Evaluating Pine Bark as an Alternative to Coco Coir as Substrate for Production of Long-Cane Raspberries







Long-Cane Raspberry System





Location of Project

Winnipeg

Calgary

NEVADA

MONTANA

NORTH DAKOTA

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SOUTH DAKOTA

(Leveril)

WYOMING

NEBRASKA

UTAH COLORADO

United States

KANSAS

oLas Vegas

Los Angeles ARIZONA San Diego

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California

NEW MEXICO

OKLAHOMA Dallas

TEXAS

San Antonio Houston

Monterrey

Mexico

Guadalajara Mexico City

MINNESOTA

WISCONSIN MICHIGAN

- Chicago IOWA ILLINOIS

INDIANA

MISSOURI

MISSISSIPPI

ARKANSAS

WEST O VIRGINIA

OHIO

. Sal VIRGINIA KENTUCKY

TENNESSEE

ONTARIO

SOUTH

CAROL

Ottawa

PENN

Toronto

0

ALABAMA GEORGIA

1 ----LOUISIANA

Gulf of Mexico

FLORIDA

Miami

0 Havana Cuba







Location of Project: Southeastern North Carolina

USDA Hardiness Zone 8A/B



Long Canes

- Dormant
- Containerized
- Canadian nursery
- Shipped to grower in late Dec/early Jan
- Held in coolers until planting date
 - Kwanzaa
- Two canes per pot



Substrate EvaluationCoco CoirPine Bark



Industry-standard in Europe and Canada

- Sourced from Sri Lanka
- Excellent water handling lateral water movement, aeration)



Coco Coir

characteristics (water holding capacity,

Pine Bark

- Can be produced locally
- Grinding and aging process affects finished product
- Less water holding capacity, less
- Need a supplier willing to produce what you need
- Cost savings



lateral movement, drains more freely

Substrate	Total Porosity % Volume	Container Capacity % Volume	Air Space % Volume	Bulk Density g/cc	Initial Moisture % weight	Testing Moisture % weight
Pine Bark (pre)	75.6	46.4	29.2	0.19	54.0	53.97
Pine Bark (post 2)	85.2	49.9	35.3	0.17	64.8	64.81
Pine Bark (post 4)	85.6	52.2	33.4	0.17	68.0	68.02
Coco Coir (pre)	91.1	54.2	36.9	0.06	83.1	83.11
Coco Coir (post 1)	96.2	68.4	27.8	0.06	85.1	85.08
Coco Coir (post 3)	96.1	67.2	29.0	0.06	85.2	85.19

Physical Properties



High Tunnels



• 4 Haygrove HO 60 high tunnels • 30' by ~200', 3 rows per tunnel



Pull Out – Jan. 24/25

- 7 liter containers
- 5 canes/meter
- Two tunnels planted to pine
- Tunnels switched in the second season
- Two drip emitters/pot
- Trellis with lateral support

bark, two planted to coco coir



Mar. 3





Tunnel Venting/Frost Protection



Harvest Starts Mid-April

Irrigation and Fertility Management



 Pump house set up with two tank system - Tank A - calcium nitrate – Tank B – N-P-K with micros • Target EC of 1.3 - 1.6depending on plant growth phase Know your water source and

fertilizer to control pH swings

Monitor pH and EC of drip and drain daily, leaching fraction High number of short run times in a day

Monitoring Station

Growth Stage	рH	EC (mS)	Combined EC Max (mS)		
'egetative	5.5	1.6	3.5		
ruiting	5.5	1.3	3.0		

Target Values

Season Overview – 2022 versus 2023

2022

- Heat stress in May
- Ran dryer
- Higher EC
- First pick (13 April/17 April)
- Peak (6 May 31 May)
- Last pick (8 June)

2023

- Warm February, early bud break, cool April/May
- Ran wetter
- Lower EC
- First pick (7 April)
- Peak (4 May 29 May)
- Last pick (8 June)

Season Overview – 2022 versus 2023

- Total yield
- Cull weights
- Berry size
- Fruit quality SSC and TA
- Plant growth

 - Flowers: number, fruitful
 - Root growth
- Plant tissue nutrient levels

Parameters Measured

– Laterals: numbers, length, dry matter

	4200
	3600
	3000
Per Acre	2400
d Flats	1800
Iotal Yle	1200

600 ·

2022

Mean Cull Weights – 2023

Medium

Fruit Size and Quality

Berry Size All

Berry Size Comparable Dates

Berry Quality 2023 Soluble Solids (% Brix) **Titratable Acidity**

Pine bark

Medium

	1.820	.			
nt/100 ml juice	1.365 -				
cid Equivale	0.910 -				
T Acid G Citric Ad	0.455 -				
•	0.000 -		Сосо	coir	

Were there differences in plant growth?

Overall Plant Growth

- Laterals
- Flowers
 - Roots
- No difference in the number of laterals
- 40-42 laterals per pot
- 5 canes per linear meter

• 20-21 laterals per floricane

Lateral Length and Dry Matter

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Year

Media

Coco Coir

Total Flowers Versus Fruitful Flowers

media flowers

- No difference in flower number between the two
 - 3
- No difference in number of fruitful
 - rs
- Lateral position has significant effect on flower number

Root Growth

March 12, 2022

Seasonal Root Progression

March 23, 2022

May 3, 2022

1 0 - 20%

Root Scores

3

2 21 – 40%

41 – 60%

4 61 – 80%

Root Scores

	3.3
Score	2.2
Average F	1.1

0.0

Plant Tissue Samples • No difference in N, P, K, Ca, S, Mn, Cu, Na • Slight differences in Mg, Fe, Zn, B, Al

Solution Samples

Conclusion

- to coco coir
- Total yield and berry size were not different
- growth or nutrient status
- No difference in fruit quality No negative impact on plant
- Less expensive
- Locally produced
- Watch irrigation management

• Pine bark is a viable alternative

North American Raspberry & Blackberry Association