Float Greenhouse Tobacco Transplant Production

Need to maximize usable transplant yield

Objective

Evaluate the response of four water soluble fertilizers for float greenhouse tobacco transplant production with two different water sources

Focus on:

- Changes in bay water pH and conductivity (Ec)
- Soil medium (substrate) response in chemistry
- Seedling growth and nutrient content

Greenhouse Water Source Test Results

Source	Southern Piedmont (municipal supply)	Cox Road Lab. (well)
pH	7.2	7.8
Ec (mS/m)	0.18	0.37
Total Alkalinity (ppm $CaCO_3$)	66	183

The SPC water has a relatively lower buffering capacity while the Cox Road water is highly buffered

Greenhouse Water Source Test Results (ppm)

Source	Southern Piedmont (municipal supply)	Cox Road Lab. (well)
Ca	20.9	32.6
Mg	3.0	3.9
K	2.9	1.2
SO_4	24.3	0.8
NO_3	4	4
PO_4	0.364	0.084
Na	8.2	41.8

Fertilizers Evaluated:

Product	Nitrogen Composition (nitrate, ammonium, and urea)	Reaction ($CaCO_3$ equivalent per tonne)
20-10-20 Southern Ag	12.1, 7.9, and 0.0 *(61% nitrate)*	211 kg potential acidity
16-5-16 UltraSol	10.0, 6.0, and 0.0 *(62% nitrate)*	143 kg potential acidity
15-5-15 Jack's	12.0, 3.0, and 0.0 *(80% nitrate)*	35 kg potential basicity
13-2-13 UltraSol	12.4, 0.3, and 0.3 *(95% nitrate)*	185 kg potential basicity

Influence of nutrient uptake on soilless medium pH

- ✓ Plant uptake of cations lowers substrate pH
  (**NH_4^+**, K^+, Ca^{++}, Mg^{++}, and Na^+)
- ✓ Plant uptake of anions raises substrate pH
  (**NO_3^-**, SO_4^-, and $H_2PO_4^-$)

Fertilizers Evaluated:

Product	Calcium	Magnesium	Sulfur
20-10-20 Southern Ag	---	---	---
16-5-16 UltraSol	---	3.0	4.0
15-5-15 Jack's	5.0	2.0	---
13-2-13 UltraSol	6.0	3.0	---

All contained similar micronutrients: B, Cu, Mn, Mo, and Zn

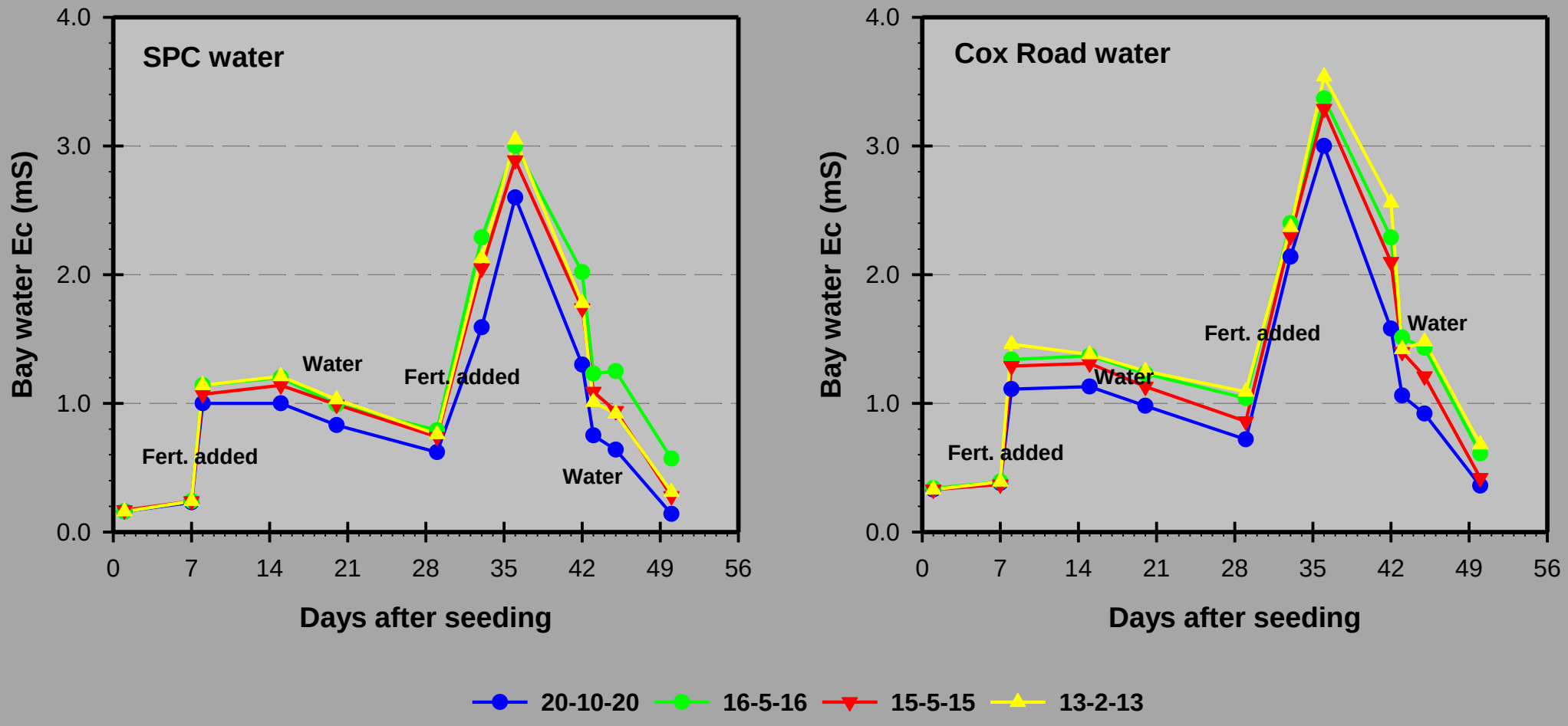
Fertilization Protocol

- ✓ **1st fertilizer addition** at 5 to 7 days after seeding,
  100 ppm N (*7 DAS*)

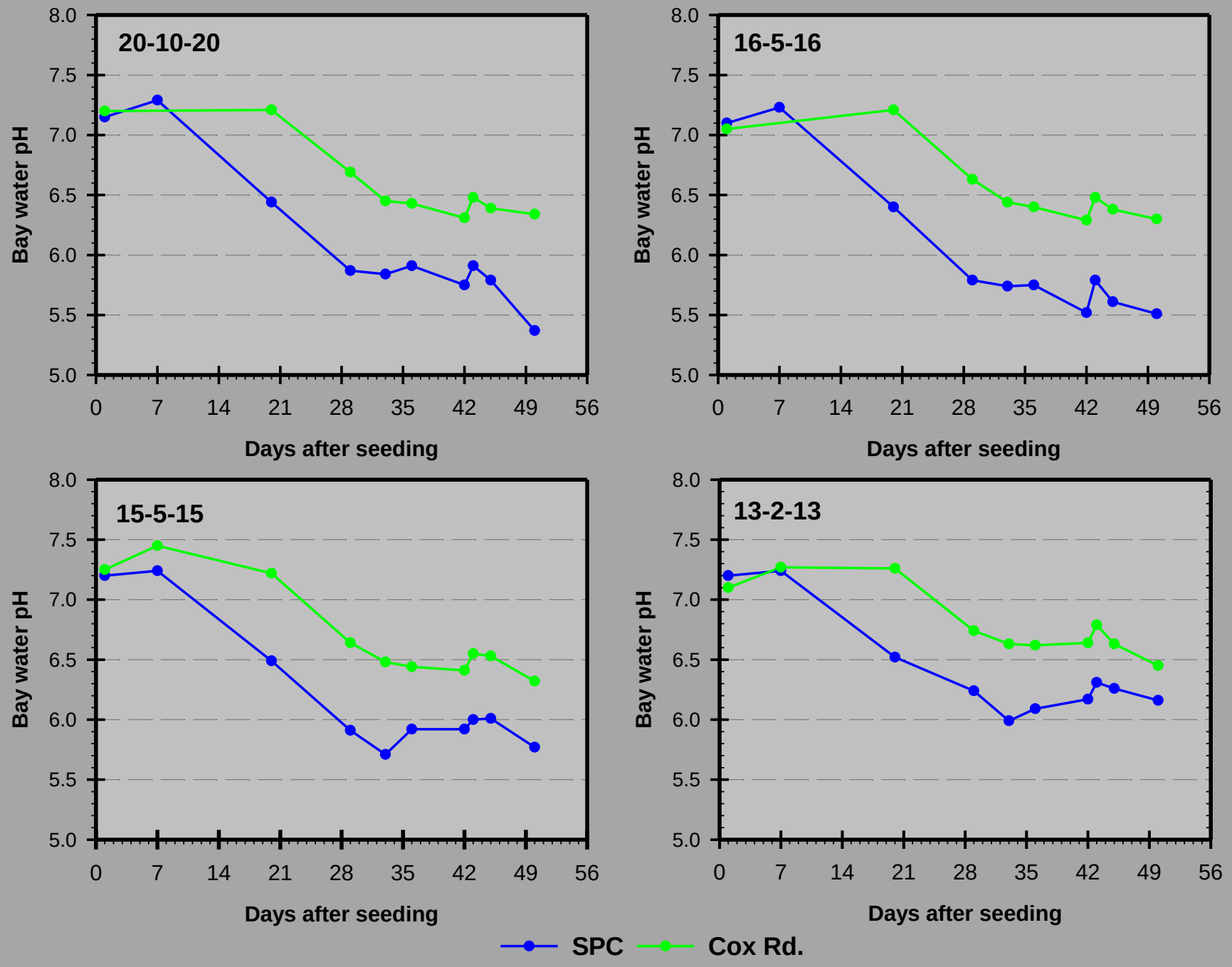
- ✓ **2nd fertilizer addition** at 4 weeks after seeding,
  150 ppm N, (*31 DAS*)

- ❖ Bays filled with water to a 10 cm depth with fertilizer addition
- ❖ Additional water added as needed (*17 and 43 DAS*)

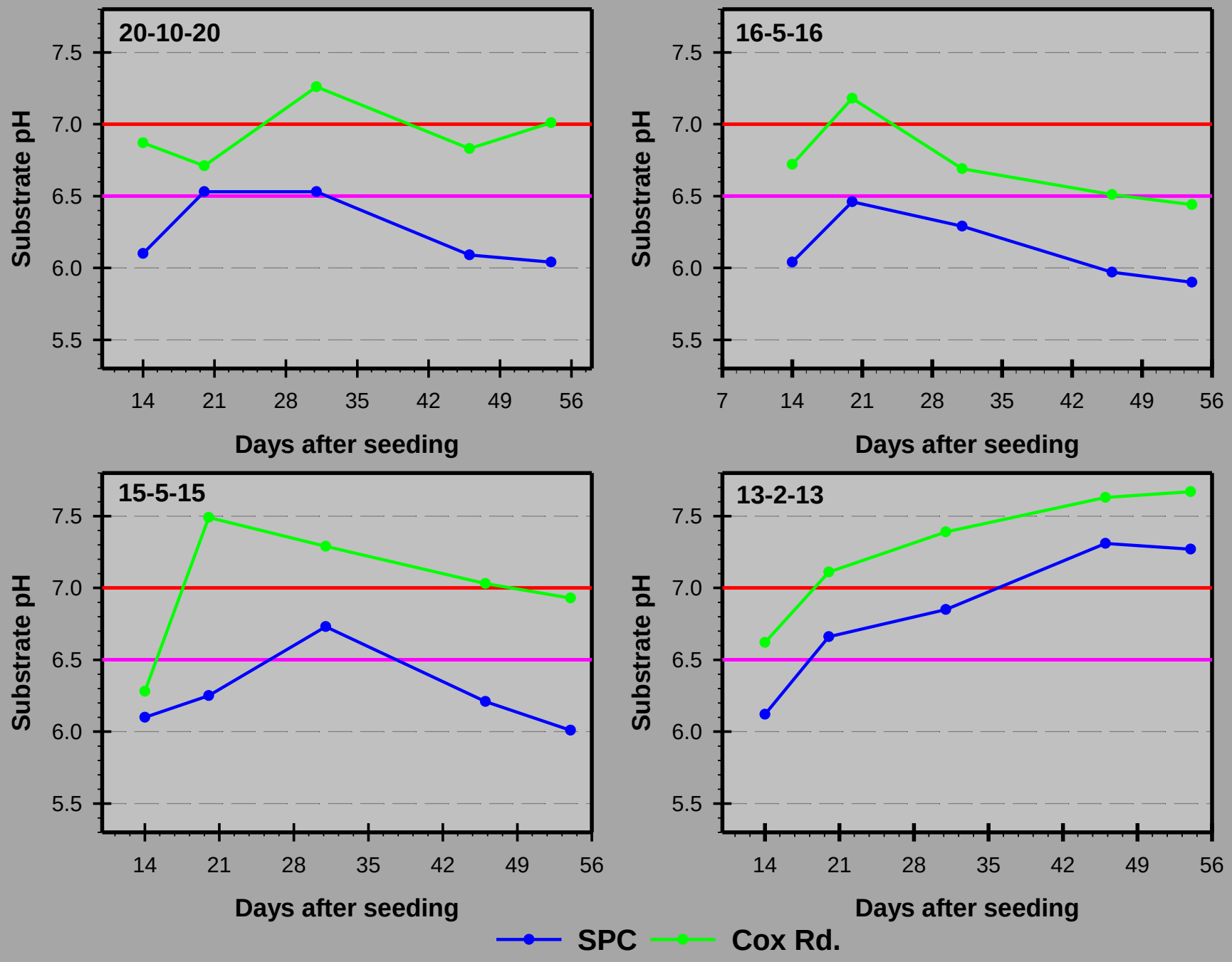
Seasonal trends in conductivity levels of float bay water with four fertilizer materials and two water sources.



Trends in float bay water pH with two water sources and four fertilizer products



Trends in soilless substrate pH with two water sources and four fertilizer products



Statistical Analysis of Seedling Nutrient Levels

Factor	Sample Time (days after seeding)		
Nitrogen	**18 DAS**	**31 DAS**	**46 DAS**
Fertilizer	0.1253	0.2648	0.1071
Water source	0.5606	0.7098	0.5375
Fertilizer X Water	0.3854	0.1816	0.0925
Phosphorus			
Fertilizer	0.0540	0.0001	0.0002
Water source	0.7914	0.8788	0.8568
Fertilizer X Water	0.8903	0.8372	0.5496
Potassium			
Fertilizer	0.8318	0.2054	0.0842
Water source	0.7155	0.6014	0.5330
Fertilizer X Water	0.6977	0.9009	0.2908

Statistical Analysis of Seedling Nutrient Levels

Calcium	Sample Time (days after seeding)		
Factor	**18 DAS**	**31 DAS**	**46 DAS**
Fertilizer	0.5392	<0.0001	<0.0001
Water source	0.3971	0.3119	0.0236
Fertilizer X Water	0.9407	0.0131	0.0703

Fertilizer	Days after seeding		
	18	**31**	**46**
20-10-20	1.30 ***a***	1.50 ***c***	1.50 ***c***
16-5-16	1.46 ***a***	1.40 ***c***	1.53 ***c***
15-5-15	1.61 ***a***	1.89 ***b***	1.88 ***b***
13-2-13	1.46 ***a***	2.18 ***a***	2.36 ***a***

Statistical Analysis of Seedling Nutrient Levels

Magnesium	Sample Time (days after seeding)		
Factor	**18 DAS**	**31 DAS**	**46 DAS**
Fertilizer	0.0409	<0.0001	<0.0001
Water source	0.3712	0.8788	0.4850
Fertilizer X Water	0.9623	0.8372	0.0677

Fertilizer	Magnesium (%)		
	18 DAS	**31 DAS**	**46 DAS**
20-10-20	*0.52* ***c***	*0.48* ***c***	*0.43* ***c***
16-5-16	*0.74* ***a***	*0.97* ***a***	*0.93* ***a***
15-5-15	*0.61* ***bc***	*0.78* ***b***	*0.72* ***b***
13-2-13	*0.65* ***ab***	*0.87* ***ab***	*0.88* ***a***

Statistical Analysis of Seedling Nutrient Levels

Sulfur	Sample Time (days after seeding)		
Factor	18 DAS	31 DAS	46 DAS
Fertilizer	0.2045	<0.0001	<0.0001
Water source	0.7107	0.0004	0.0053
Fertilizer X Water	0.9199	0.0696	0.2593

Cox Road Well

Southern Piedmont

Fertilizer	Days after seeding			Days after seeding		
	18	31	46	18	31	46
20-10-20	0.57 **a**	0.34 ***b***	0.32 ***b***	0.64	0.60 ***b***	0.52 ***b***
16-5-16	0.76 **a**	0.77 ***a***	0.79 ***a***	0.82	0.86 ***a***	0.84 ***a***
15-5-15	0.54 **a**	0.41 ***b***	0.34 ***b***	0.57	0.54 ***b***	0.58 ***b***
13-2-13	0.44 **a**	0.43 ***b***	0.38 ***b***	0.40	0.49 ***b***	0.44 ***b***

Summary

- ✓ Both water sources were quite acceptable for greenhouse tobacco transplant production
  - ➢ No plant nutrient related problems occurred with any treatment combinations (water source and fertilizer product)
  - ➢ Differences were observed in substrate pH and tissue nutrient levels between fertilizer products
- ✓ Selecting the most appropriate fertilizer becomes more important with problematic water source chemistry

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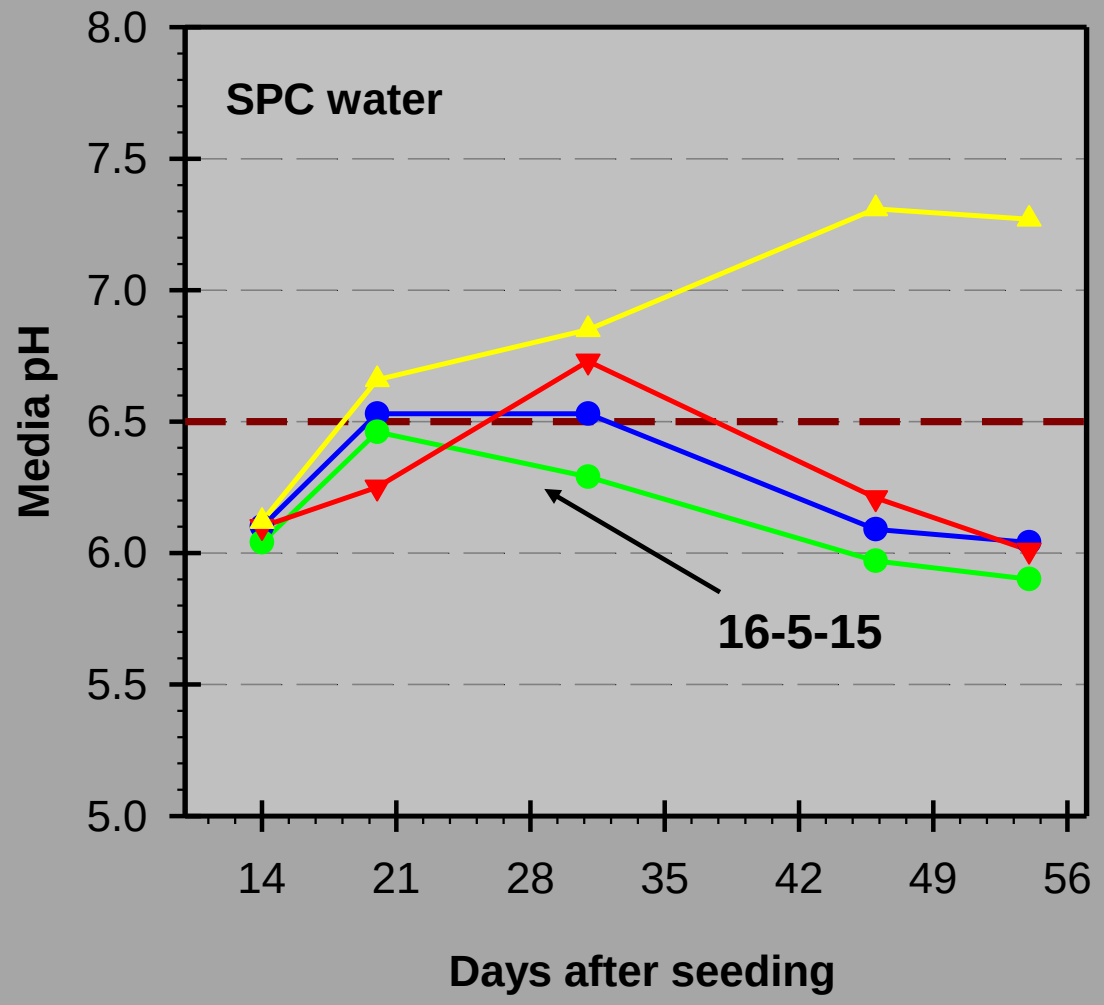
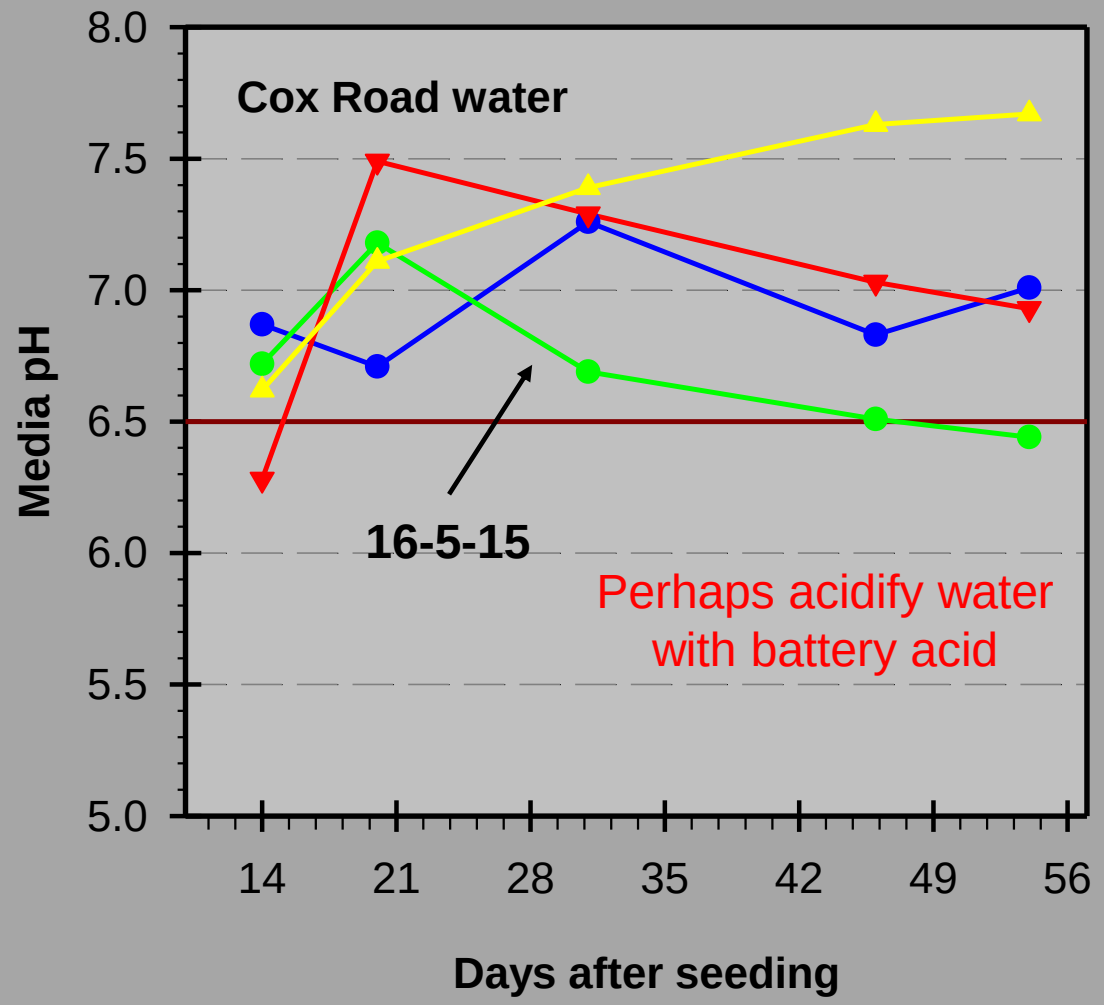
My fertilizer choice would be 16-5-16 for both water sources.





20-10-20 16-5-16 15-5-15 13-2-13

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is acknowledged.

QUESTIONS

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