Training and Pruning Tall Spindle Apple Orchard System

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High Density Systems, using **dwarfing rootstocks**, apply to Vertical Axe, Slender Spindle, Super Slender Spindle and Tall Spindle

- No understanding of framework necessary.
- Central leader remains dominant by tying to vertical support or wires
- Can allow fruit to develop with minimal consequences
- Ignore rules of branch spacing applied to CL
- The 50% rule does apply: leave only small weak branches, remove branches > 50% caliper of leader;
  - In fact, closer spacings ratchet down to removing branches greater than 30 % of leader

Our apple industry has transformed from low density at 70 trees / acre to 400-700 trees per acre Vert Axe System

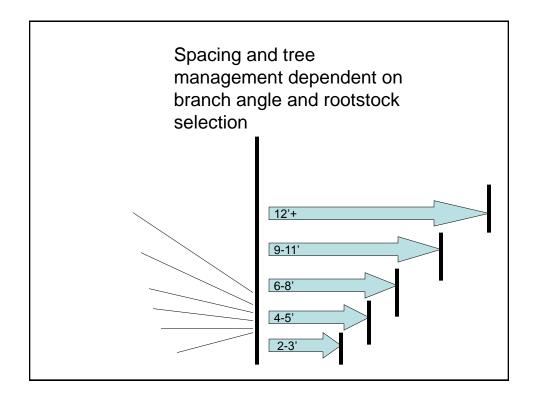# Pruning High Density Trees; Vertical Axe and Tall Spindle

- Limit height of tree to 80-90% of between row spacing by cutting leader to a weak side branch
  Example -15 ft row spacing (depends on variety/stock)
  - 13.5 ft high – 90%
  - 12.0 ft high – 80%

- Keep only branches that are 50% diameter of leader. Remove all which are larger above shoulder height. Shorten those below in VA. Recycle all in Tall Spindle.
- Prune/recycle 2-3 branches greater than 1 inch diameter bevel cut.
- Additional Gala rule: Shorten pendant branches back to point where branch diameter exceeds diameter of pencil (T. Robinson recommendation).

Pruning and Training Principles

- Keep only weak branches
- Remove upright and strong growing branches
- Keep horizontal and pendant branches
- Make mostly thinning cuts; tipping cuts only in special situations such as forcing of laterals in an area devoid of branches.
- Make "Dutch" or bevel cuts on branches > 3-4 yrs of age to recycle back to Axis.
- Tie or weight branches as much as possible especially new succulent branches in the summer (June 22-July 15).
- Wait to reduce tree height in mid summer; focus on thinning cut to weak or fruit bearing lateral.

Not preferred approach to lowering Tree ht…winter time Excessive watersprout response

Spacing and tree management dependent on branch angle and rootstock selection

12'+

9-11'

6-8'

4-5'

2-3'

Tying (webbing) branches, fundamentals of Slender Spindle Training

Headed feathered tree for Vertical Axe or Slender Spindle @ planting
Bend feathers below horizontal for SSS and TS and do not head at planting

Weighting or bending branches in summer, key to weakening – simulate effects of fruit

Wait till mid summer to lower tree height, thin to lateral fruit bearing branches

N. Spy / B.9

Scion Variety / Vigor make major difference.

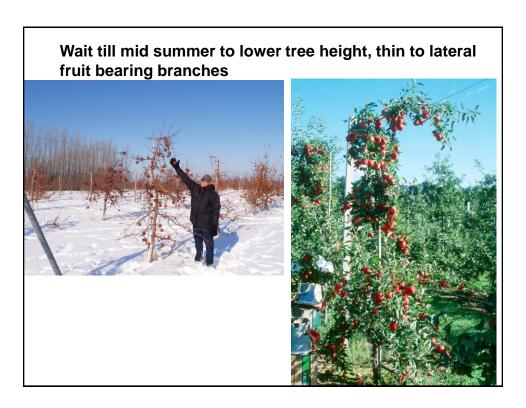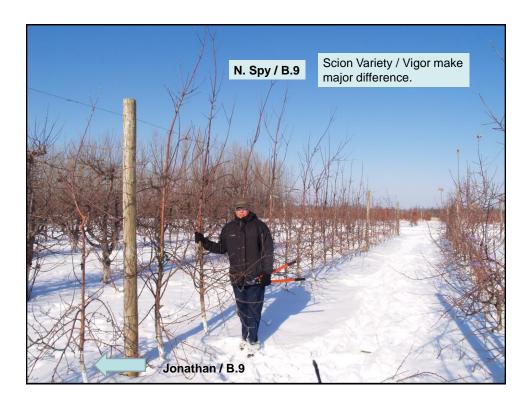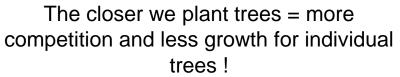Jonathan / B.9

Rootstock Selection

- Must know soil type to determine best rootstock and for plant spacing.
- Generally, the stocks found best to work with are the upper vigor group of M.9s for Vert Axe & Tall Spindle unless vigorous soils
  - M.9 RN 29 (also known as ReNic 29)
  - M.9 EMLA
  - G.16 (required virus free budwood), G. 11
- Vigorous soils or Vert Axe & Tall Spindle
  - M.9 NAKB 337
  - G. 41
  - Bud.9 (cold hardy, weakest of the three, & FB resistant)
- Weak soils or N. Michigan, especially 'Honeycrisp'
  - G.935 or G.30
  - M.26 (problem for Fireblight)

Selecting the Right Rootstock

Gala / B.9

Gala / P.2

The closer we plant trees = more competition and less growth for individual trees !

Tall Spindle System

. Need to plant feathered trees; do not prune at planting.

. Spacing:

* Tree Row: 2-4 ft apart (3 ft most desirable, depending on soil type).

* Alleyway space: 10-11 ft

Bend all laterals/feathers down at planting. No heading cuts.

New branches need to be pinned and banded down as they begin to grow in season

1. Trees with large feathers; remove the 2 largest feathers but leave the leader and feathers unheaded. T. Robinson, Cornell Univ, GLXPO 2009.
2. Tie down (up to 10) all remaining feathers to suppress their vigor. (TR)
3. Do not prune trees with many short feathers. TR

1. Allow fruit in yrs 1 & 2 on size of tree.
   – No fruit on weak trees and more on vigorous trees.
2. Fruit at end of first growing season 2009 following fall 2008 planting

2/2/2012

Keep Only Weak Branches in the System

- Retaining fruiting branches
  - Keep branches that are:
  - 33% - 50% of leader size Tall Spindle and SSS
  - remove at least 2-3 branches ¾"- 1" diameter per tree on mature trees.

Recycling branches by making "Bevel Cuts"

Bud forced on upper side Of branch stub (cut).

Bud forced from under side Of branch bevel cut.

Mature Pruning of Tall Spindle

Limit height of tree by cutting leader to a fruitful side branch at optimum tree height (0.9 X row spacing).

Remove 2-3 branches per year >3/4 inch diameter or that are longer than 3' (2 cut rule).

From: T. Robinson, 2011 GLFW

No permanent branches.
All branches smaller than 1" diameter

Top of tree cut to weak lateral

From: T. Robinson, 2011 GLFW

Tall Spindle is Similar to Vertical Axe System except that all branches are temporary not just the upper eschelon

Leader supported "Vertical Axe

Branch angle on Table of Production should be horizontal

Canopies will have to be narrow to accommodate visibility and access by mechanical instruments, mechanical assist and camera lens of visual robotics

Narrow Canopy   **Wide Canopy**

Future orchards must have trees with narrow canopies and closely planted; Tall Spindle or Vert Axe or <u>whatever the name of the system!!</u>

Gala / B.9 Vert Axe 9th season