

# Management Practices for Successful Greenhouse Tobacco Transplant Production

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1

## Greenhouse Tobacco Transplant Production

- ✓ The industry standard for 30 years in the U.S. and adapted in various forms elsewhere
- ✓ Increased annual production costs are **offset** by convenience and reduced labor requirements

2

## What is successful greenhouse transplant production?



3

## Objectives

1. Review our Extension recommendations for greenhouse management
2. Discuss management issues that our growers have experienced



4

## Management practices for successful greenhouse tobacco transplant production

1. Greenhouse sanitation
2. Greenhouse water testing
3. Ventilation and air circulation
4. Temperature control
5. Trays, soilless media, and seed
6. Fertilization
7. Clipping of seedlings
8. Pest control

5



6



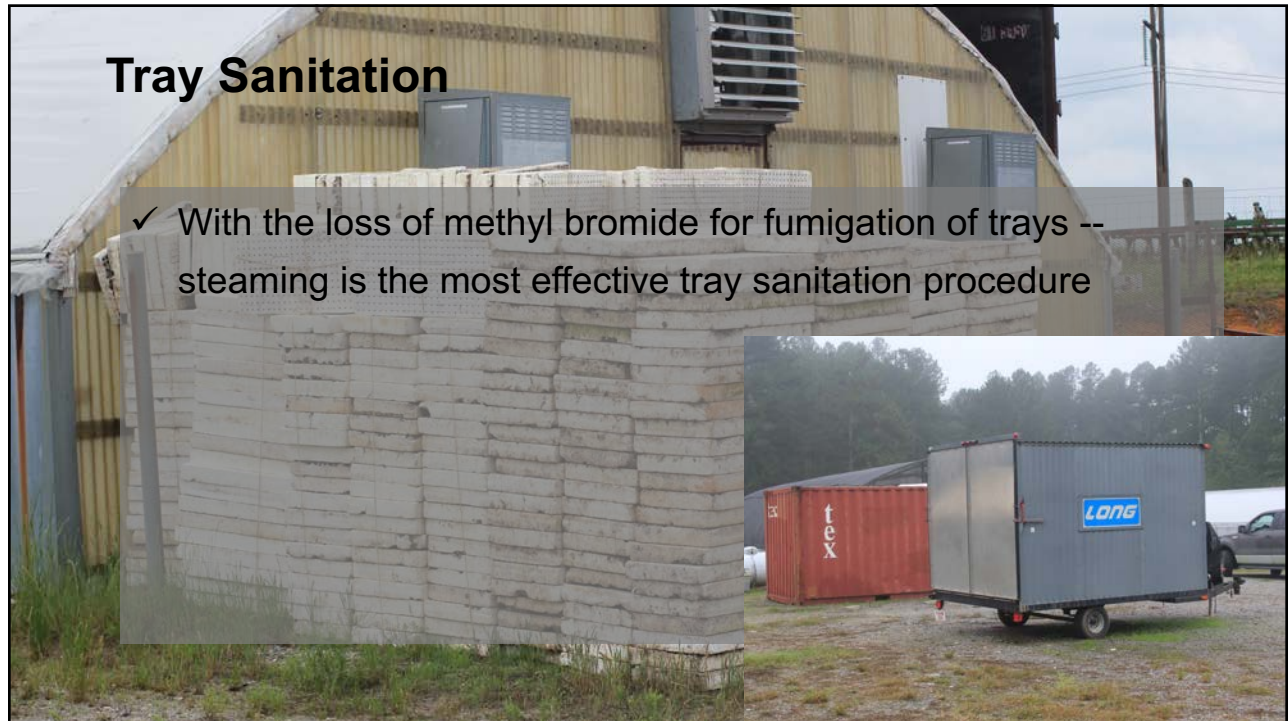
7

## Greenhouse Sanitation

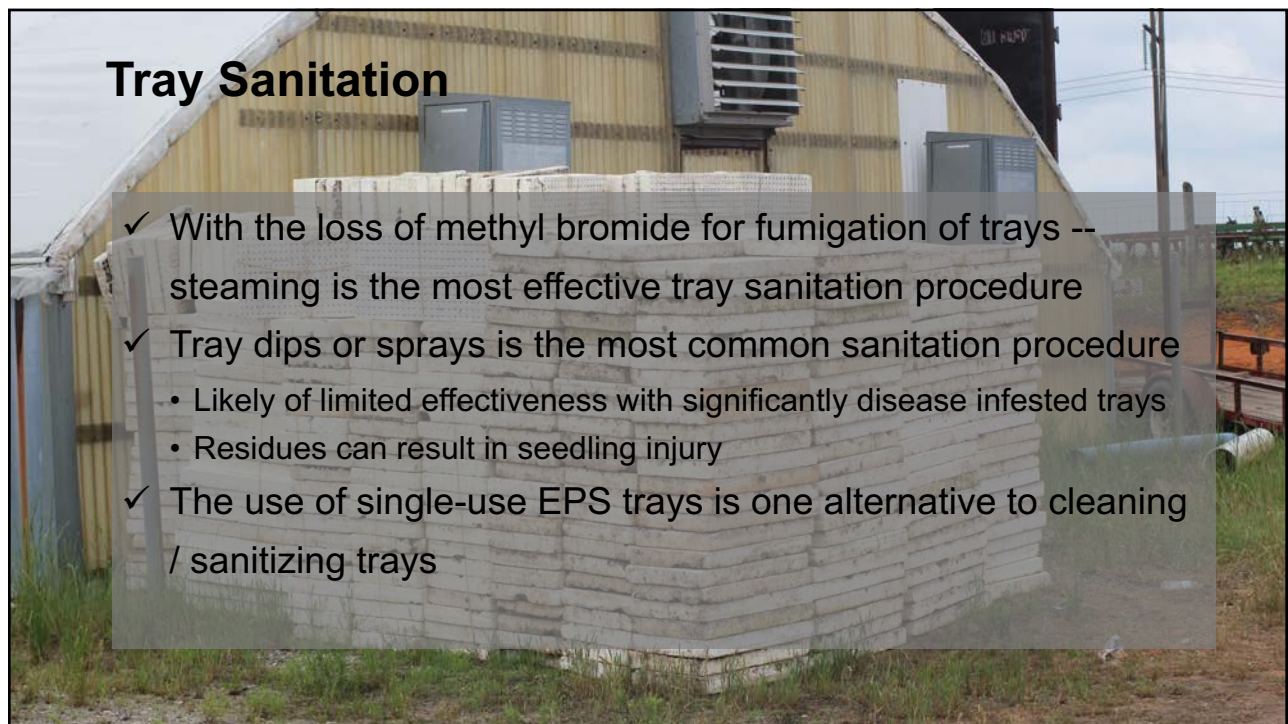
1. Greenhouse structure and surrounding area
  - Remove plant debris and vegetation
  - Avoid wet, muddy conditions near greenhouse entry
2. Avoid potential for contamination
3. Tray sanitation
4. Sanitary clipping of seedlings



8



9



10



11

## Greenhouse Water Testing

<u>Parameter</u>	<u>Desired range</u>
pH	5.8 to 6.5
Soluble Salts (Ec)	0.1 to 0.25 mS
Total Alkalinity as CaCO <sub>3</sub>	40 to 120 ppm

12

## Selecting a fertilizer base on water alkalinity level

ppm CaCO <sub>3</sub>	Management Practice	Fertilizer Choice
Less than 40	Avoid highly acidic or basic fertilizers	16-4-13 15-5-15
40 to 120	No special management (within desirable range)	
120 to 200	Select acidic fertilizers	16-5-16 20-10-20
200 +	<i>Neutralize alkalinity</i> with addition of acid	20-10-20 or 16-5-16

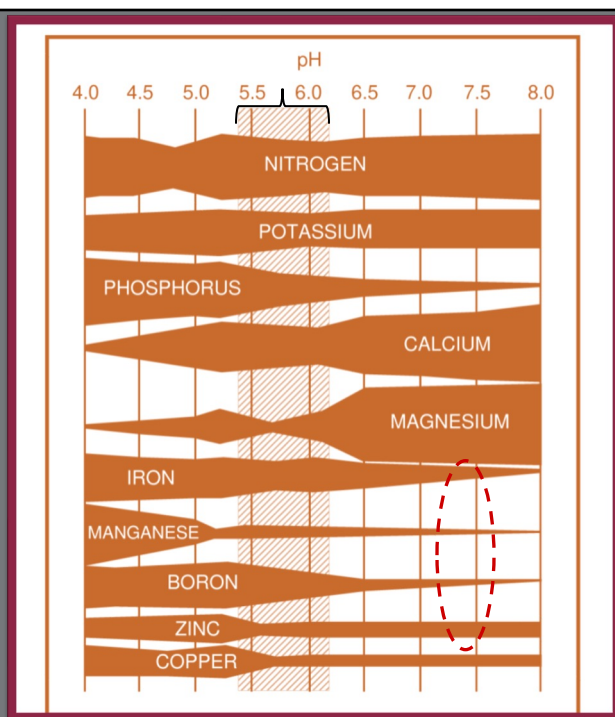
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## Why is soilless medium pH important ?

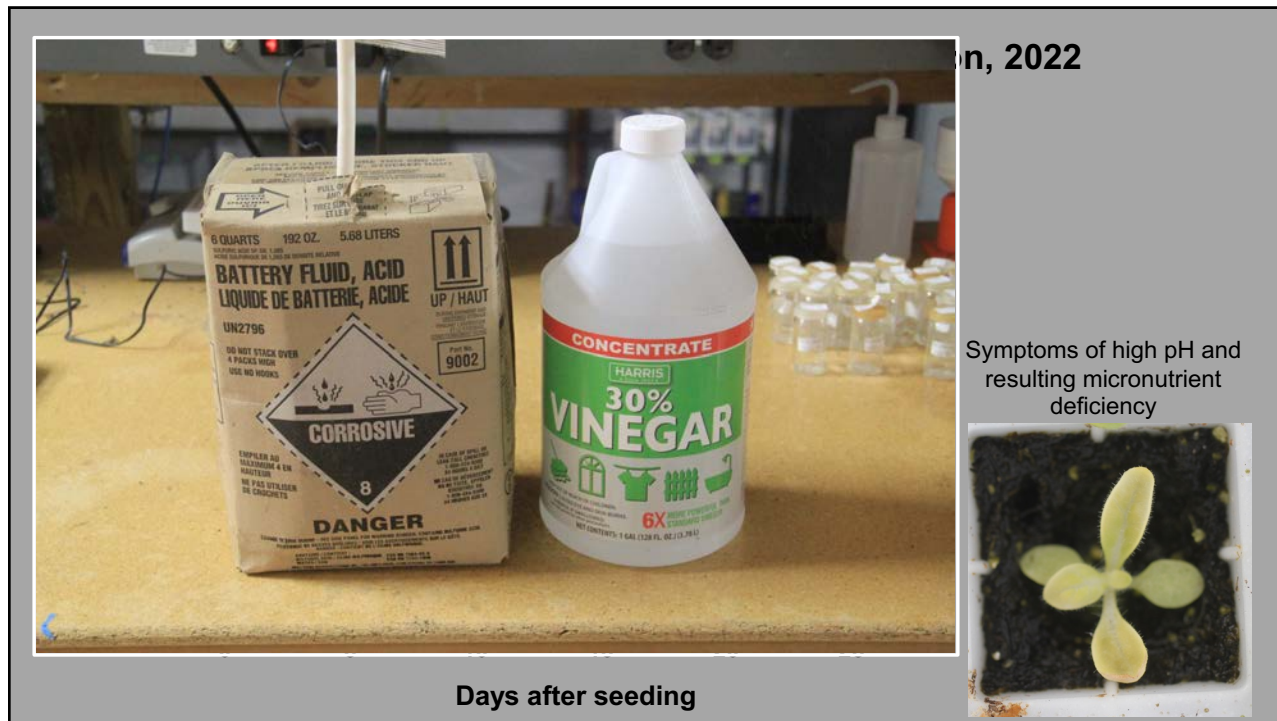
### Nutrient availability as a function of pH

#### Impact of increased pH:

1. Micronutrient deficiencies (esp. Fe, Mn, and B)
2. Reduced P availability
3. Increased Ca and Mg availability (imbalance ?)



14

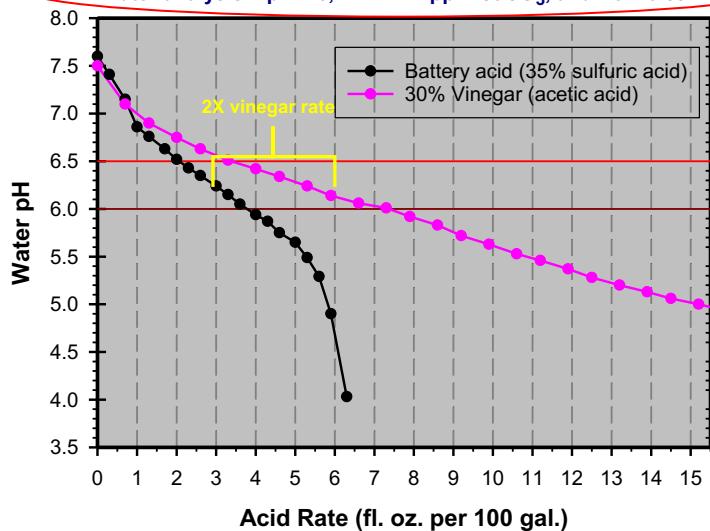


Days after seeding

15

### Comparison of Acids to Neutralize Greenhouse Water Alkalinity

Water analysis = pH 7.6, TA = 222 ppm CaCO<sub>3</sub>, and Ec = 0.59 mS



#### Calculated Battery Acid Rates

pH 6.5 = 2.5 oz per 100 gal.

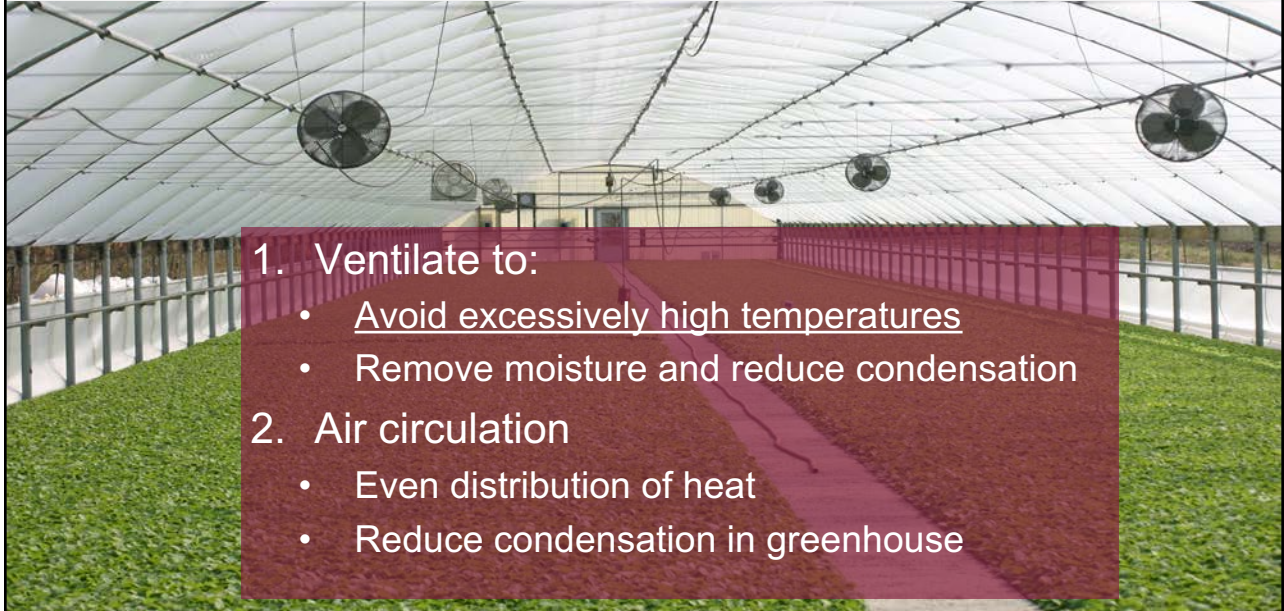
pH 6.0 = 4.3 oz per 100 gal.

1.8 to 2X rate of 30% vinegar compared to battery acid

16



## Ventilation and Air Circulation



1. Ventilate to:
  - Avoid excessively high temperatures
  - Remove moisture and reduce condensation
2. Air circulation
  - Even distribution of heat
  - Reduce condensation in greenhouse

17

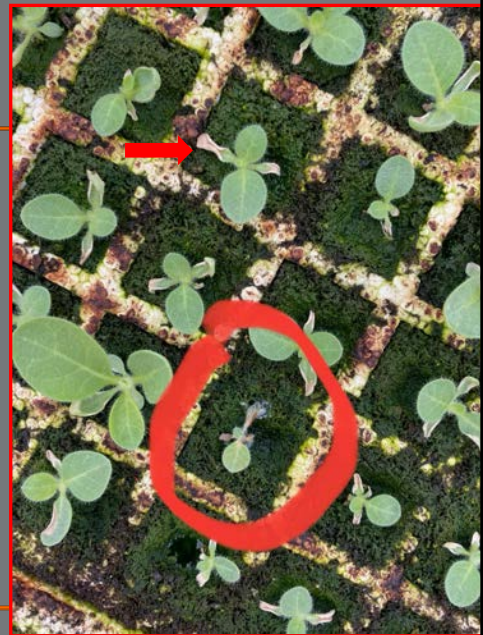
## Temperature control

1. Maintain minimum temperature of 68°F until final seedling emergence is obtained (12 to 14 days)
2. Some amount day to night temperature fluctuation is beneficial for the emergence of some seed
3. Heating can gradually be reduced to harden plants off for transplanting
4. Avoidance of excessive temperatures is equally as important as heating

18

## Excessive greenhouse temperatures

1. Try to avoid temperatures greater than 90°F the first 2 weeks
  - Reduce fertilizer salts accumulation and potential injury
  - Avoid seedling injury and possible mortality
2. Wide swings in day to night temperatures can increase condensation in the greenhouse and thus water dripping onto plants



19

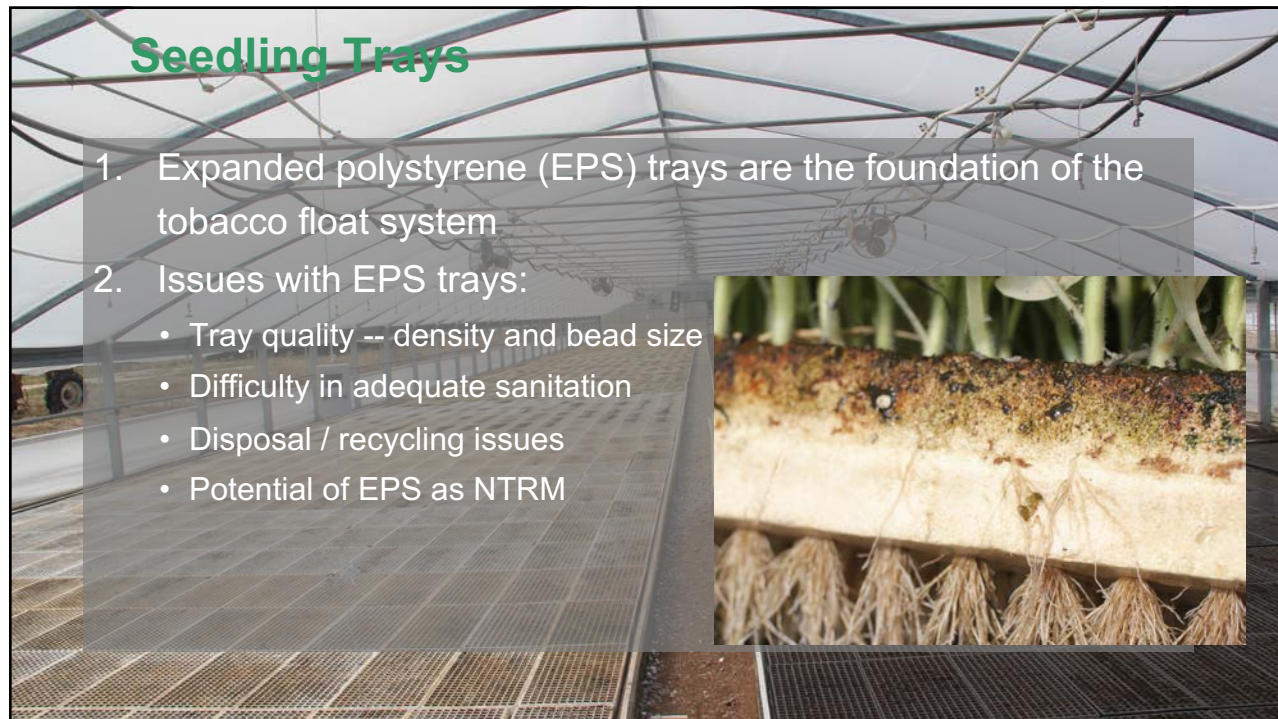
## Air Temperatures Measured near Tray Surface in Two Greenhouses, 2024



20

## Seedling Trays

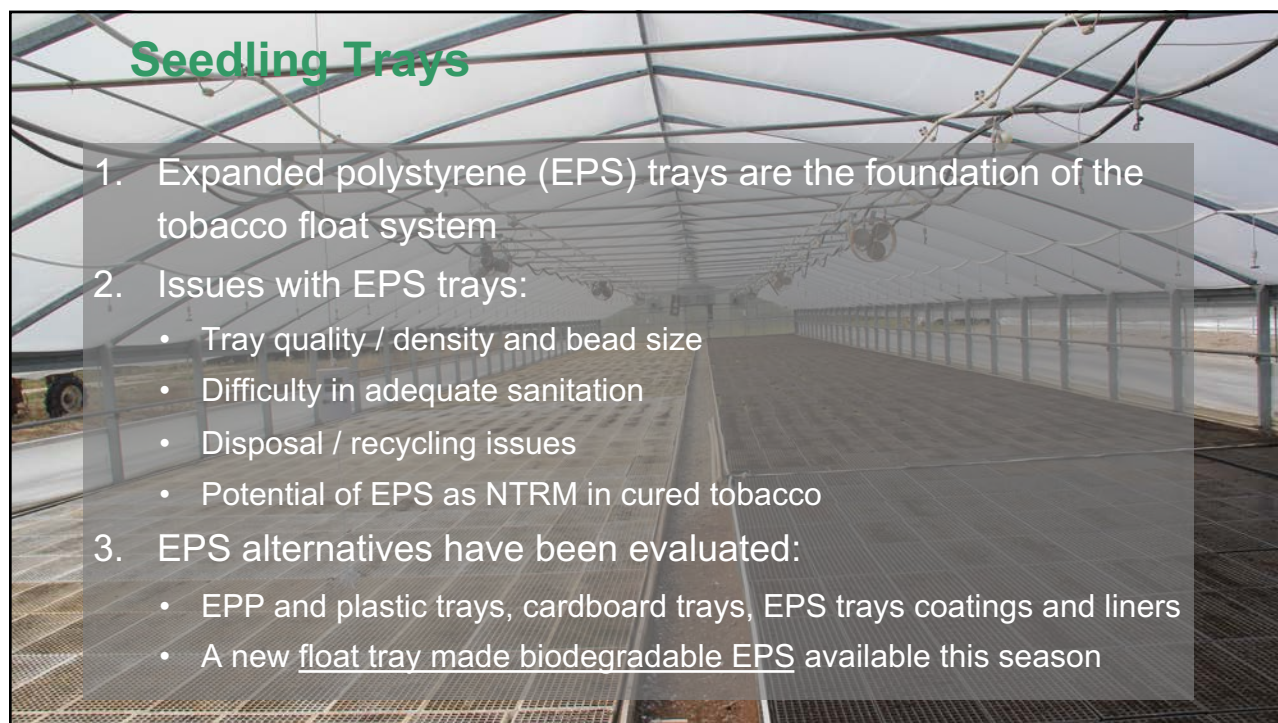
1. Expanded polystyrene (EPS) trays are the foundation of the tobacco float system
2. Issues with EPS trays:
  - Tray quality -- density and bead size
  - Difficulty in adequate sanitation
  - Disposal / recycling issues
  - Potential of EPS as NTRM



21

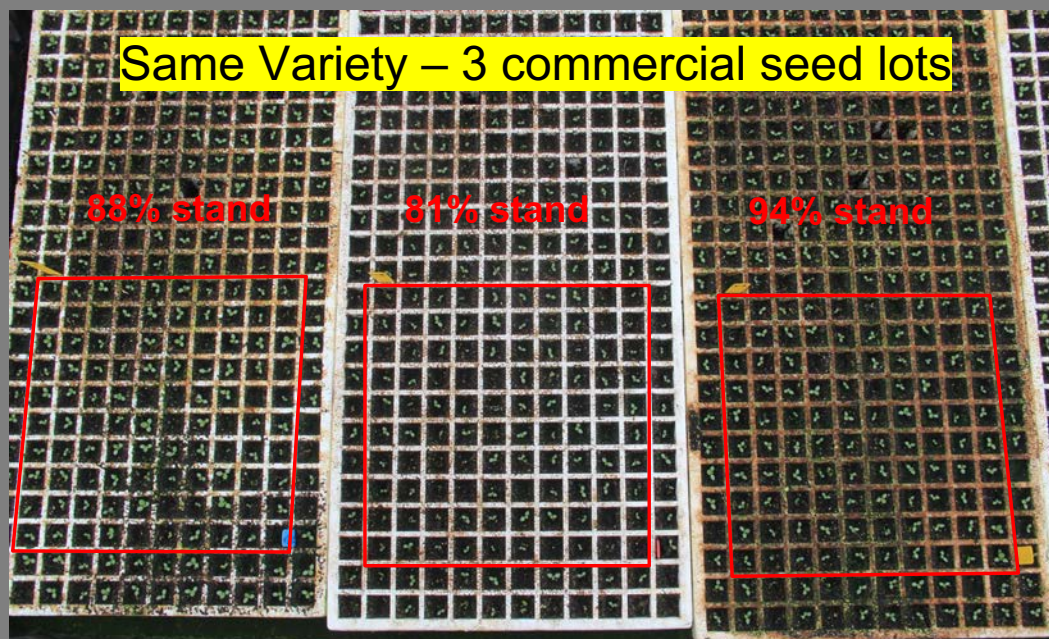
## Seedling Trays

1. Expanded polystyrene (EPS) trays are the foundation of the tobacco float system
2. Issues with EPS trays:
  - Tray quality / density and bead size
  - Difficulty in adequate sanitation
  - Disposal / recycling issues
  - Potential of EPS as NTRM in cured tobacco
3. EPS alternatives have been evaluated:
  - EPP and plastic trays, cardboard trays, EPS trays coatings and liners
  - A new float tray made biodegradable EPS available this season



22

## Variable Seed Performance



23

## Suggested Greenhouse Fertilization Program

1. Add 150 ppm N at 5 to 7 days after seeding
    - certainly at 80% seedling emergence
    - 3 to 5-day lag in movement of fertilizer from bay water to top of cell
  2. Add 100 ppm N at 4 weeks after seeding  
(approximate timing of initial clipping of seedlings)
- ✓ Maintain water depth near 75% of original depth to avoid concentration of fertilizer
  - ✓ Periodically circulate water to maintain uniformity within bay

24

# Clipping of Greenhouse Seedlings

**Reel mower**



- More frequent clipping with relatively minimal removal
- Produces a cleaner, drier clipping of the seedlings

**Rotary mower**



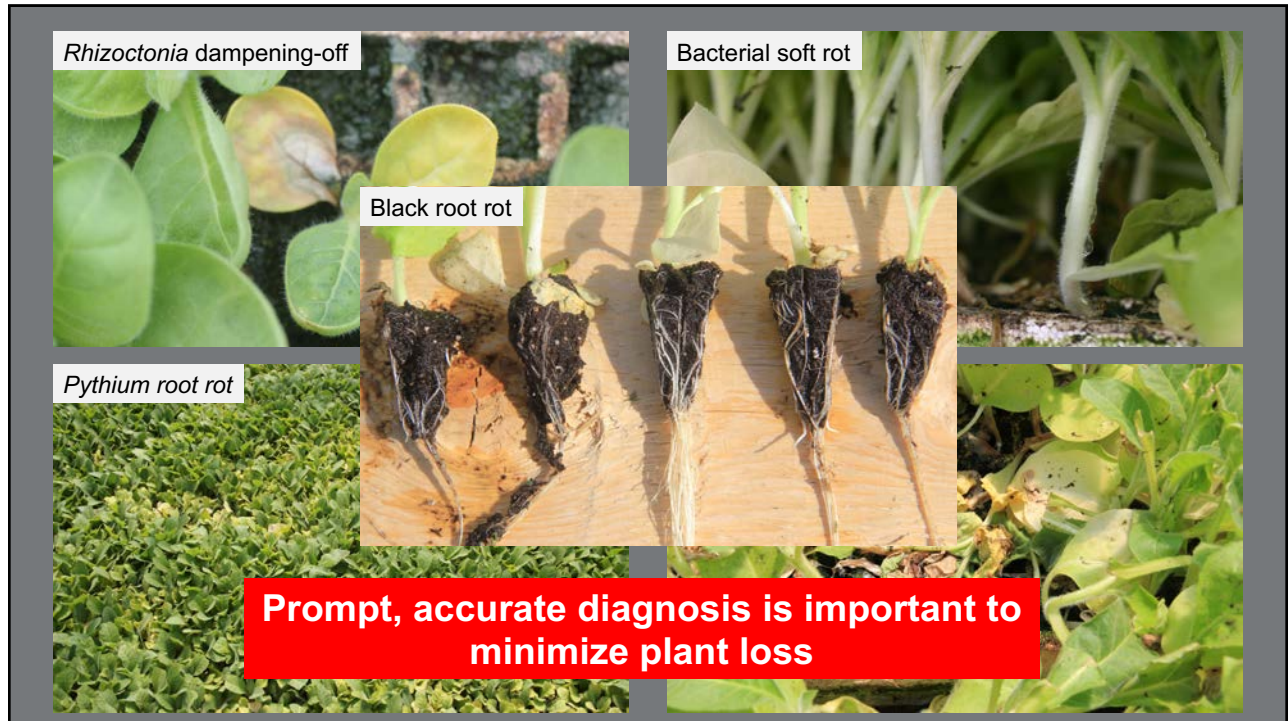
- Less frequent clipping with more removal
- Vacuum provides for more uniformity
- Rotary blade action produces plant sap and wetter clipping material

25

## Pest Management



26



27



28

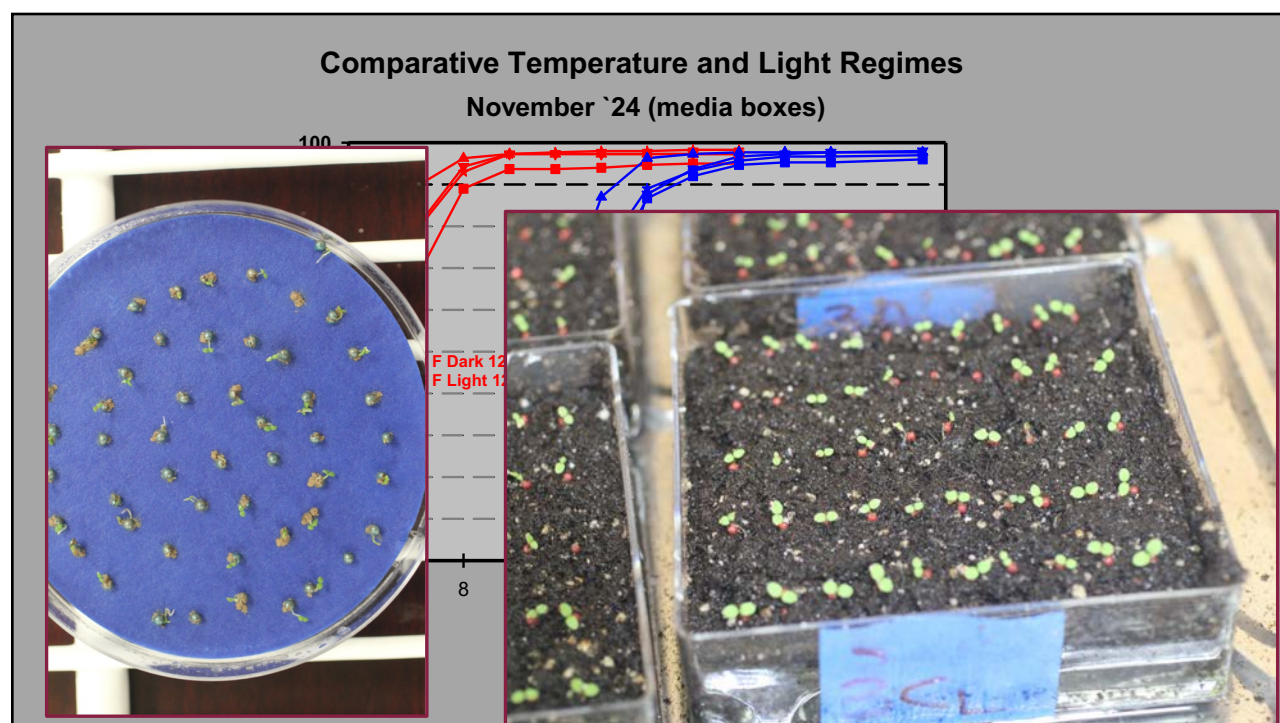
## Topics for Growers to Refocus on with Greenhouse Management to Improve the Yield of Useable Transplants

1. Greenhouse water testing and following recommendations
2. Selection of fertilizer product based on water chemistry
3. More attention to actual fertilizer concentration, timely addition of water and fertilizer, and Ec monitoring to optimize fertilization
4. Observe seedling stand and growth at least daily and seek help early for concerns or issues – before significant plant losses

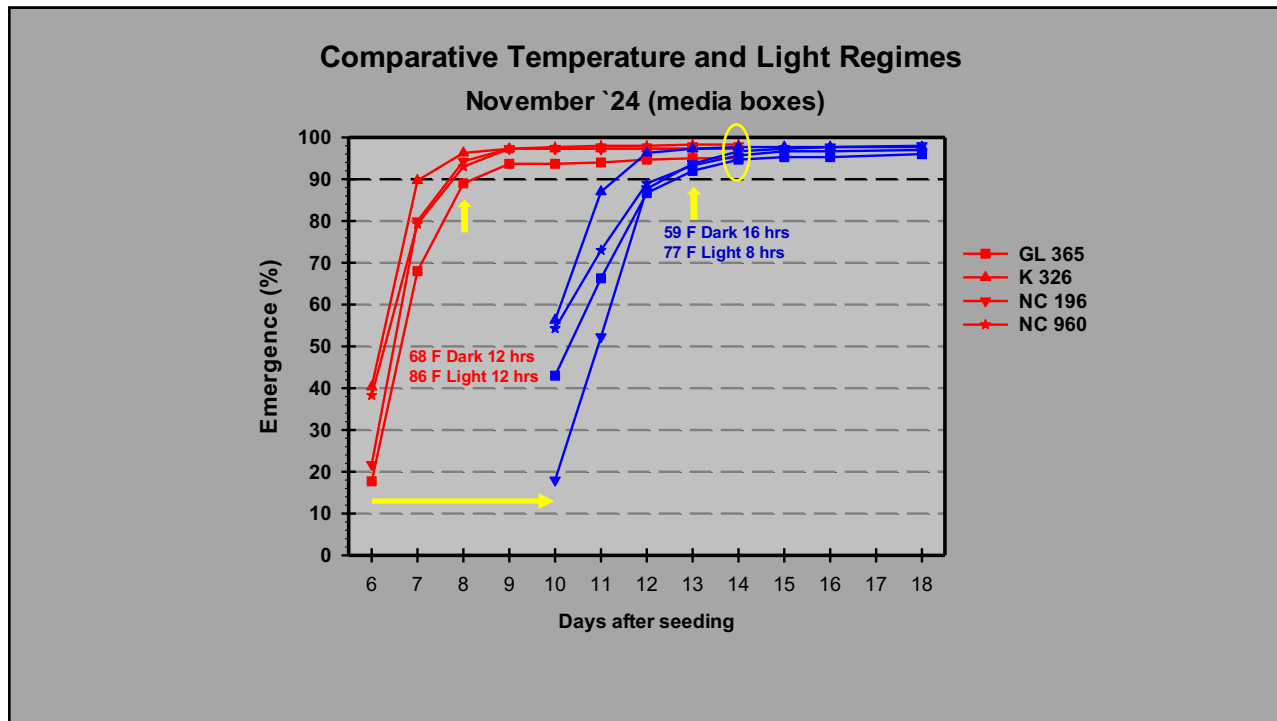
Soilless medium and seed performance are impactful, but largely outside control of grower management



29



30



31



32