



Citrus From Florida

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**Prior to the  
introduction of HLB  
Disease  
Citrus was the signature  
crop for Florida farmers**

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# Phillip Rucks Citrus Nursery, Inc.

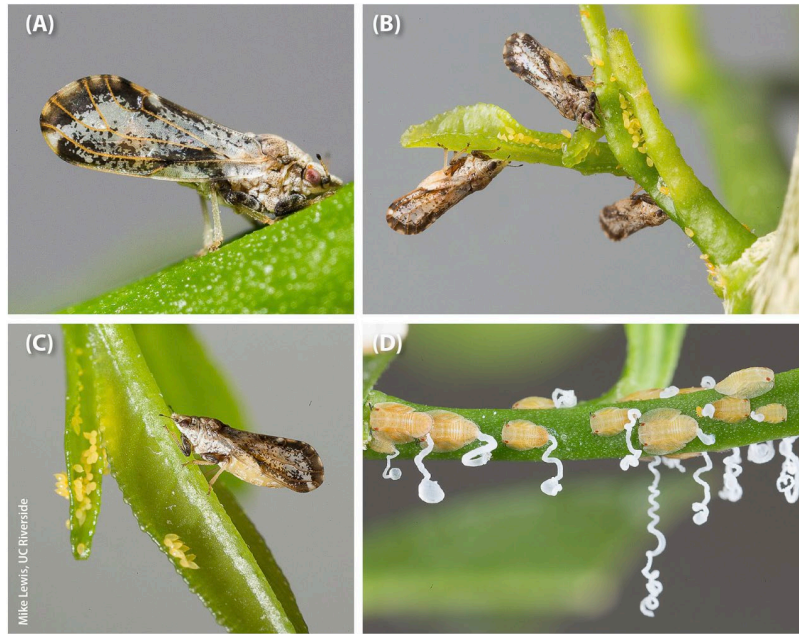
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- ❑ 6 + Acres of enclosed greenhouse space.
- ❑ The largest enclosed Citrus Nursery in the US.
- ❑ Built and maintained to FDACS and USDA specifications for commercial Citrus propagation.
- ❑ Inspected monthly by FDACS and USDA.
- ❑ Capacity over 1 million trees





# Huanglongbing (HLB) – Citrus Greening Disease



\* About 600,000 acres of Citrus has been lost in Florida since 2005.  
\* Associated industries affected and jobs lost.

\* 75% reduction in citrus productivity while doubling production costs.

\* Over a BILLION dollars and about 15 years of research work spent trying to find a practical solution for HLB without finding a practical solution.





# Bamboo: A Drop-In Crop for Citrus While HLB Solutions Are Developed



**PHILLIP RUCKS  
CITRUS  
NURSERY**





**RETAIL FOOD AND  
PRODUCT  
MANUFACTURING.  
  
NUMEROUS DIVERSE  
PRODUCTS CAN BE  
MADE FROM BAMBOO.**



#### **Edible Asper Bamboo Shoots**

- Bamboo Shoots are a 3-Billion-dollar segment of retail markets worldwide.
- Fresh and processed shoots are currently available in the United States which represents a \$356 million dollar segment of the retail market which is currently filled through bamboo shoot imports. This accounts for 44,500 tons of fresh bamboo shoots at a wholesale price of \$4.00 per pound.

*\*\* data reported by T Ridge global*

*sourcing hub\*\**

**Asper Bamboo Culms can also be utilized in:**



**A 96-billion-dollar overall bamboo industry world wide**

Manufactures import bamboo culms to create marketable finished goods such as construction materials which are both strong and environmentally friendly.

Construction materials are the most valuable uses for Asper Bamboo Culms though the manufacturing of bamboo slats which are used to make many different construction materials such as bamboo panels eliminating the need for wall studs as well as 2 x 4 lumber to 12 x 12 post or railroad ties.





### **Laminated Panels**

Focused on the markets' standards, this product range parallels veneer consumption needs with "solids" across the cabinetry, furniture, millwork, flooring and retail sectors.

S4S boards or cut-stock for remanufacture; full cut-to-size flexibility to client needs.

Complete options as to grain direction and colorations.



### **Paper and Fabric manufacturing**

Parent rolls can be made into toilet paper, paper towels, cups ect.

Grove Collaborative is a natural products retailer out of San Francisco and has committed to purchase bamboo toilet paper as soon as it can be manufactured in the United States.

The Grove order will utilize 700 acres of bamboo for paper manufacturing each year and double in acreage needed in the second year.



### **Bio Fuel products such as bamboo pellets**

Bamboo pellets can be sold to Europe as a high intensity biomass burning fuel source.





### Production of Mulch

- Clean and chemical free.
- Doesn't float away during rain or irrigation.
- Doesn't absorb nutrients intended for plants.
- Degrades very slowly.
- Insect and pest resistant new product for wholesale and commercial markets.



### Production of Bio Char materials

Used for fertilization and soil improvement.



### Carbon Credits and Offset Credits

US based carbon credits are valuable to each company and help the environment .



## Potential Environmental Benefits

- Climate Change Mitigation
- Erosion Control
- Phytoremediation of contaminated gray water and soil



# Environmental Considerations for Growing Bamboo in Florida

USDA Climate Zone: Choose appropriate bamboo species for location

## Soil Quality and Type

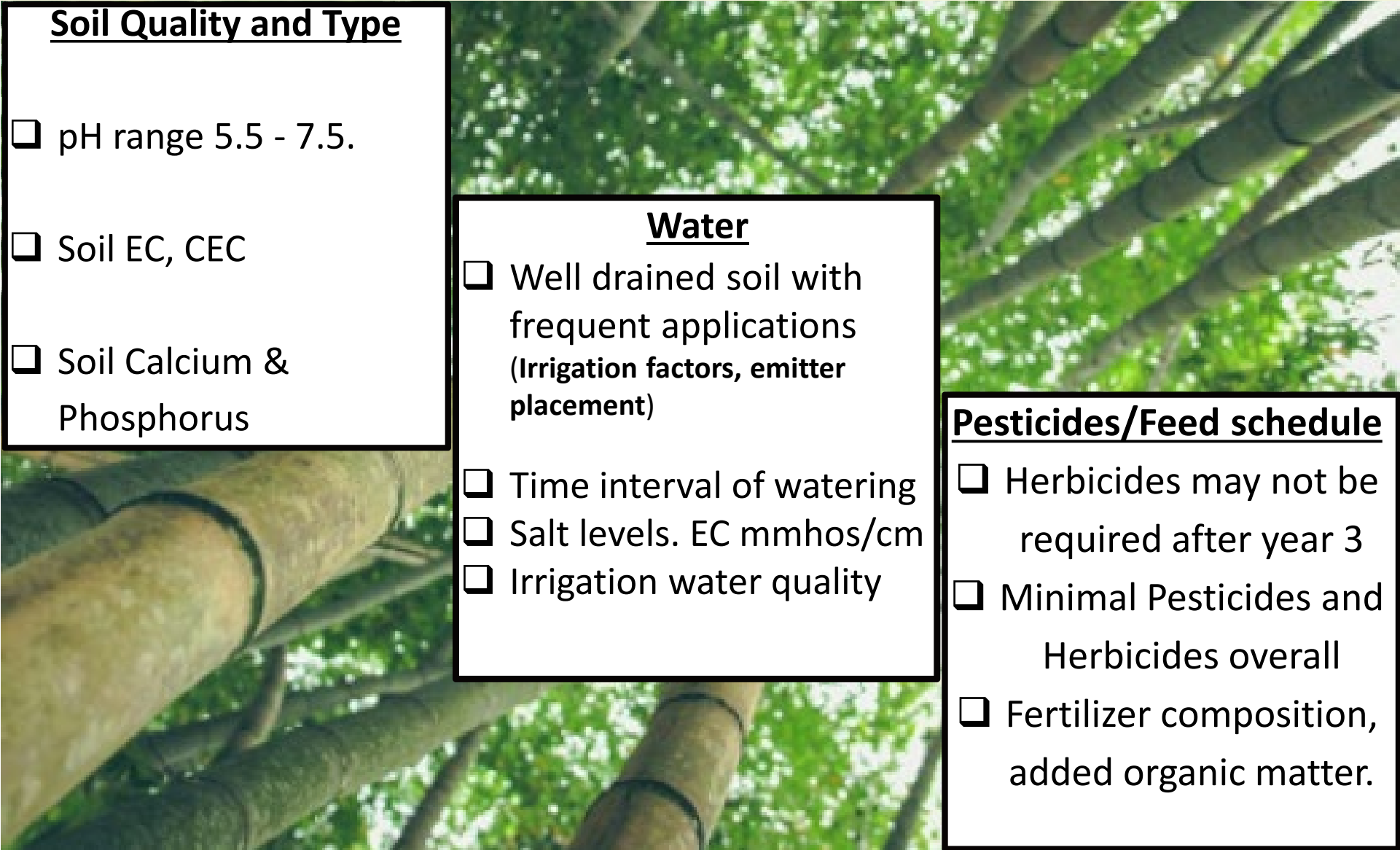
- pH range 5.5 - 7.5.
- Soil EC, CEC
- Soil Calcium & Phosphorus

## Water

- Well drained soil with frequent applications (Irrigation factors, emitter placement)
- Time interval of watering
- Salt levels. EC mmhos/cm
- Irrigation water quality

## Pesticides/Feed schedule

- Herbicides may not be required after year 3
- Minimal Pesticides and Herbicides overall
- Fertilizer composition, added organic matter.







## Spacing:



Preferable spacing:  
**15' X 25' or 25' X 25'** based  
on results from Rucks  
Demo Block planting.

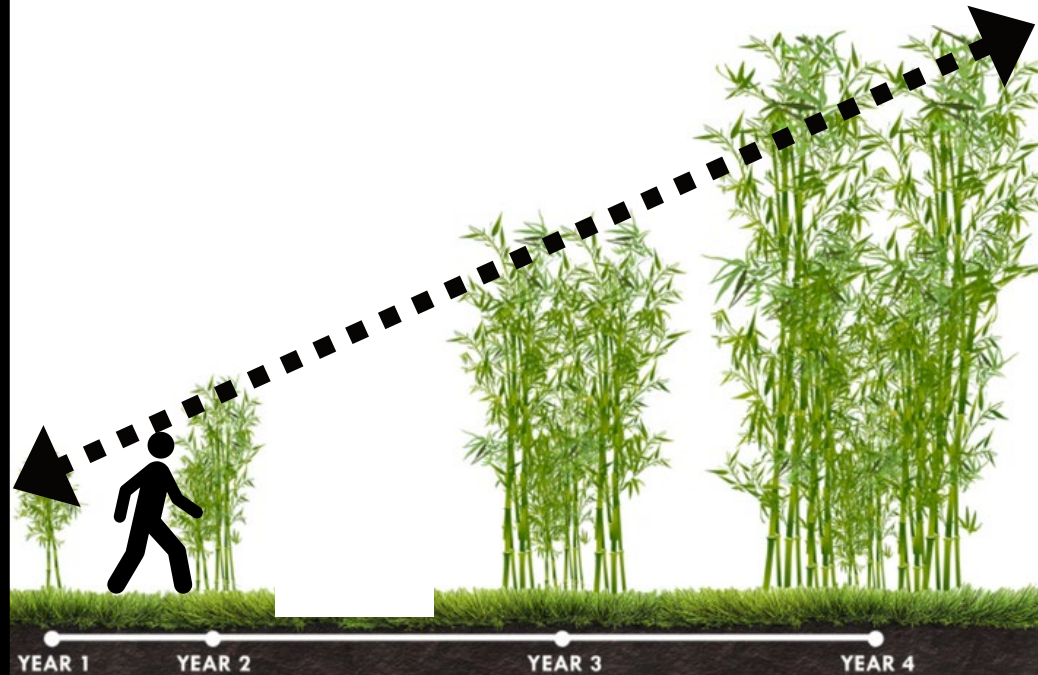
12' X 25' plant  
spacing after 19  
months.



## Growth Rate:



Years 1 through 4







*Bambusa oldhamii* 19 months old.  
15' x 25'



Yunnan Hybrid #3  
(*B. pervariabilis* x *D. daii*)



**YEAR 1 PLANTING + CT COSTS**

**\$6,661.74**

**YEARS 1 & 2\* NET SHOOT REVENUES**

**\$0**

**YEARS 3\* - 6 NET SHOOT REVENUES**

**\$1,010.22**

**\$1,704.20**

**\$2,486.20**

**\$3,880.20**

**COST AND RETURNS BUDGET**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Existing Irrigated Citrus Grove	1,501.95					
Plant Cost	2,088.00					
Planting Costs	310.15					
Plastic Ground Cover First Year	436.77					
Initial Mulch	290.40					
Initial Soil Amendments	600.55					
Comprehensive Soil Analysis	33.00					
Water	300.86	650.50	650.50	700.45	700.45	700.45
Dry Fertilizer	232.32	97.58	126.62	155.66	155.66	155.66
Liquid Fertilizer	300.86	465.81	561.06	651.66	651.66	651.66
Herbicide	350.81	350.81	-	-	-	-
Irrigation Maintenance	99.90	99.90	99.90	99.90	99.90	99.90
Repair & Maintenance	99.90	99.90	99.90	99.90	99.90	99.90
Property Taxes	16.27	16.27	16.27	16.27	16.27	16.27
Pest control	-	199.80	199.80	199.80	199.80	199.80
Biologic Inputs	-	149.85	149.85	149.85	149.85	149.85
Organic Soil Amendments	-	160.31	160.31	160.31	160.31	160.31
<b>Total Planting Cost</b>	<b>5,260.82</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Total Annual Caretaking</b>	<b>1,400.92</b>	<b>2,290.73</b>	<b>2,064.21</b>	<b>2,233.80</b>	<b>2,233.80</b>	<b>2,233.80</b>
<b>Total Year 1 Planting + CT Costs</b>	<b>6,661.74</b>					
<b>Total Gross Shoot Revenues</b>	<b>-</b>	<b>-</b>	<b>8,143.43</b>	<b>9,670.00</b>	<b>10,875.00</b>	<b>13,050.00</b>
Pick & Haul Expenses	-	-	2,626.00	2,831.00	2,892.00	3,020.00
Wholesale Fee 20% & Plant Surcharge 10%	-	-	2,443.00	2,901.00	3,263.00	3,915.00
<b>Total Net Shoot Revenues</b>	<b>-</b>	<b>-</b>	<b>1,010.22</b>	<b>1,704.20</b>	<b>2,486.20</b>	<b>3,880.20</b>

\*Cost and Return Budget is based on a per acre cost and return, of 116 bamboo plants per acre. Growers are forecasted to receive \$1.50 per pound of bamboo shoots harvested. Harvest season will take place April through October for an estimated period of 20 weeks, with 16-20 harvests intervals for each bamboo block.



# Crop Caretaking Assistance

Proper bamboo  
field set up  
15' x 25'  
bedded rows

Initial Planting and  
fertilizing

Plastic soil cover  
weed barrier

Proper mulch  
placement  
18+ inch radius  
3 to 4  
inches thick

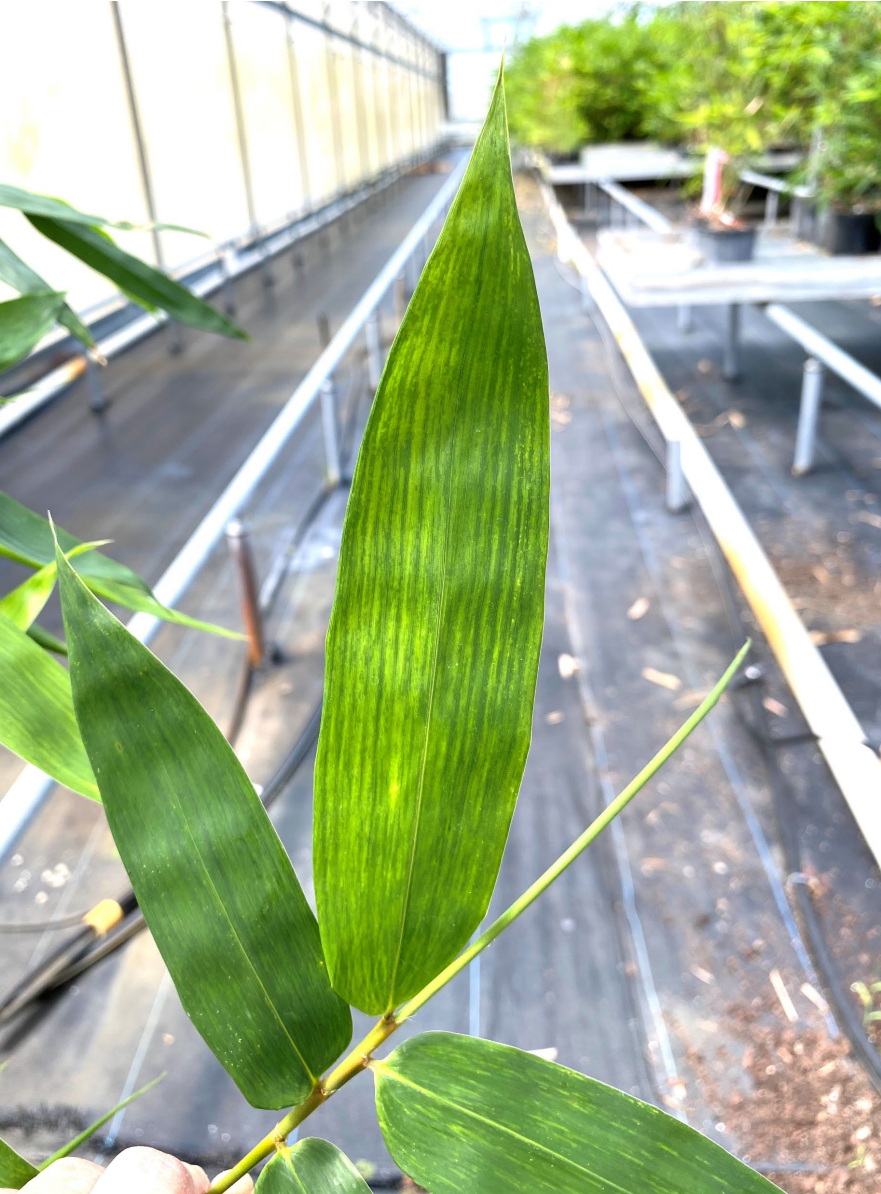
Education and  
Guidance of  
advanced growing  
techniques - Educate  
farmer on  
proper techniques  
for the planting

Growing bamboo  
is not intuitive-  
Weed removal  
Proper irrigation techniques  
Thinning clump techniques  
Fertilization needs

Providing a  
strong/healthy  
plant for field  
planting.



**Propagation** – Reliable methods needed.  
Mother stock tested for viruses.





# TISSUE CULTURE –

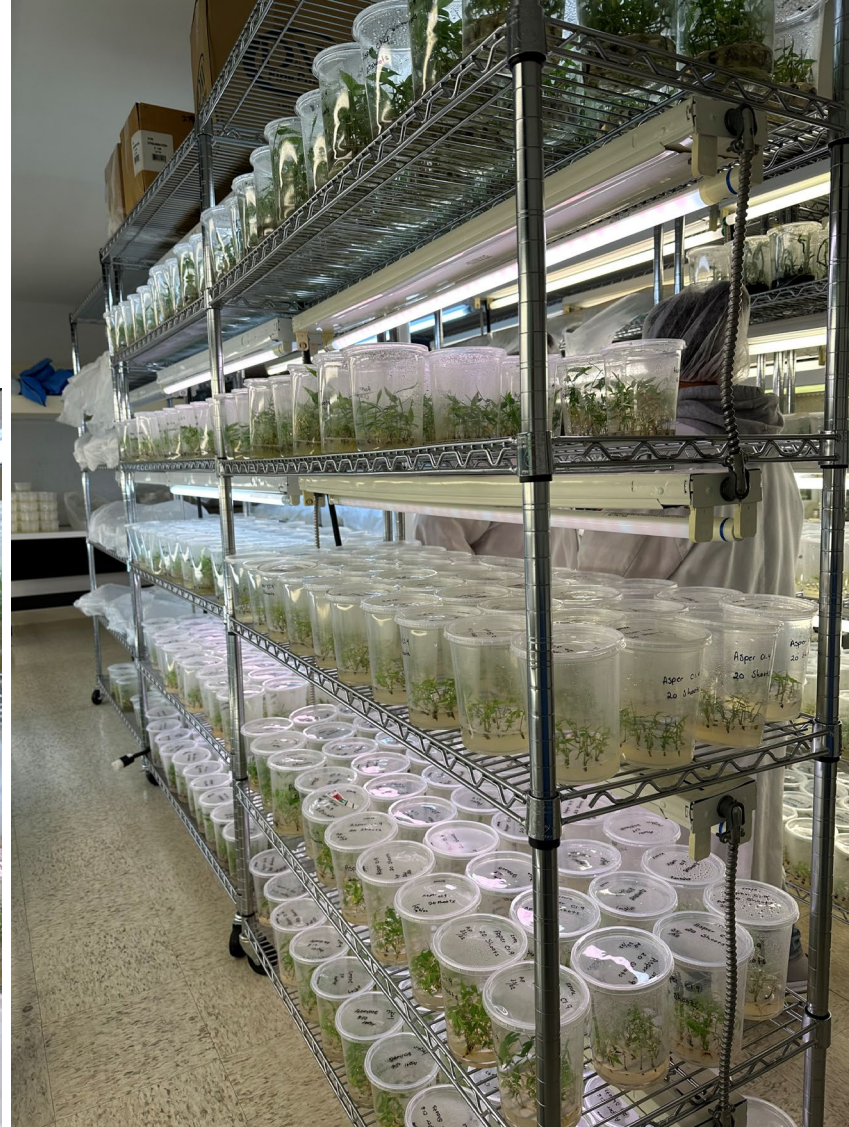
Used in many crops



**Tissue culture propagation of Citrus rootstocks – Phillip Rucks TC lab.**

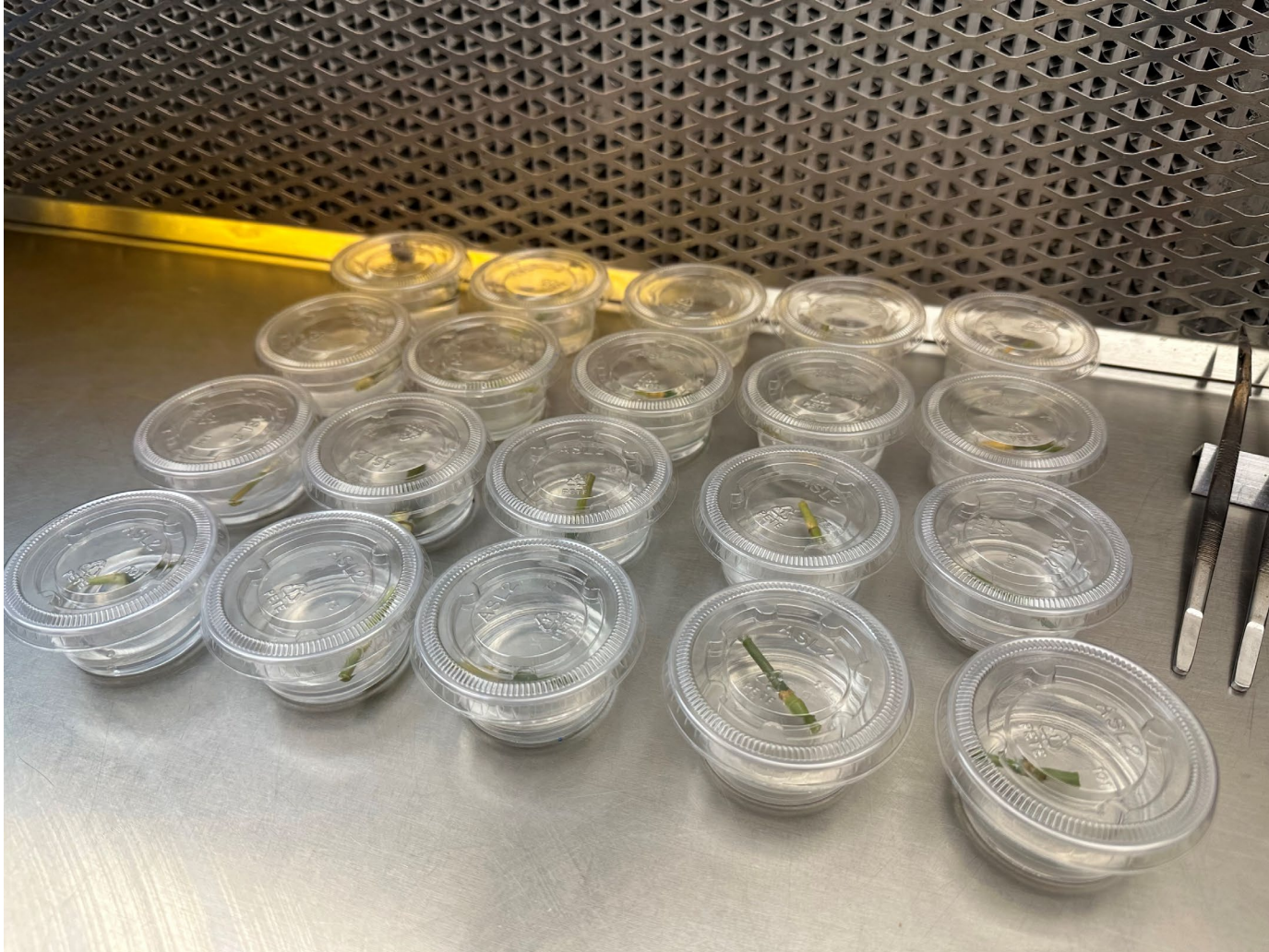


# Tissue Culture methods applied to Bamboo





**Tissue Culture - Stage-1 Culture Initiation.**  
**Cultures started from culm nodes pieces.**





**Stage-1 Cultures –  
Started from Axillary  
buds from new shoots.**





# Tissue Culture - Stage-2 Culture Multiplication





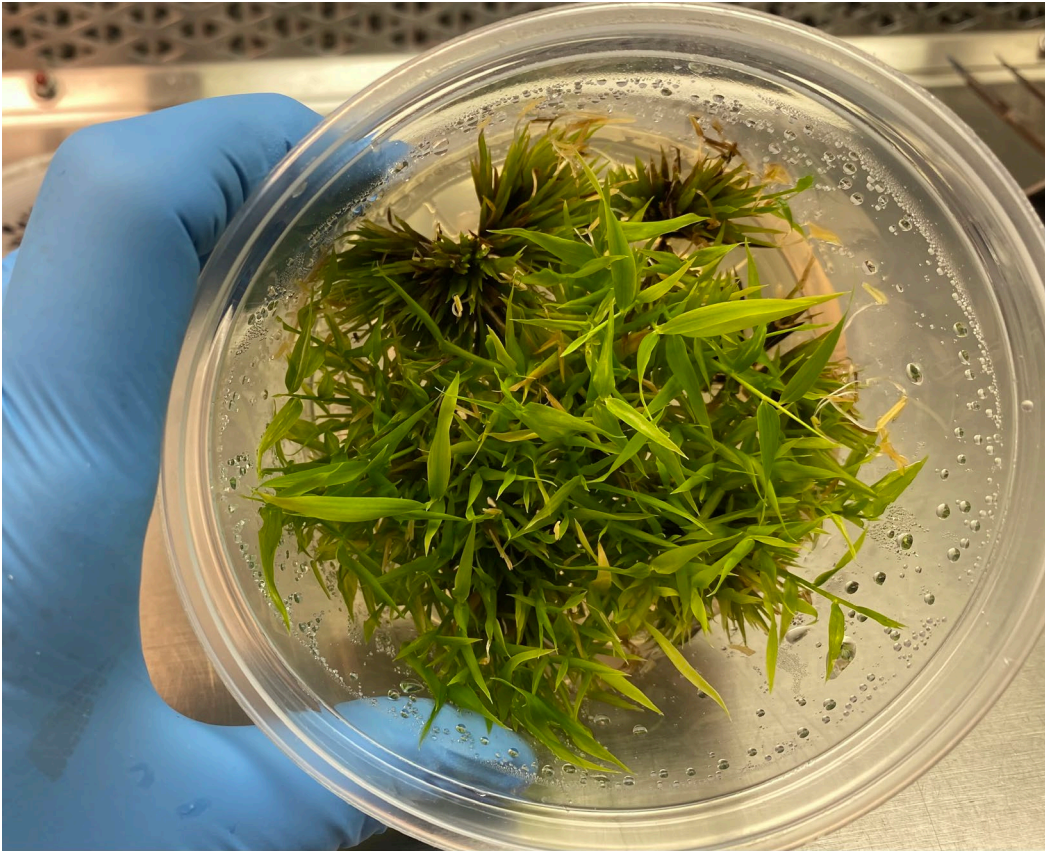
**Stage -2  
Culture  
transfer,  
multiplication  
and harvest.**





Does Tissue Culture revert bamboo to physiological juvenility?

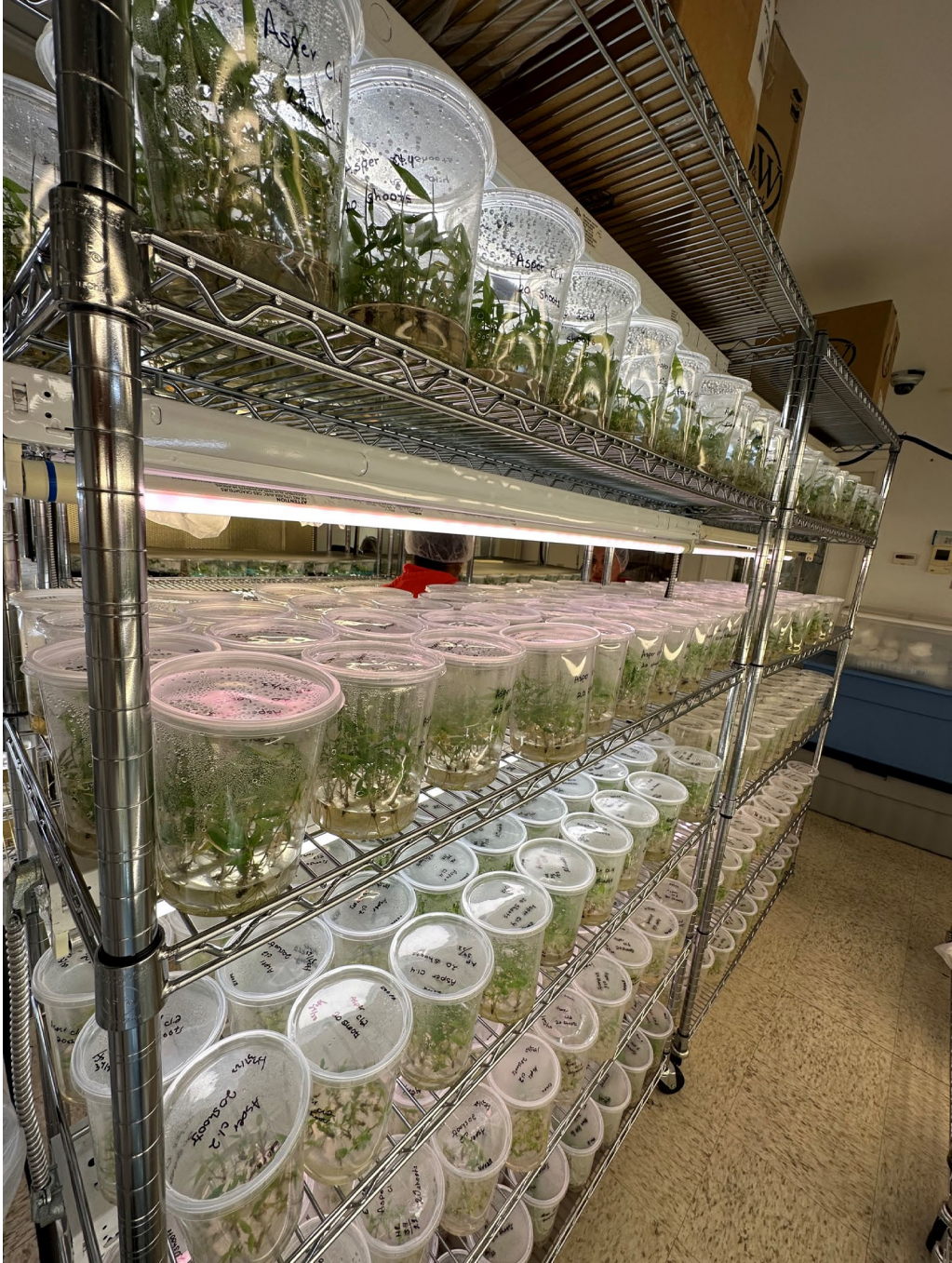
-Flowering can occur and can be induced in tissue culture of mature and seedling Bamboo.





# Tissue Culture - Stage-3 Rooting Shoots.

-0 through 6 weeks-







**Stage-4 planting out of laboratory environment.**

**- Acclimation to ambient conditions.**







**Plants grown to finish field  
or landscape planting**





From lab to the Field.  
Phillip Rucks Demo Block at 2  
years after planting.



- **Bambusa nutans\* 'Ever'**
- **Produced from tissue culture**
- **Vigorous, mid '20°F without damage, solid culms.**
- **\* Provisional identification.**



# **Dendrocalamus strictus**

\* Vigorous growing, mid '20° with out damage, solid culms.





# ***Dendrocalamus asper* '#9'\***

Produced from tissue culture.

\*provisional identification.





# ***Dendrocalamus asper* ‘#6’\***

Produced from tissue culture.

\*provisional identification.





- **Dendrocalamus asper ‘#4’\***
- Produced from tissue culture.
- \*provisional identification.

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## Other varieties in progress:

Bambusa oldhamii ‘Hirose’

Bambusa oldhamii

Bambusa beecheyana

Dendrocalamus giganteus

Dendrocalamus giganteus ‘Quail’

Dendrocalamus asper Florida-Green

Dendrocalamus asper Black Betung Hitam

Hybrid bamboo





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BIOENERGY SPECIALISTS

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Leading Supplier of Eucalyptus Tree Varieties  
& Commercial Bamboo





**“ to invent, you need a  
a good imagination and  
a pile of Junk”  
Thomas Edison –Inventor  
1847 - 1931**

**“Discovery consists of seeing what everyone else has seen and thinking what no one else has thought”**

**- Albert Szent-Györgyi  
Biochemist 1893 - 1986**