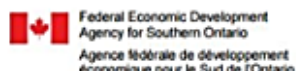




# SOLUTIONS FOR INDUSTRY

## RESEARCH FUNDERS



# Evaluation of the Performance of Zeolite-based NEREA® as a Media Amendment for Commercial Production of Basil, *Ocimum basilicum*, in Canada

November 5, 2021



## Project Team

- **Research Lead:** Christine George
- **Faculty Research Co-Lead:** Derek Schulze
- **Research Program Manager:** Kimberley Cathline
- **Research Laboratory Technologist:** Branka Milunovic
- **Research Assistants:** Denise Handley, Ashley Paling, Gabriela Torrens, Peter Brewer
- **Industry Partner Representatives:** Ray Paquette, CEO, Mark Pearlman, COO

## Project Description

A small-scale trial on basil in the Niagara College greenhouse was performed using NEREA® as media amendment embedded with nutrients. Crop performance was measured from germination to harvest and compared between standard peat moss-based media (control) and peat moss blends with NEREA® at 0%, 25%, 50% and 75%.

## Growing Trials

Seeds sown on September 13<sup>th</sup> into 50 pots each of:

- **Control:** standard LM3 media (80-90% peat moss, perlite, vermiculite, lime, starter fertilizer)
- **0%:** peat moss only
- **25%:**  $\frac{3}{4}$  peat moss,  $\frac{1}{4}$  NEREA®
- **50%:**  $\frac{1}{2}$  peat moss,  $\frac{1}{2}$  NEREA®
- **75%:**  $\frac{1}{4}$  peat moss,  $\frac{3}{4}$  NEREA®



## Observations:

Germination : September 20<sup>th</sup> : even germination across treatments

Seedlings maintained at 5 plants per pot for consistency



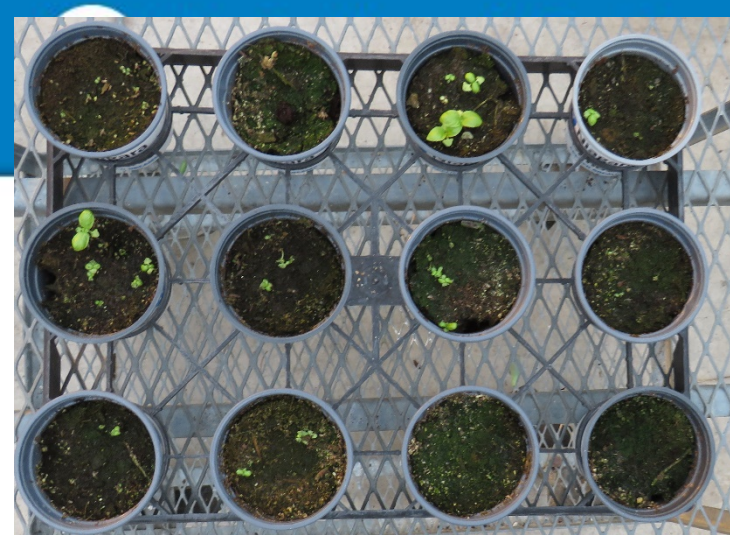
Photo taken  
Sept 22

September 24th



October 4th





0% NEREA



Control Lambert LM3-AP F



Control Lambert LM3-AP NF



25% NEREA



50% NEREA



75% NEREA



0% NEREA



Control Lambert LM3-AP NF

Control Lambert LM3-AP F



25% NEREA



50% NEREA

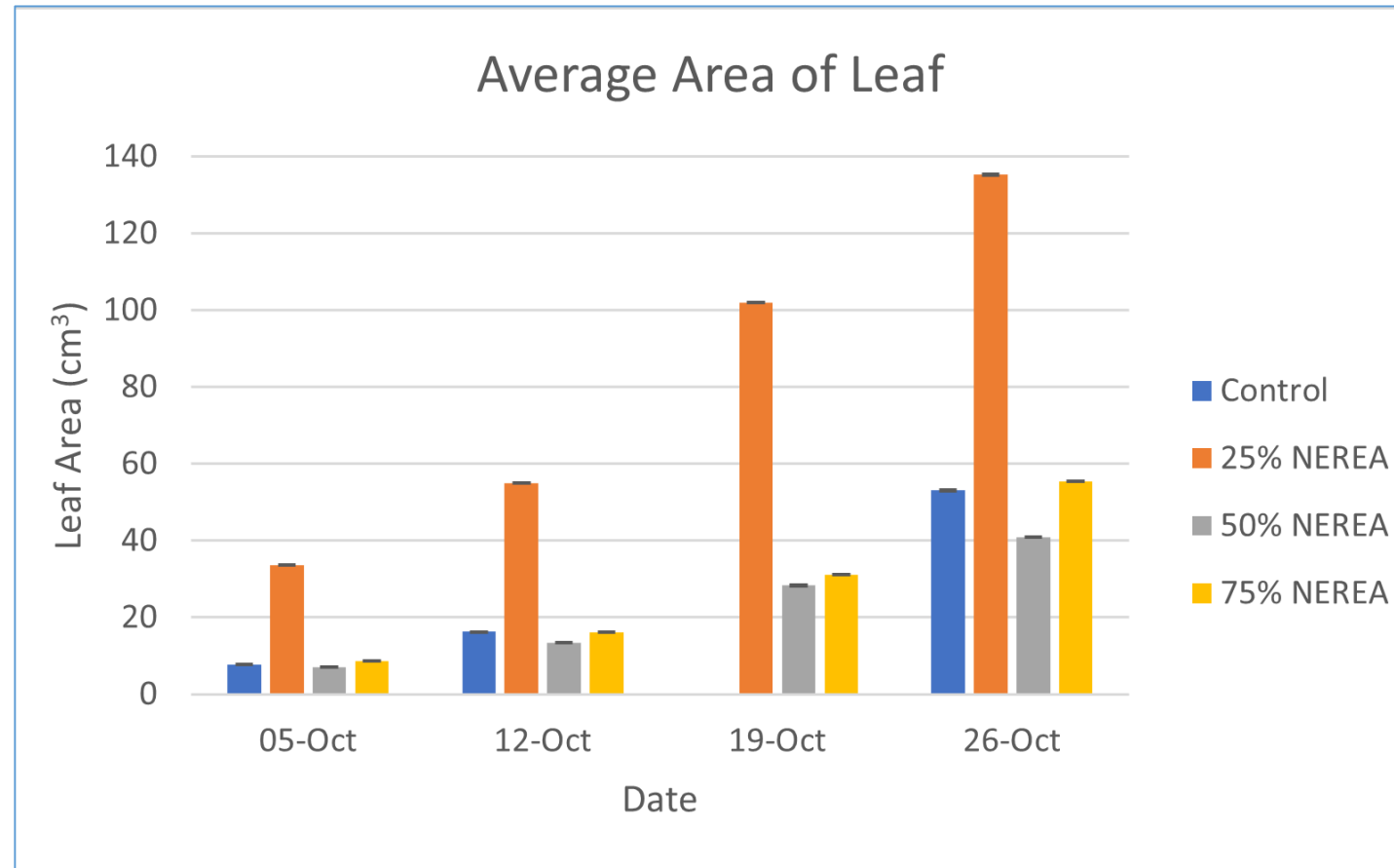


75% NEREA

## Observations: Growth

- Leaf Area = Size of leaf, on average

**\*SUMMARY\*:** Larger leaves in 25% NEREA media blend than all other blends



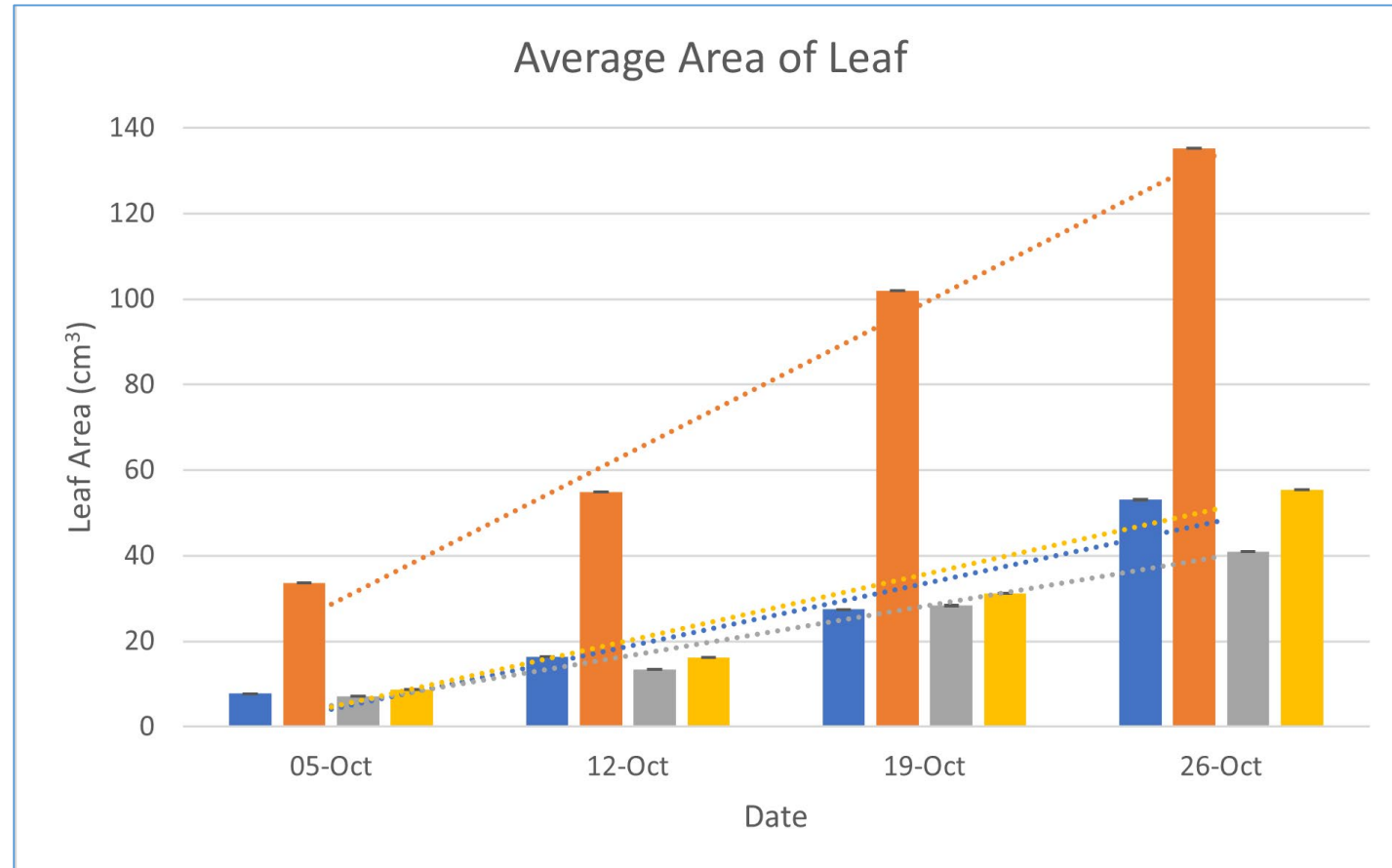
## Observations: Growth

- Leaf Area = Size of leaf, on average

***\*SUMMARY\****: Larger leaves in 25% NEREA media blend than all other blends

*AND,*

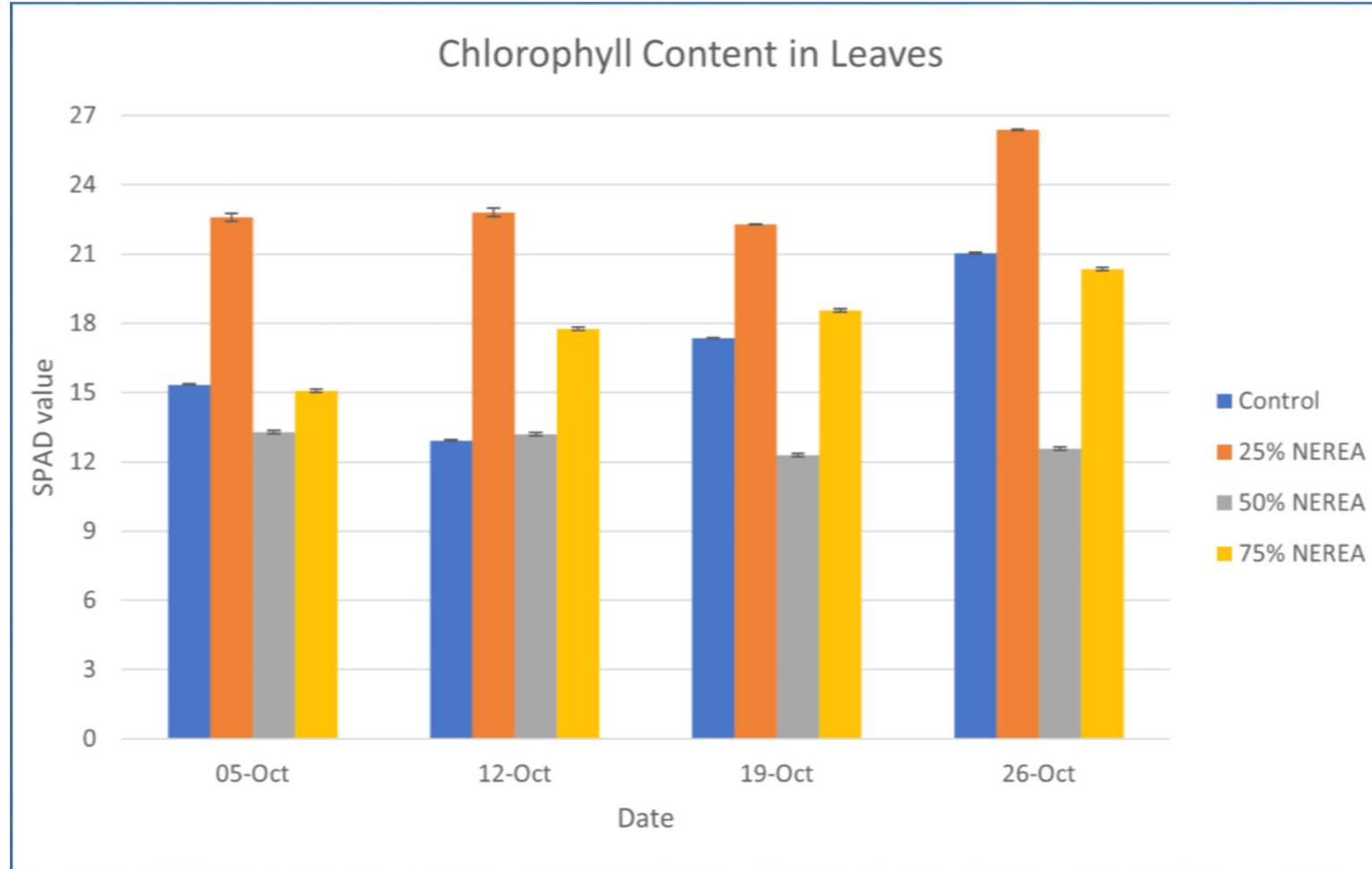
Growth rate of leaves in 25% NEREA blend is **FASTER** than all other blends



## Observations: Growth

- Chlorophyll measurements, as SPAD, demonstrate Nitrogen content in leaves

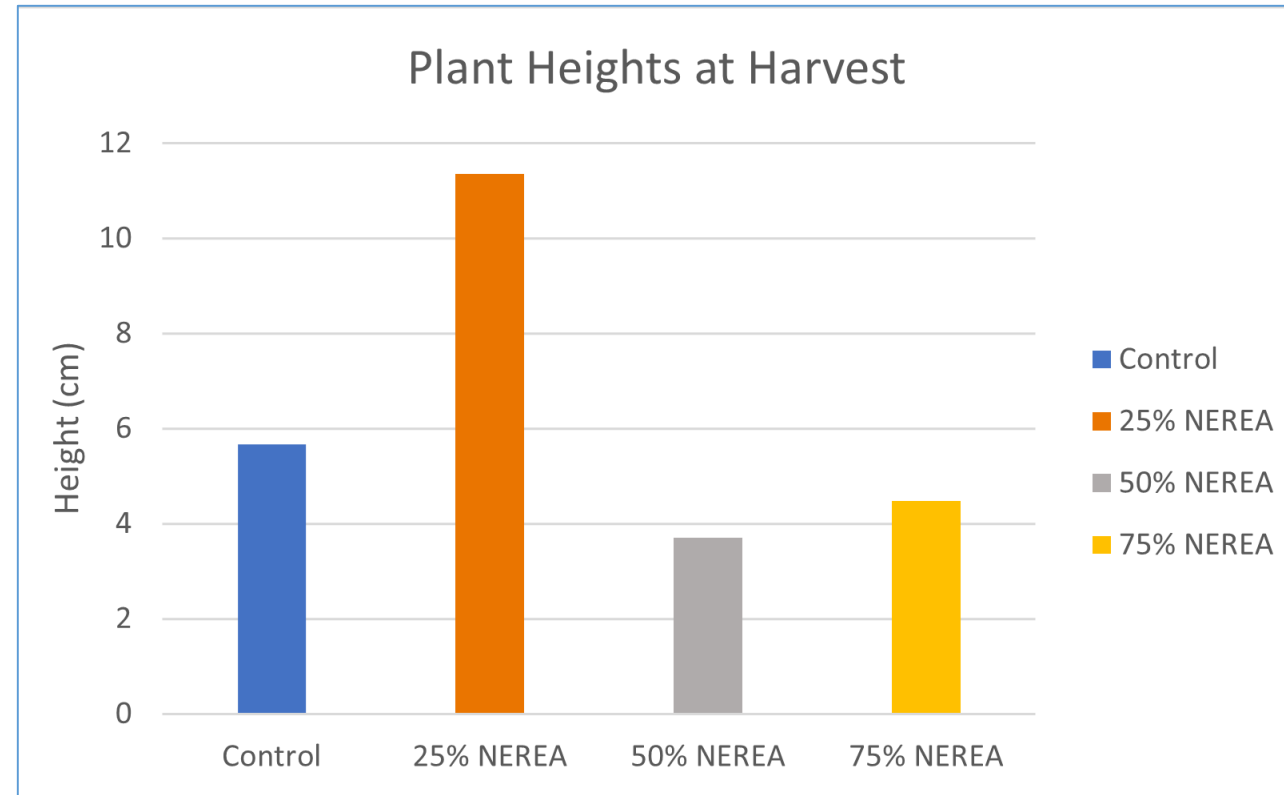
**\*SUMMARY\*:** More chlorophyll, and therefore nitrogen content, in leaves grown in 25% NEREA blend than other blends



## Observations: Growth

- Height recorded at harvest, 4 weeks after germination

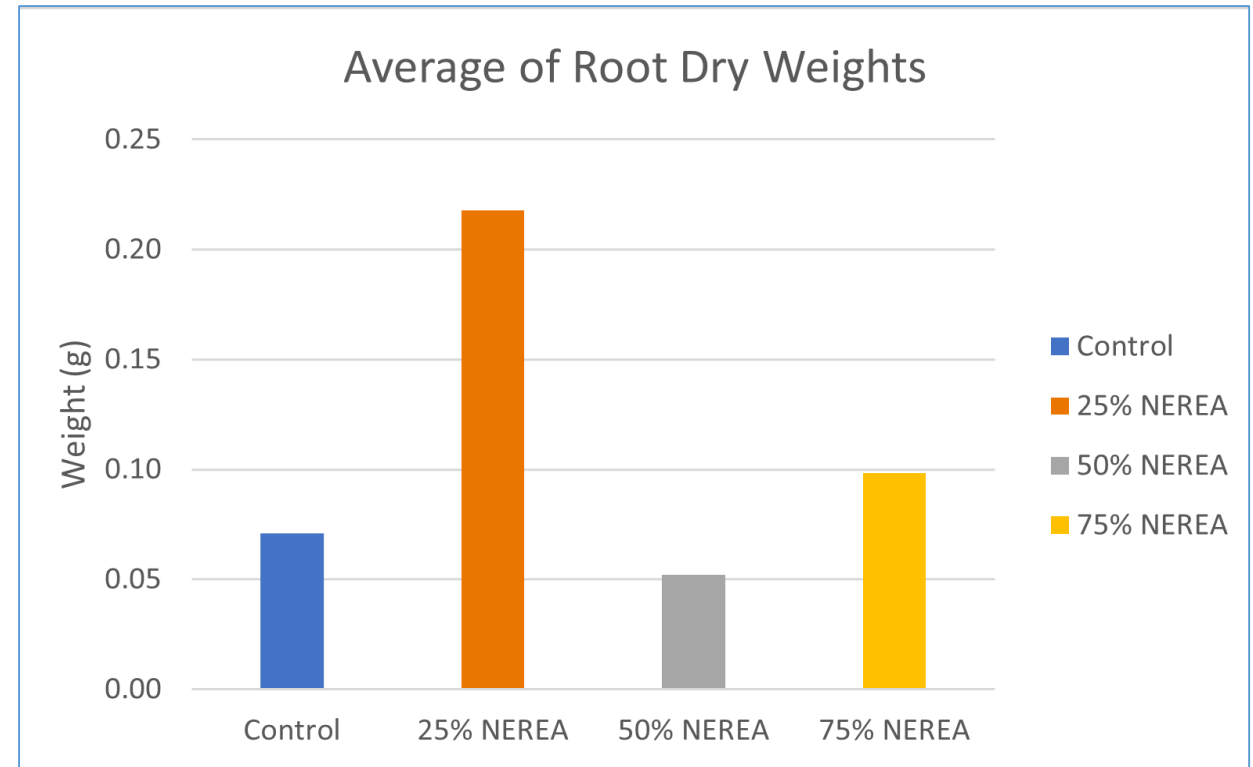
***\*SUMMARY\****: Tallest plants grown in 25% NEREA



## Observations: Growth

- Roots: washed and weighed (damp)
  - Dried in drying oven for several days

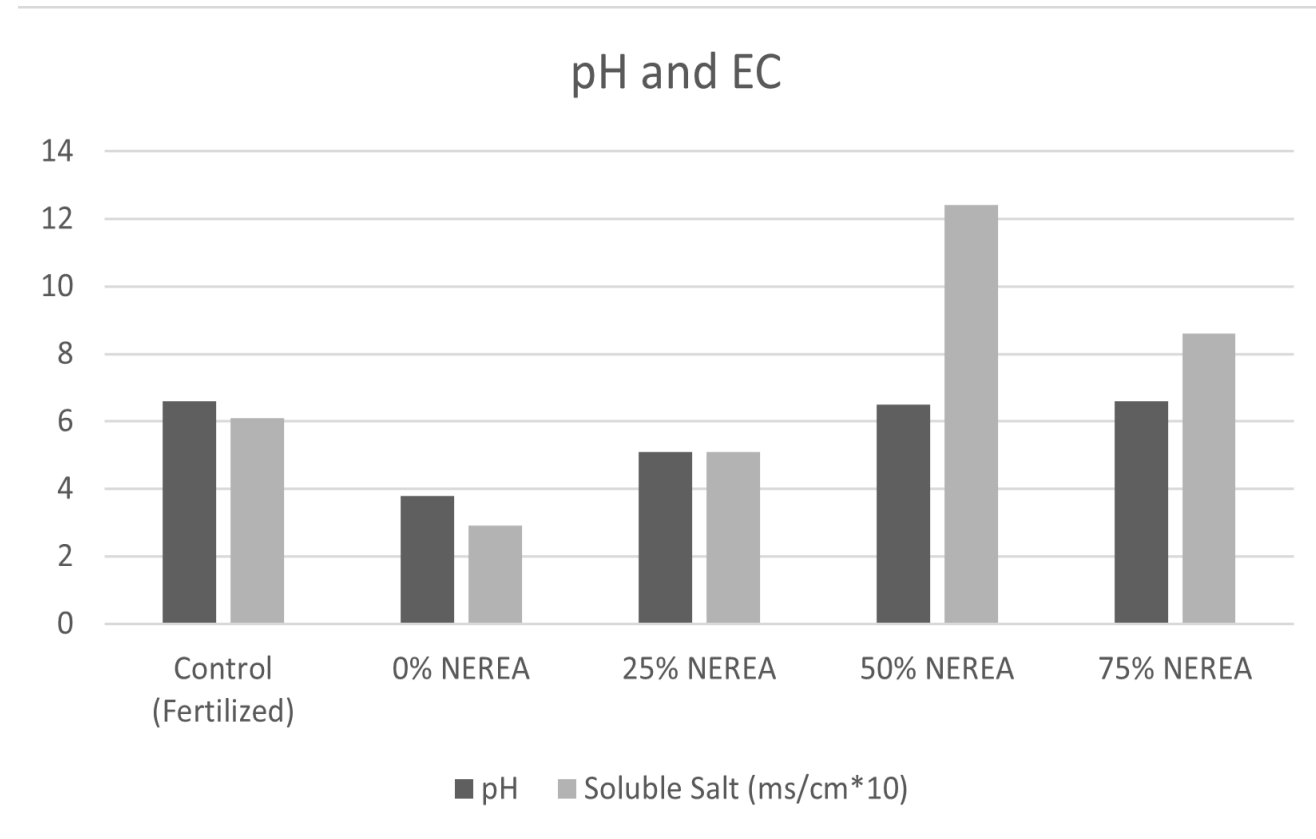
**\*SUMMARY\*:** Basil in 25% NEREA blend grew more root material than in all other blends



## Observations: Soil Analyses

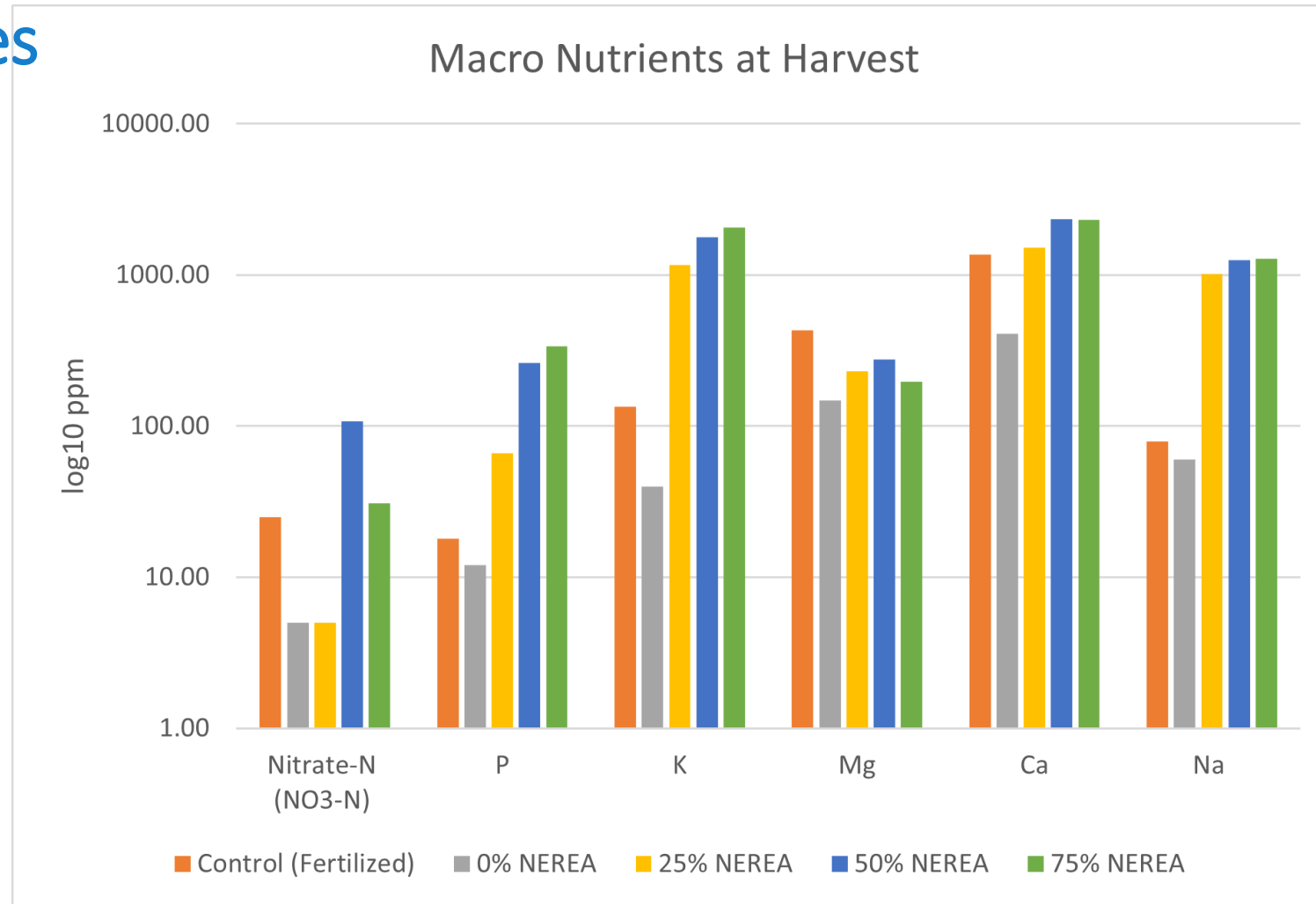
### Soil Analysis Results

- pH and EC compared:
  - 0% NEREA : too low (should have applied lime to increase pH)
  - 25% NEREA: in line with control
  - 50% and 75% NEREA: pH ideal, EC getting high, particularly high for end of harvest



## Observations: Soil Analyses

- Nutrients were not limiting in higher NEREA blends
- Nitrate is present in higher NEREA blends and in Control, much lower in 0% and 25% NEREA
  - May have been used to grow larger basil



## Observations: Leaf Tissue Analyses

Sample ID	Nutrient (%)							Nutrient (ppm)						
	N	P	K	S	Mg	Ca	Na	B	Zn	Mn	Fe	Cu	Al	
NO FERT. CONTROL	0.99	0.22	3.56	0.17	0.48	1.47	0.06	15.31	42	76	216	2.23	108	
CONTROL	5.3	1.09	7.1	0.36	0.79	2.07	0.07	30.2	105	73	250	4.04	64	
0%	1.53	0.19	1.94	0.45	0.53	0.72	0.44	11.46	47	179	821	10.49	442	
25%	5	1.72	5.14	0.76	0.61	2.17	0.09	18.82	71	331	240	3.88	96	
50%	6.14	1.92	5.4	0.48	0.7	2.23	0.12	11.06	62	379	289	2.53	172	
75%	4.41	1.75	6.3	0.47	0.67	2.07	0.15	13.6	64	271	383	2.54	392	

Legend:
Very High
High
Sufficient
Low
Deficient

- Most macronutrients in leaf tissue tested high to very high (except where fertilizer was not provided)
- Low levels of Copper and Boron in NEREA-grown basil may be due to low levels seen in NEREA (*see previous NC project for data*)

## Conclusions

### PROS

- 25% NEREA blend outperformed a standard commercial media blend in all aspects of plant growth (chlorophyll, leaf size, plant height, roots)

### CONS

- 50% and 75% NEREA blends underperformed against standard commercial media
- Late fertilizer application in control may have affected outcome



## Next Steps...

- Follow-up research ideas with NEREA®:
  - Test percentages of NEREA below 25% blended with peat moss to establish a lower limit for physical and chemical properties in the blend
  - Test the effects of 25% NEREA and lower percentages on final weight of blends
  - Grow basil and other crops (high-fertility demanding) in 25% NEREA:75% peat moss vs. standard peat-based blend to strengthen this project information (reproduce data)

# Thank you!

For more information visit: [ncinnovation.ca](https://ncinnovation.ca)

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