety
- Watering lengths
 - Initial tissue cultures
 - 4 ≈ 2 minute cycles/day
 - Shallow moisture needed
 - Winter months
 - 2 ≈ 3-6 minute cycles/day
 - Deeper penetration needed
 - Summer months
 - 3 ≈ 3-6 minute cycles/day
 - More irrigation needed for hot days

2. Irrigation/Fertigation Practice



- Fertigation
 - Applied with irrigation water
 - Pump adds .25 – 2.5% fertilizer mix as based on watering needs
 - 3 MiracleGro solution applied based on need (mg/m²/week)
 - Regrowing after cutting
 - Grows bigger
 - » 0.81mgN, 0.27mgP, 0.54mgK
 - Holding and Sizing
 - ½ Grows Bigger ½ Tomato
 - » .61mgN, 0.38mgP, 0.58mgK
 - Tissue Cultures/Long term holding
 - Tomato
 - » 0.35mgN, 0.35mgP, 0.47mgK



2. Ratooning practice



- Observations:
 - In dense plantings critical to keep growth uniform to avoid shading.
 - When making multiple cuttings from same source take care to leave plants that will regenerate well.
 - Tip cuttings are preferred over sub-terminals.
 - Plant spacing is critical and must change according to stage of production.
 - Tissue culture plants may start unevenly
- Cutting
 - Early season – select cut
 - Later season – clear cut
 - Leave 2-4 inch (5-10 cm) stump
- Spacing
 - Initial = 1.5 inch (3.8 cm)
 - Later = 2 inch (5 cm)
- Care must be taken in cutting to avoid pulling stems and roots out of the medium.

4. Quality assurance practices (internal, external) – NCPN QMS



Component	Therapy thru tissue culture (Lab stuff)	Foundation plant and 'seed' production
Document control system		√
Quality manual	√ (1)	
Quality procedures	√ (15)	
Work Instructions	√ (13)	
Forms	√ (23)	
Management review system		
Internal audit system		
External audit system		
Accreditation		

4. Quality assurance practices (internal, external) – virus testing seed roots



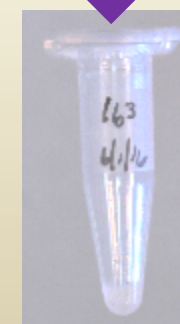
Roots randomly collected during harvest, cured, stored.



Cross section slice cut from proximal end with mandolin.



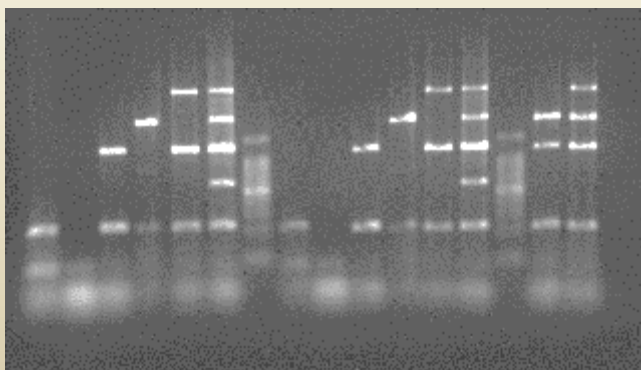
Slice placed in bag with CTAB buffer, homogenized.



Total nucleic acid extracted.

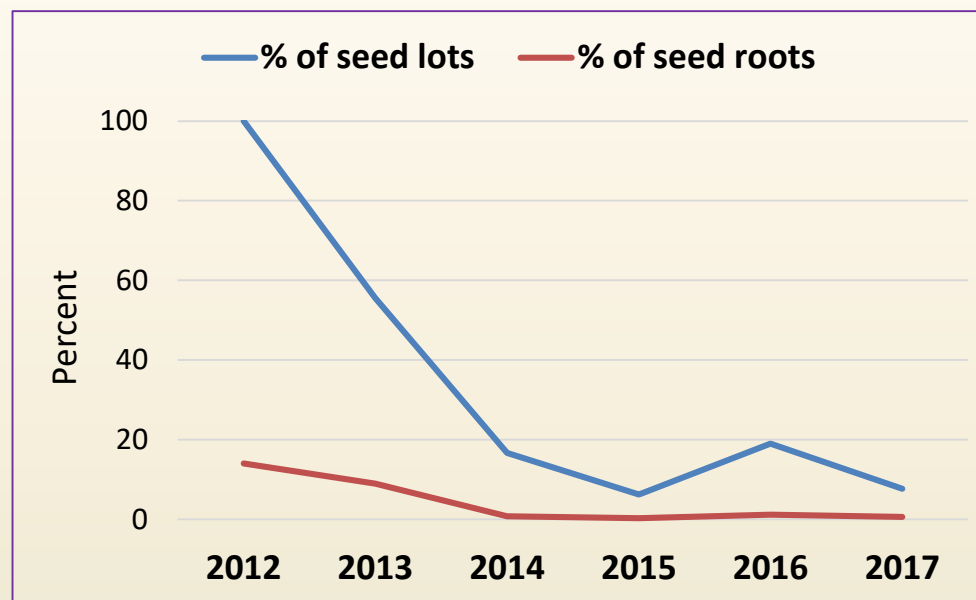


Potyvirus multiplex PCR performed.



Products of PCR revealed by electrophoresis.

4. Quality assurance practices (internal, external)



	2012	2013	2014	2015	2016	2017
Number of seed lots tested	2	18	18	16	21	26
Number of seed lots with infected roots	2	10	3	1	4	2
Number of seed roots tested	125	523	745	380	499	622
Range (%) of seed roots infected	7-21	0-42	0-2	0-4	0-12.5	0-12.5
Overall mean % of seed infected	14	9	0.8	0.3	1.2	0.6

4. Quality assurance practices (internal, external) – trace back capability



- Tracking – need to track back to find problems, e.g. mislabeling, variety mixup, etc.
 - Bar code scanning
 - Still a work in progress

5. Temperature and humidity management



- Temp. Goal = 75-90° F (24-32° C)
 - Heating
 - Double layer plastic is well insulated
 - Two 200,000 btu heaters at opposite ends of the house
 - Cooling (4-stage process)
 - Gabel fan/louvers activate at 80 F/27 C
 - Large louvers open at 83 F/28 C
 - Fan 1 activates at 86 F/30 C, fan 2 at 90 F/ 32 C
 - Evaporative cooling pads activate with fan 2
- Soil Temp. goal = > 75 F, 24 C
 - Irrigation water can drop to 45 F, 7 C, lowering soil temp to 55 F, 13 C
 - Irrigation water is heated to 90 F/ 32 C which can raise soil temp from 55 F, 13 C to 80 F, 27 C
- Humidity
 - High (80-90%) due to overhead irrigation and evapotranspiration
 - Humidifiers are used in rooms with only aeroponics to raise from 30-40% to 75%.

6a. Other measures to reduce unit cost of production; Lighting systems



- Lighting systems
 - Led light is used to extend day length to 16 hours a day
 - 50% red and blue, no white light
 - As the days get longer supplemental lighting is reduced until it is not used at all.



6b. Other measures to reduce unit cost of production; Aeroponics



6b. Other measures to reduce unit cost of production; Aeroponics



- Issues for us
 - Pythium root rot
 - Water too warm
 - Tanks too close to peat mix (possible source of inoculum)
 - Can't sustain plants as long as in potting mix

- Advantages for us
 - Rapid start



Pythium root rot

Other measures to reduce unit cost of production; Staking/trelising



A commercial grower has used hanging baskets, allowing vines to grow down to floor then cutting into segments.

Clean sweetpotato plant production is ramping up in Europe and Australia. They are new and fresh thinking may bring new ideas.



Output measures e.g. multiplication rate; unit cost of production, revenue



Plant Multiplication:

(1 plant) + 7 (weeks) = 3 plants

(1 plant) + 14 (weeks) = 12 plants

(1 plant) + 21 (weeks) = 42 plants

(1 plant) + 28 (weeks) = 150 plants

Cost of production is approximately 50% of our operating budget at SPRS

Sales Revenue – comprises 60% of operating budget (\$200k - \$300k) annually depending on rotation and environmental fluctuations

Varietal turnover including number of varieties per season



Major cultivars for seed:

- Bayou Belle
- Beauregard
- Bellevue
- Burgundy
- Evangeline
- Murasaki-29
- O'Henry
- Orleans

Heirloom cultivars:

- Heartogold
- Okinawa
- Porto Rico
- Texas Porto Rico

Breeding lines, standards, etc.:

- About 30-50 per year
- Some changes every year

Thank you, we look forward to addressing your questions on May 21, 2020

