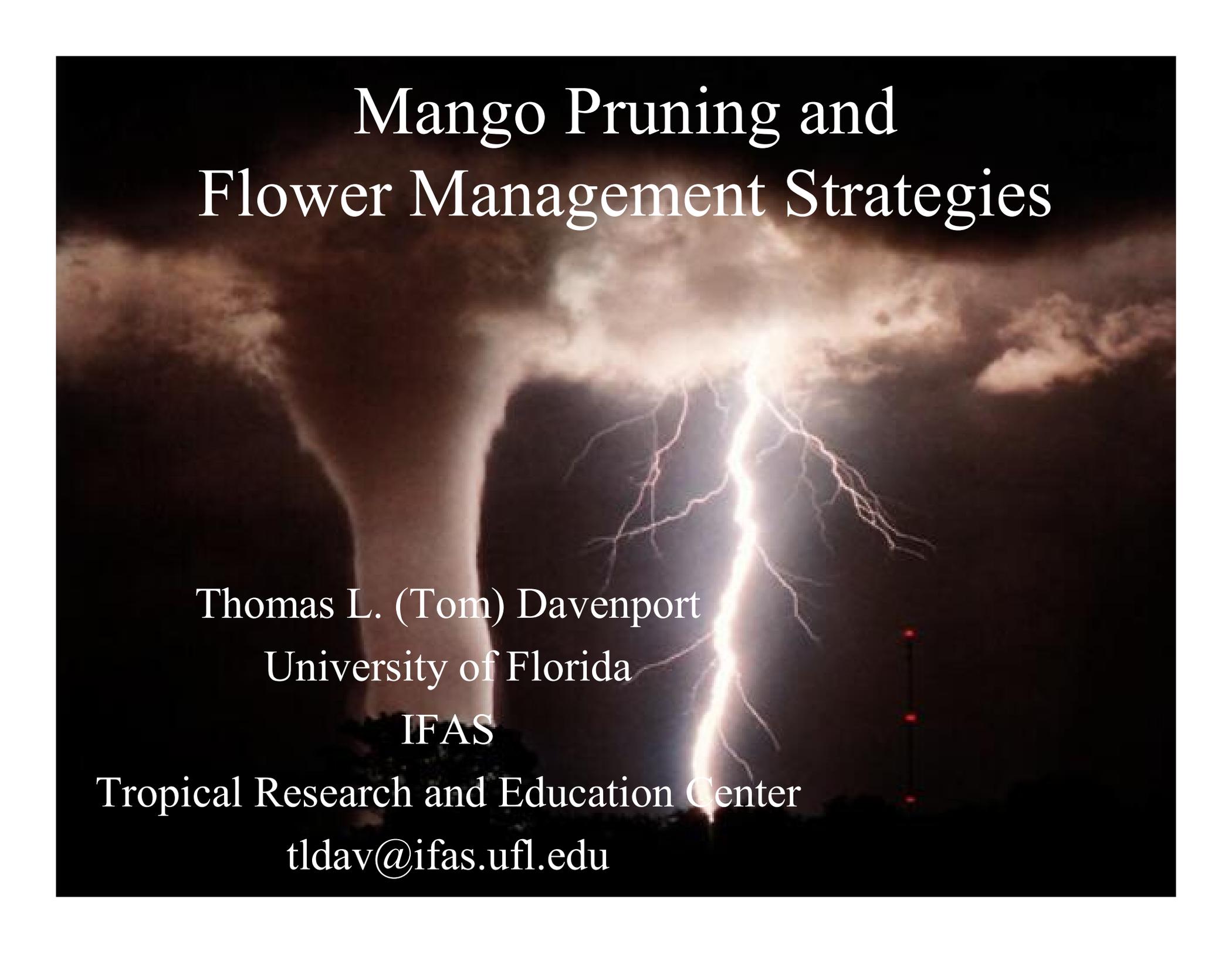


# Mango Pruning and Flower Management Strategies



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# Pruning is Unavoidable for Consistent Long-term Mango Production

- Avoids Development of Large Trees
- Rejuvenates Large Trees in Old Orchards
- Speeds Development Time of Young Trees
- Maintains Shape and Size
- Synchronizes Vegetative Growth and Flowering Events
- Better Disease Control
- Maximizes Yield

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# Mango Pruning

- Severe Prune
  - Rejuvenate Large Trees
- Formation or Shape Prune
  - Correct Tree Size & Shape
- Tip Prune
  - Rapid Plant Development
  - Multiply Number of Flowering Stems
  - Slow Tree Growth
- Synchronize Growth Flushes

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# Severe Prune

- Rejuvenate Large Trees in Old Orchards
- Make Cuts Low (<2 Meters) so Regrowth Begins Low
- Tip Prune Every Three or Four Months to Maximize Terminals
- One- to Two-Year Production Loss



Non-pruned Trees Have  
an Efficient Production  
Life  
of About 20 Years

# Fruit in Upper Canopy Cannot be Harvested Without Monkeys



# Overgrown Orchard

A photograph of a dirt path winding through an orchard. The trees are tall and dense, with some fruit visible. The ground is covered in tall grass and weeds. The sky is blue with some clouds.

The grower should be driving these trees.  
These trees are driving the grower (crazy).

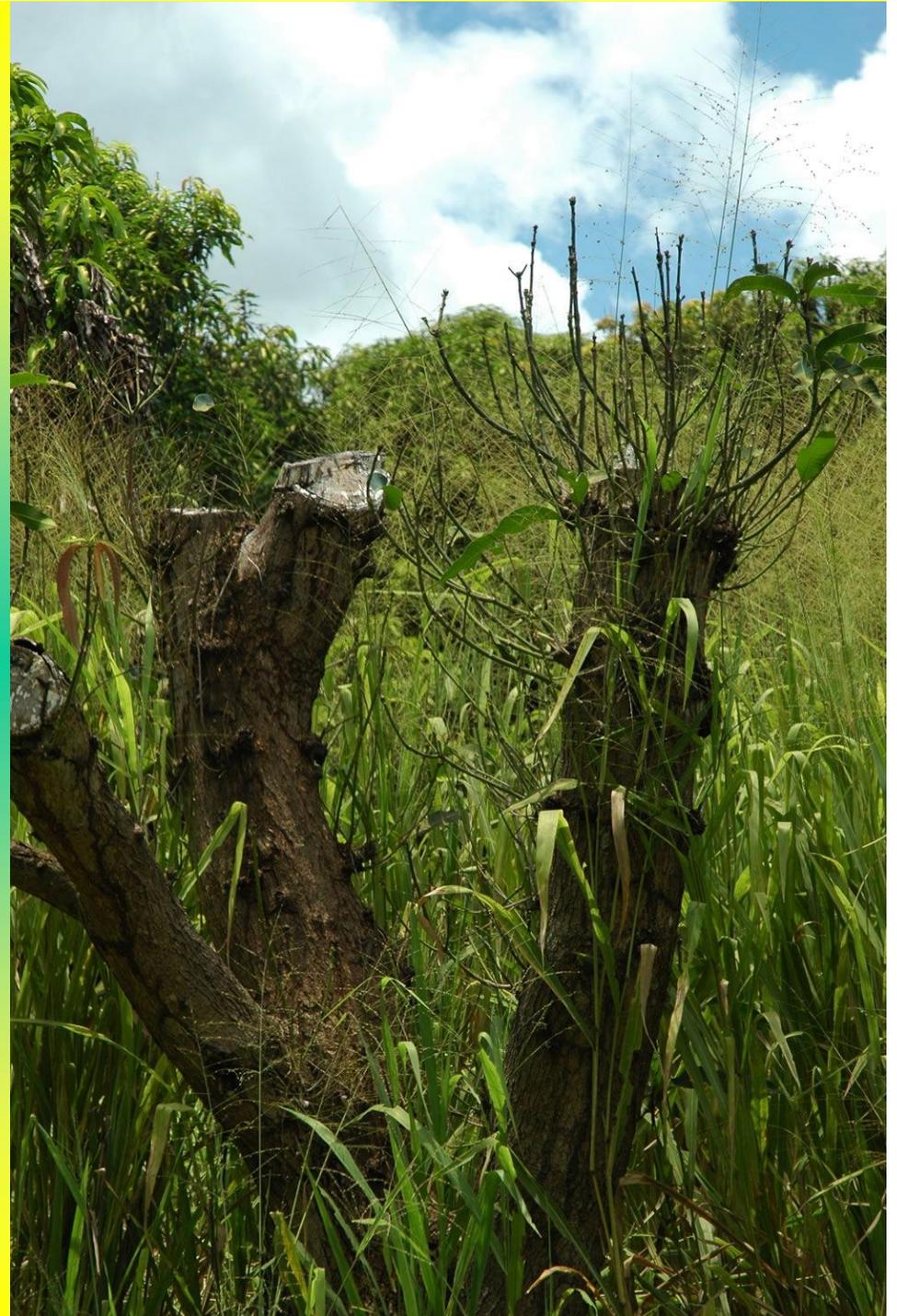


## Tree Grows From the Prune Point

# This is the Place to Cut the Tree

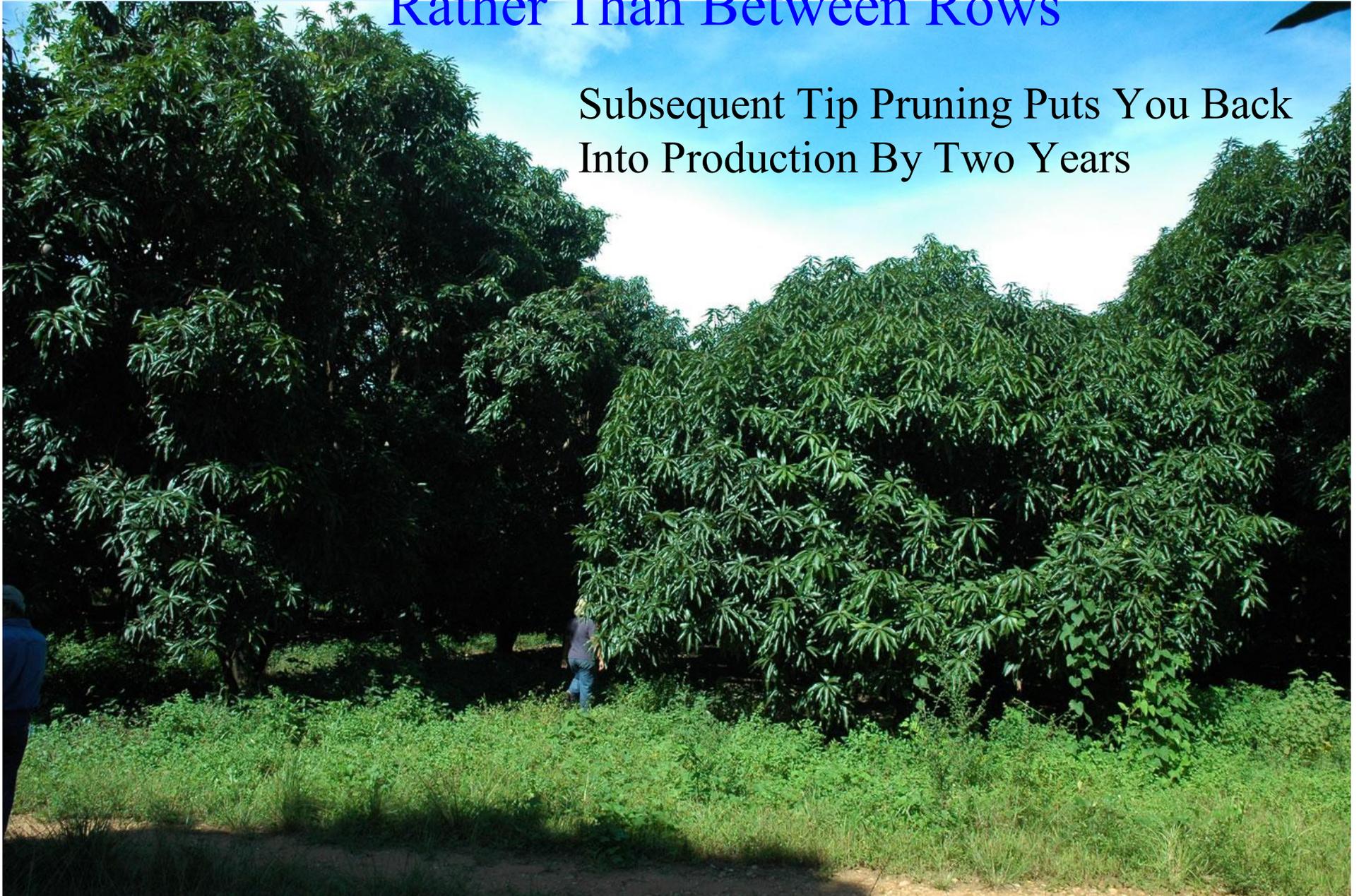


Pruning Stimulates  
Initiation of Many Shoots



# Trees Respond Best When Pruned in Blocks Rather Than Between Rows

Subsequent Tip Pruning Puts You Back  
Into Production By Two Years



# Before Severe Prune



Quinta la Cabuya

# Quinta la Cabuya





Despite the pain  
rivaling the loss  
of your first-borne child,

**JUST SAY YES**

You will get over it  
when your crop comes in  
two years later.

You must drive the orchard.  
Don't let it drive you crazy.

# Tools Suitable for Severe Pruning

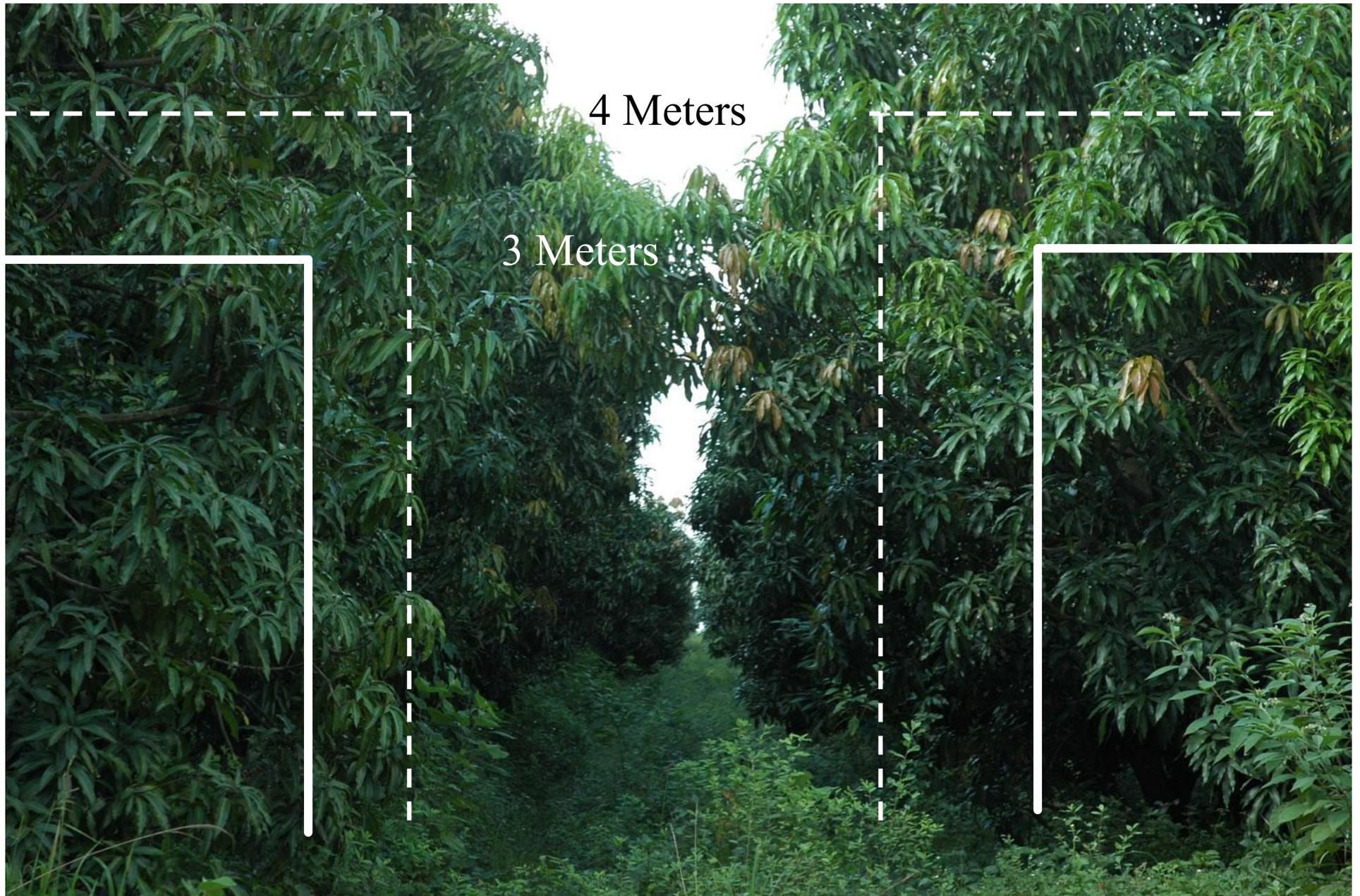


# Formation or Shape Pruning

- Prune Intermediate Sized Branches
- Mold to Desired Canopy Shape
- Cuts Should Be  $\frac{1}{2}$  to 1 Meter  $<$  Final Desired Canopy Shape
- Tip Prune Every Three or Four Months to Maximize Terminal Numbers
- Facilitates Orchard Management of a Flowering Program

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# Reaching Maximum Productive Canopy Size at La Gloria



# Ideal Time for Shape Prune of Large Trees



Shape Prune Should be 1 Meter  
Less Than Final Desired Size



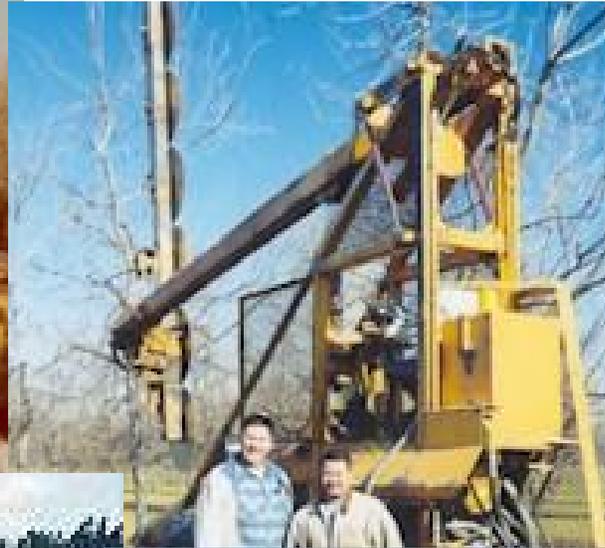
# Tools Suitable for Severe Pruning



# Hand Tools Suitable for Shape Pruning



# Pruning Machines Suitable for Shape Pruning



# Shape Prune



Quinta la Cabuya

# One Year After 2004 Shape Prune 2005



‘Tommy Atkiins’  
Quinta la Cabuya

Two Years after 2004 Shape Prune  
Last Tip Prune in September 2005  
Good Production 2006 After Two Applications of  $\text{KNO}_3$



‘Tommy Atkiins’  
Quinta la Cabuya

# Before Shape and Tip Prune



Finca Mangos de Matanzas

# Shape and Tip Prune



Finca Mangos de Matanzas

# Two Weeks After Shape and Tip Prune



Finca Mangos de Matanzas

# One Year After Shape and Tip Prune



Finca Mangos de Matanzas



Eleven flushes in one year.

Branched one time.

Tip pruning would have reduced the height and increased branching.

# Shape Prune 2004



‘Haden’  
Finca CAEI

# One Year After 2004 Shape Prune 2005



'Haden'  
Finca CAEI

# Two Years After 2004 Shape Prune 2006

Synchronizing Prune in June 15, 2006 'Haden'

July 15, 2006 'Parvin'

August 15, 2006 'Keitt'

4% KNO<sub>3</sub> Application October 15, 2006 'Haden'

November 15, 2006 'Parvin'

December 15, 2006 'Keitt'

Flowering in

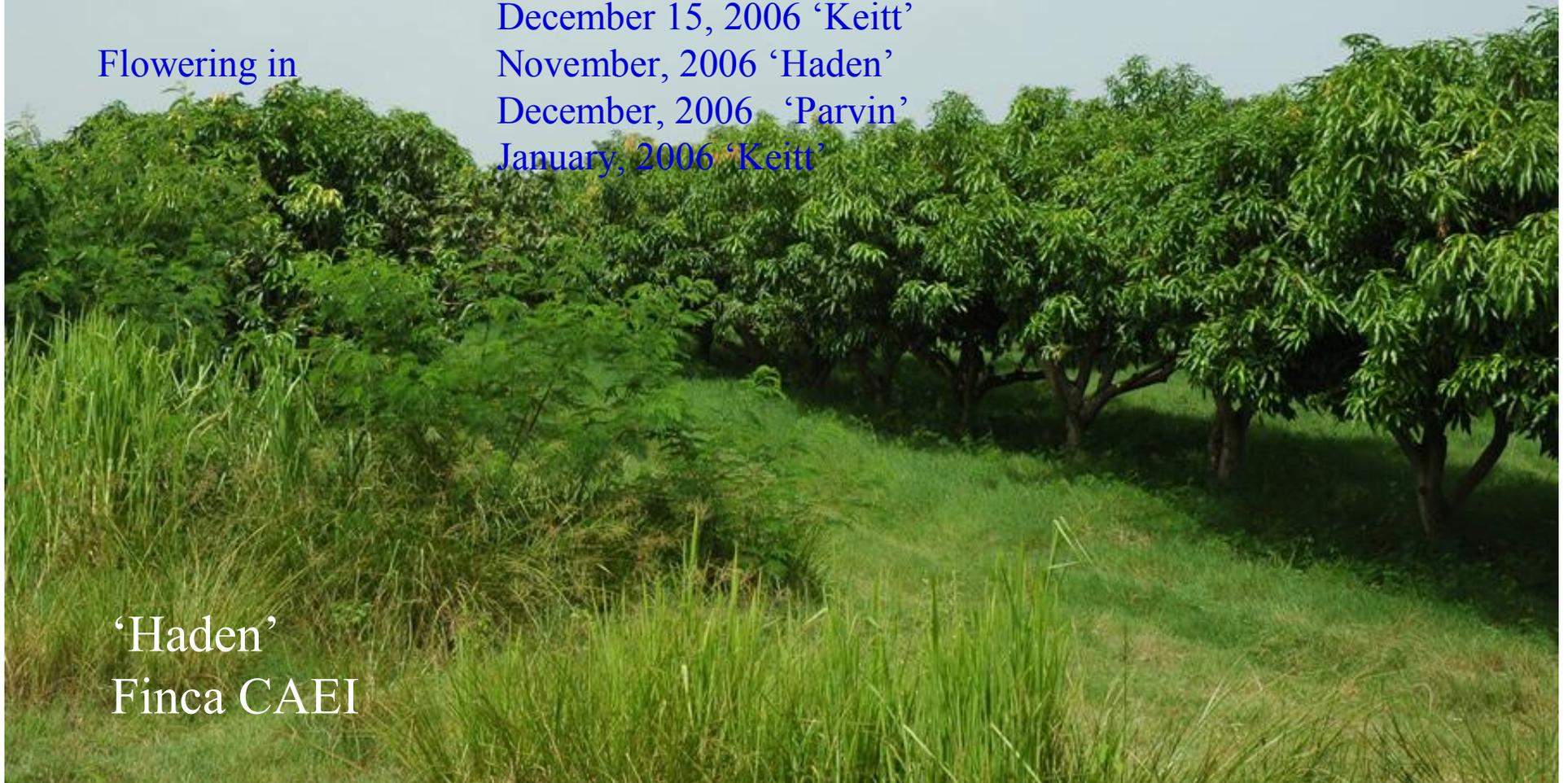
November, 2006 'Haden'

December, 2006 'Parvin'

January, 2006 'Keitt'

'Haden'

Finca CAEI



# Shape Prune or Severe Prune? 2005



'Haden'  
Finca CAEI

# Shape or Severe Prune? 2005



‘Haden’  
Finca CAEI

# One Year After 2005 Shape and Severe Pruned Trees 2006



‘Haden’  
Finca CAEI

One Year After 2005 Shape and Severe Pruned Trees 2006  
Tip Pruned Four Times for Synchronized Flowering with KNO<sub>3</sub>



‘Haden’  
Finca CAEI

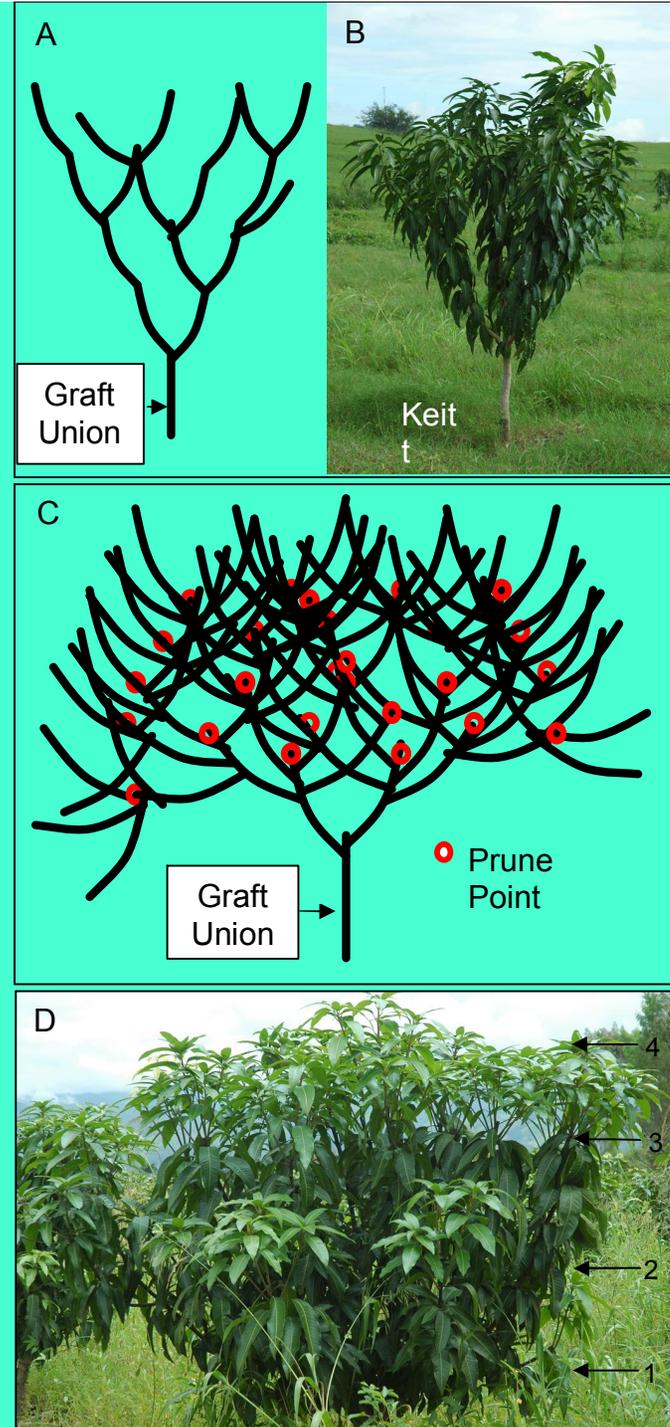
# Tip Prune for Rapid Development of Juvenile Trees

- Force Frequent Growth Flushes
- Increase Branching
- Full Rapidly Growing Canopy
- Begin Production in 2 to 3 Years After Planting

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Sunset Flowers

# Change in Tree Architecture Due to Frequent Pruning



# One Year Old 'Keitt' Tip Pruned Three Times

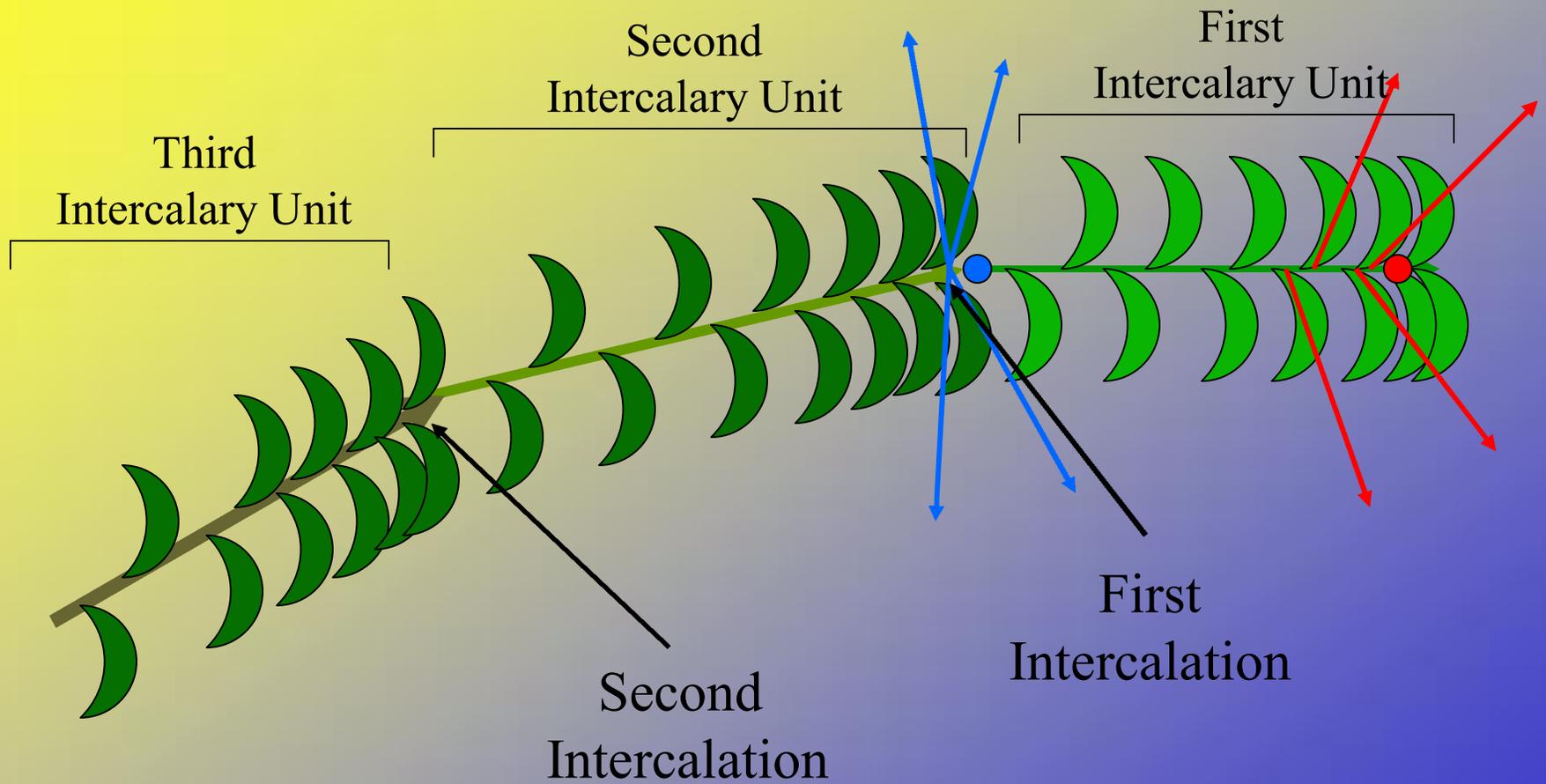


Finca Cesar Paniagua

# Tip Pruning Young Trees



# Tip Prune



If You Prune  
at the Tip



# If You Prune Above Intercalation





Tip Prune New Stems Following  
Severe or Formation Prune Three  
or Four Times in the First Year

Maximize Branching for More Terminals  
Reduce Frequency of Flushes  
Essential for Rapid Return to Flowering

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Violet Garland



Eleven flushes in one year.

Branched one time.

Tip pruning would have reduced the height, increased branching, and promoted earlier flowering.

# Tip Prune for Synchronized Flushes of Growth

- Stimulates Branching
- Synchronizes Growth Activities
  - Floral Induction
  - Disease Control
- Removes Growth Inhibiting Floral Rachis

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# Tip Pruning Multiplies Number of Stems



# Asynchronous Growth Results in Asynchronous Flowering



# Tip Prune Synchronizes Growth





Tip Pruning Removes  
Previous Season's  
Fruiting Structures

They Inhibit Initiation  
of Flowering

# Pruning with Machete



## The More Stems Cut, The Better the Growth Response



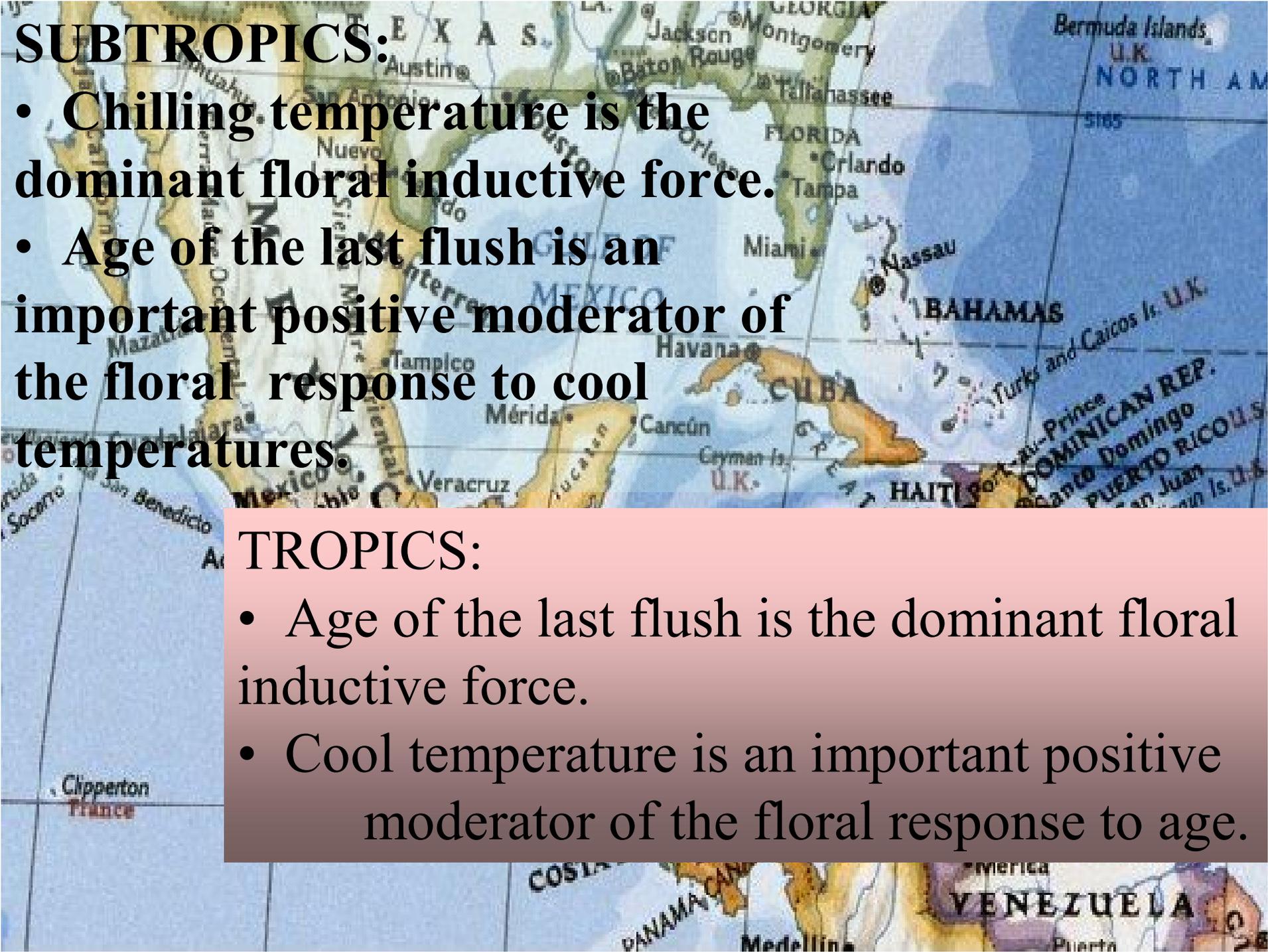
# Mechanical Topping



Tip Prune Produces Synchronized Vegetative Flush  
It Is the Start of the Synchronized Flowering Program





A map of the Americas and surrounding regions, including parts of North America, Central America, and the Caribbean. The map shows various countries and territories, with labels for major cities and geographical features. The text is overlaid on the map, with the 'SUBTROPICS' section in the upper left and the 'TROPICS' section in a pink box in the lower right.

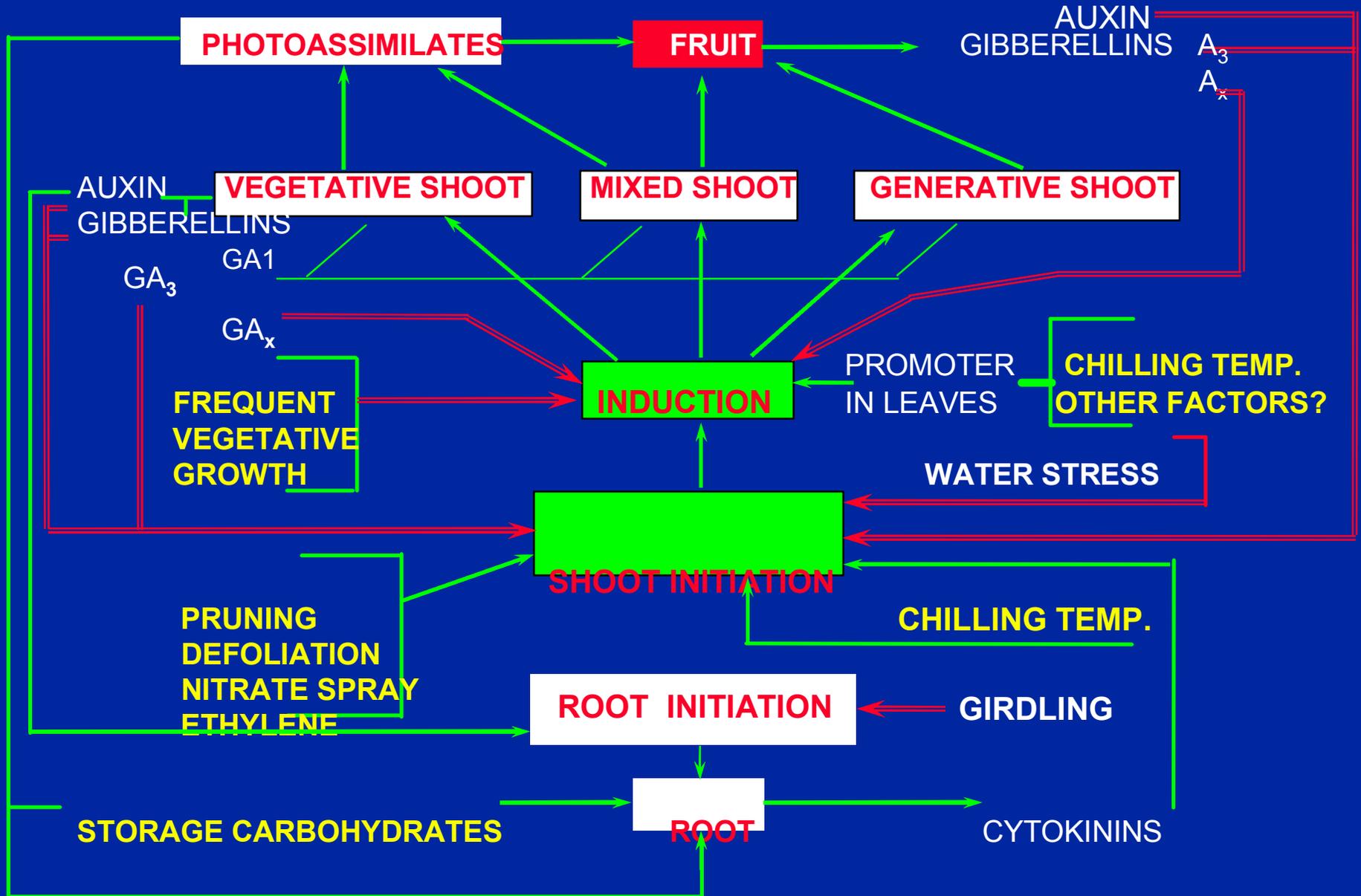
## SUBTROPICS:

- Chilling temperature is the dominant floral inductive force.
- Age of the last flush is an important positive moderator of the floral response to cool temperatures.

## TROPICS:

- Age of the last flush is the dominant floral inductive force.
- Cool temperature is an important positive moderator of the floral response to age.

# Mango Flowering Model



# Initiation Responses



## ***HYPOTHESES:***

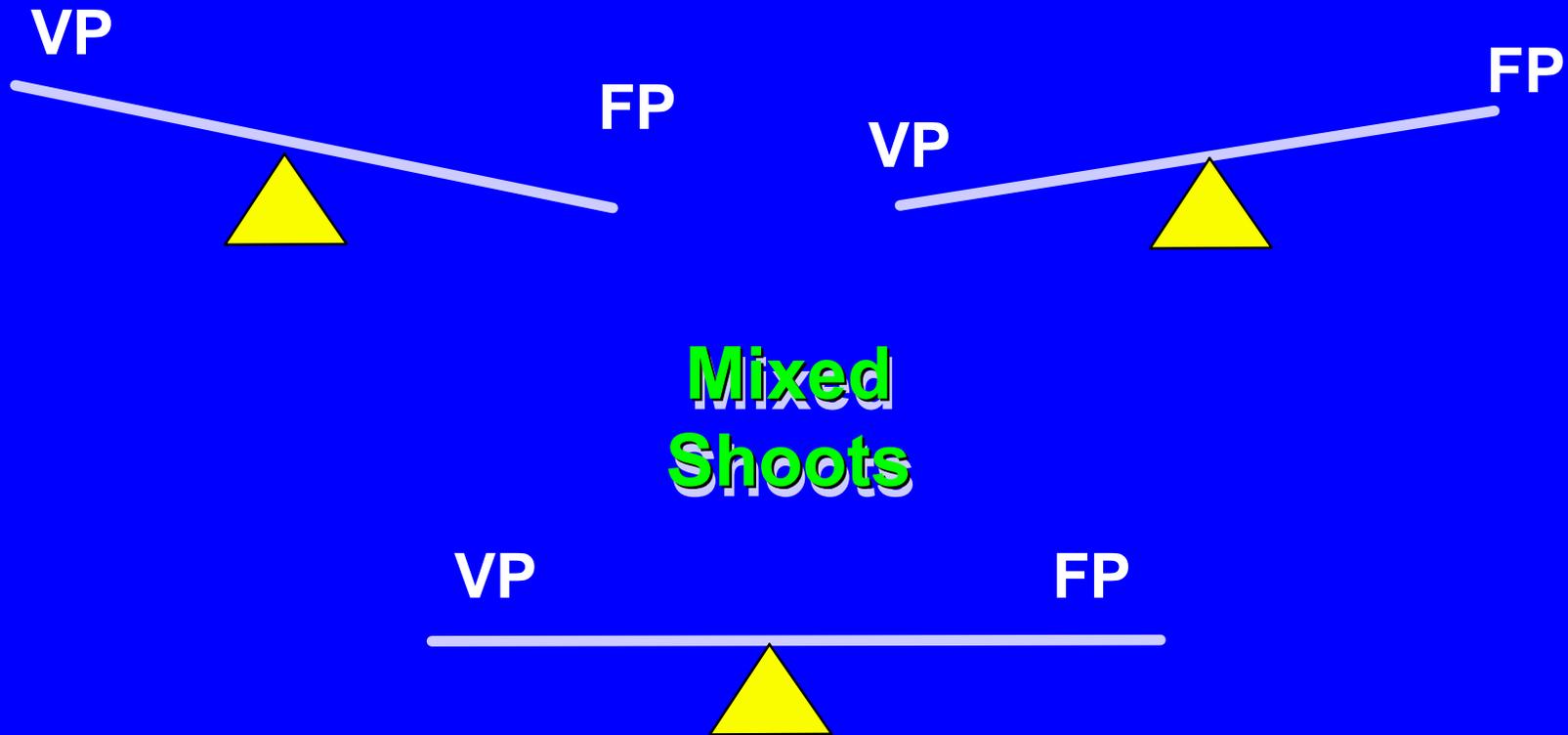
- The *FLORIGENIC PROMOTER* is up-regulated in leaves during exposure to cool temperatures and down regulated to a basal level during exposure to warm temperatures. Changes occur daily – possibly hourly.
- It interacts with a *VEGETATIVE PROMOTER*, most likely a gibberellin, that may also be synthesized in leaves but is slowly metabolized over time (months).

# Inductive Responses

Mango Flowering Model

Vegetative Shoots

Generative Shoots



# Mango Flowering Program Without Paclobutrazol



# Mango Flowering Program Using Paclobutrazol

## Months From Synchronizing Prune for '*Haden*'

0	1	2	3	4	5	6	7	8	9	10	11	12
↑P	↑PBZ			↑ <sub>KNO<sub>3</sub></sub>	↑flowering					↑harvest		

## Months From Synchronizing Prune for '*Tommy Atkins*'

0	1	2	3	4	5	6	7	8	9	10	11	12
↑prune		↑PBZ			↑ <sub>KNO<sub>3</sub></sub>	↑flowering					↑harvest	

D

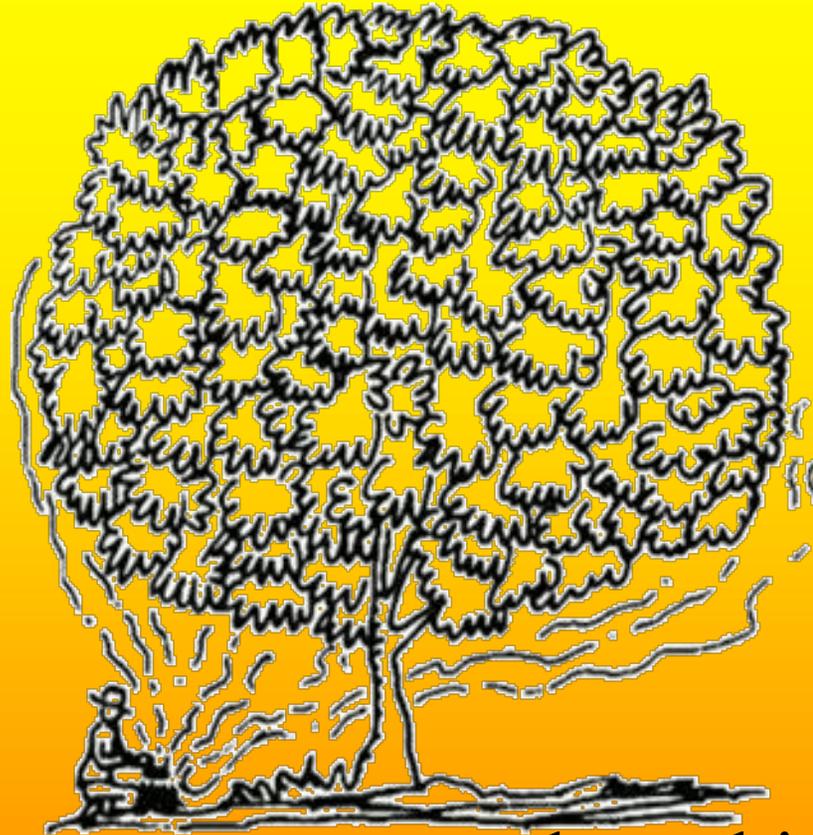


Loading Potassium Nitrate to Stimulate Flowering Growth of Trees

# Spraying Potassium Nitrate to Non-Synchronized Trees in Mexico



# Shoot Initiation Using Smoke



Expose canopy to smoke, which contains ethylene gas, for several days.

Slow cool burn of green leaves.

# Synchronized Flowering



# Synchronized Harvest



## One Flush After Prune Leads to Flowering



## One Flush After Prune Leads to Flowering



## Two Flushes After Prune Lead to Vegetative Growth



Management of flowering in the tropics requires close attention to:

frequency of vegetative flushes  
influenced by leaf nitrogen levels

plant water relations

depth of prune

(night temperatures)

# Leaf Nitrogen

Desired Concentration Range - 1.1% to 1.4% Prune  
Time

Sources of N:

- Inorganic Fertilizer - Rapid Uptake
- Organic Fertilizer - Slow Uptake Longer Lasting
  - Nitrogen fixing plants and fungi
  - Rain

Amount and timing of application is critical

Desire highest levels of N uptake during early fruit  
development

# Plant Water Relations

- Availability of water at prune event
- Water stress delays shoot initiation
  - Post prune vegetative flush
  - Prolongs rest period
- Avoid shift from dry to rainy season during desired rest period

# Depth of Prune

- Tip prune (<finger diameter) provides one flush under optimal N and/or soil water conditions.
- Deeper prunes (>finger diameter) stimulate frequent subsequent flushes of growth.
- Number and frequency of flushes dependent upon prune depth.

Muchas Gracias

