



# BEST MANAGEMENT PRACTICES

## IN HIGH TUNNEL PRODUCTION

### Tomatoes for High Tunnels

#### Determinate versus Indeterminate

One of the first choices when beginning high tunnel tomato production is variety. Tomato varieties fall into one of two categories: determinate or indeterminate. Both types of tomatoes can be grown successfully in a high tunnel. Differences in the growth habits, nutritional needs, disease resistance, and fruit attributes of determinate and indeterminate tomatoes will influence the varieties a grower will choose. The following comparison guide will help



*In this photo, determinate plants are on the left with the wooden stakes, indeterminate plants are on the right, individually trained up a length of twine.*

**Determinates** are shorter, with more restricted branching and a concentrated harvest period.

**Indeterminates** are tall and vining with an extended harvest period.



#### Management Considerations: **Trellising**

##### Determinate Varieties

- 4-6' wooden stakes are placed in-row with twine strung horizontally on either side of the row to guide plant growth upward.
- This method may require 6-8 applications of twine to trellis plants adequately.
- Trellising labor ends mid-season due to the determinate growth pattern.

##### Indeterminate Varieties

- Can also be trellised with stakes and twine, but are often grown 'greenhouse style' in high tunnels.
- Plants are pruned to one or two leaders (see pruning section) and attached to vertically suspended twine with plastic clips.
- Small spools allow lowering of the twine as plants grow.
- Indeterminate plants will continue to grow upward and require trellising throughout the season.

## Management Considerations:

### *Pruning Techniques*

#### **Determinate Varieties**

- Require dramatically less pruning than indeterminate tomatoes.
- Approaches vary, but the Cornell Vegetable Program recommends pruning all but the last secondary shoot (suckers) below the first flower, forming a “Y” structure.
- This requires a one-time removal of approximately five suckers.

#### **Indeterminate Varieties**

- All suckers are pruned to create a single dominant growing point, which in turn facilitates vertical trellising.
- Some growers allow two growing points, which are treated as separate plants and pruned of all suckers.
- Pruning is a season long task.



*Strong Y pruning of a determinate plant.*

---

### *Harvest & Yield*

Yield varies by variety, but there are high yielding varieties in both categories. While we have achieved yields of 30 lbs. per plant with both types in our trials, the timing of harvest is dramatically different. Determinate plants have a more concentrated early harvest of fruit, while indeterminate varieties will yield more evenly over the harvest season. Indeterminate varieties are likely to provide more high quality fruit in the late season than determinate varieties.



*Left: Determinate trellis and fruit load*

*Above: Indeterminate vines can be lowered as the season progresses*



## Fertility

As total yields can be similar between determinate and indeterminate varieties, their fertility needs are quite similar. However, with concentrated fruit maturation on determinate varieties deficiencies in potassium, magnesium and phosphorus may develop more quickly than in indeterminate varieties.

Indeterminate varieties, on the other hand, may require more evenly spaced nitrogen applications as their vegetative growth will continue throughout the season. Based on fertility needs, growers should consider their ability to deliver soluble nutrients such as nitrogen and potassium in both scenarios.



## Labor

Indeterminate varieties require ongoing pruning, clipping and harvesting, while determinate varieties are trellised and harvested over shorter periods. However, the upright open canopy of indeterminate varieties facilitates easier harvest. Harvest of determinate varieties requires kneeling and searching for ripe fruit within the dense canopy.



The foliar disease of primary concern in high tunnels is Brown Leaf Mold, caused by the fungus *Passalora fulva*. This disease is more severe in tunnels than in the field and varietal resistance is the primary management tool. There are more indeterminate tomatoes with resistance than determinate, but several resistant determinate varieties are now on the market.

*In this picture, Rebelski is on the left and is leaf mold resistant. On the right is SunGold, a susceptible variety.*

For more on information on brown leaf mold *Passalora fulva* and a list of resistant varieties by Amy Ivy visit: <http://www.nnyagdev.org/wp-content/uploads/2011/12/Leaf-Mold-on-Tomatoes-final.pdf>

## Marketing Considerations: *Fruit*

The physical and sensory qualities of the tomato fruit may be the most important factor in varietal selection. Growers who seek firm fruit suitable for wholesale packing and shipping can find satisfactory varieties in both categories. Heirloom tomatoes, renowned for their taste and unique colors, are nearly all indeterminate. Satisfying the demands of the market is critical to success. Once the desired fruit attributes have been determined, a suitable variety can then be selected in either the indeterminate or the determinate category.

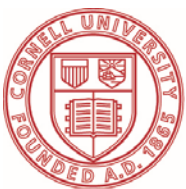


Varieties to Consider for the High Tunnel		Determinate	Indeterminate
Primo Red	<i>disease resistant hybrid for packing or direct sales</i>	✓	
Red Mountain	<i>disease resistant hybrid for packing or direct sales</i>	✓	
Red Deuce	<i>disease resistant hybrid for packing or direct sales</i>	✓	
Geronimo	<i>disease resistant hybrid for packing or direct sales</i>		✓
Rebelski	<i>disease resistant hybrid for packing or direct sales</i>		✓
Panzer	<i>disease resistant hybrid for packing or direct sales</i>		✓
Rose de Berne	<i>pink, medium sized heirloom</i>		✓
Nyagous	<i>'black', medium sized heirloom</i>		✓
Arkansas Traveler	<i>red, medium sized heirloom</i>		✓
Pike County Yellow	<i>yellow, large sized heirloom</i>		✓

### Useful Websites:

**Cornell High Tunnels:** <http://www.hort.cornell.edu/hightunnel>

**Team High Tunnel Websites:** [http://cvp.cce.cornell.edu/greenhouse\\_tunnels.php](http://cvp.cce.cornell.edu/greenhouse_tunnels.php) And [http://enych.cce.cornell.edu/greenhouse\\_tunnels.php](http://enych.cce.cornell.edu/greenhouse_tunnels.php)



**Cornell University**  
Cooperative Extension

Prepared November 2014 by Cordelia Hall

Judson Reid and Amy Ivy, Project Coordinators

Photo credits: Amy Ivy and Judson Reid

*This publication was supported by the Specialty Crop Block Grant Program at the U.S. Department of Agriculture through a grant from the New York State Department of Agriculture and Markets. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA or NYSDAM.*

*Building Strong and Vibrant New York Communities*

Diversity and inclusion are part of Cornell University's heritage. We are a recognized employer and educator valuing AA/EEO, Protected Veterans, and Individuals with Disabilities.