Primocane-fruiting blackberry nutrient levels through the season. What's going on in single and double cropping systems?

Gina_Fernandez@ncsu.edu

North American Raspberry and Blackberry Association

St. Louis, MO

March 2020

A project conducted with NCSU, NCCES, NCDA&CS and NC growers

- NCDA &CS
  - Kristin Hicks, NCDA & CS
  - Steve Dillon, NCDA&CS
- NCCES
  - Karen Blaedow, Henderson Co.
  - Daniel Shires, Cleveland Co.
- Growers
  - M&M Farm, Mike and Mike Jr Pack, Hendersonville NC
  - Faith Farms, Heather and James Webb, Shelby NC

Sufficiency ranges, NCDA & CS
Floricane-fruiting blackberry

	%			ppm
N	2.4-3		Fe	50-300
P	0.15-0.6		Mn	50-250
K	1-2		Zn	20-70
Ca	0.5-1		Cu	7-15
Mg	0.3-0.5		B	30-50
S	0.13-0.6		Mo	0.04-2

Background for 2018-19 study

- Another “new” crop: PRIMOCANE-FRUITING blackberry
- Grower interest in how to manage fertility in single and double cropping systems
- Floricane-fruiting crop, fruit is produced:
  - Summer: on floricanes only (single crop)
  - Plant tissue sufficiency and soil recommendations based on this production model
- Primocane-fruiting crop, fruit can be produced:
  - Summer (June): on floricanes and in the fall on the primocanes (double crop)
  - Fall (August): on primocanes only (single crop)

Questions:

- Are the current tissue sufficiency ranges (based on single floricane crop) accurate for these new cultivars/production systems?
- When should you sample?

What we did

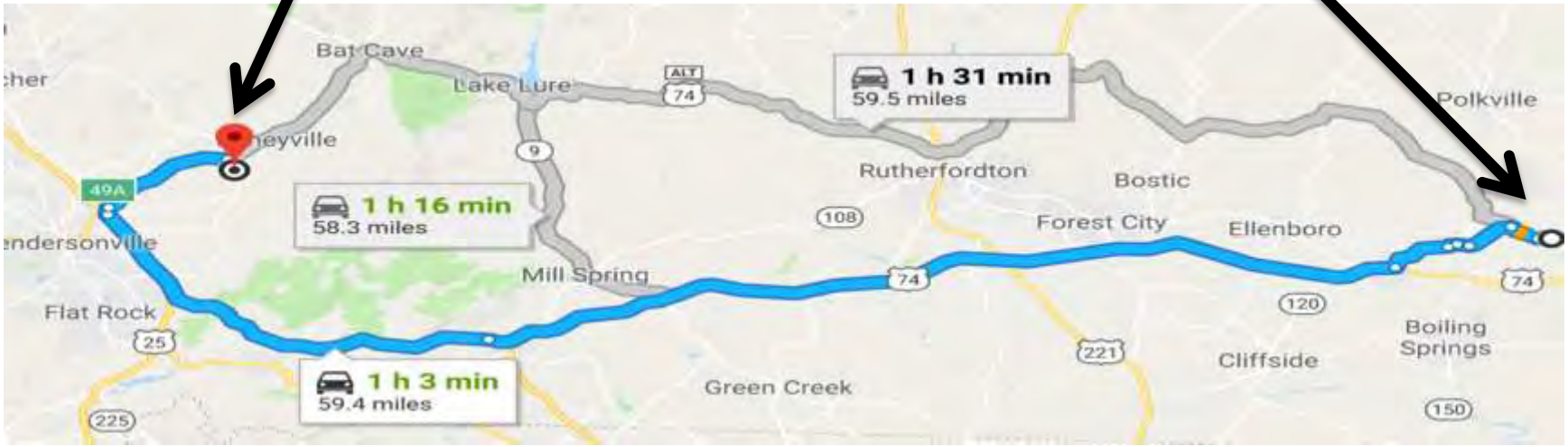
- 2018 and 2019 (2019 only today)
- Traveler and APF-45
- 2 farms
- Replicate samples (2 reps (rows) Traveler, 4 reps (rows) APF-45)
- Single and double cropped fields
- Leaf samples collected every 3 weeks by NCDA and sent for analysis
- Single crop sample: 20 most recently mature leaves, below fruiting zone of primocane
- Double crop sample: same as SCP and mid section of floricane fruiting lateral

What we did

- Seasonal phenology (primocane emergence, flowering, fruiting stages etc)
- Pictures and brix levels
- Brought in some statisticians

‘Traveler’ Farm

‘Prime-Ark® 45’ Farm



Fruiting times

First harvest and *peak fruiting* Western NC

DC Traveler floricane harvest: June 14/21

DC APF-45 floricane harvest: June 25

DC Traveler primocane harvest: Aug 6

SC Traveler primocane harvest : Aug 6

DC APF-45 primocane harvest: Aug 25

SC APF 45 primocane harvest: Aug 25

Traveler Farm

- Location
  - Edneyville/Hendersonville
- Elevation
  - 2250 ft (685 m)
- Soil type
  - Hayesville loam
- Traveler
  - Planted 2017

Prime-Ark® 45 Farm

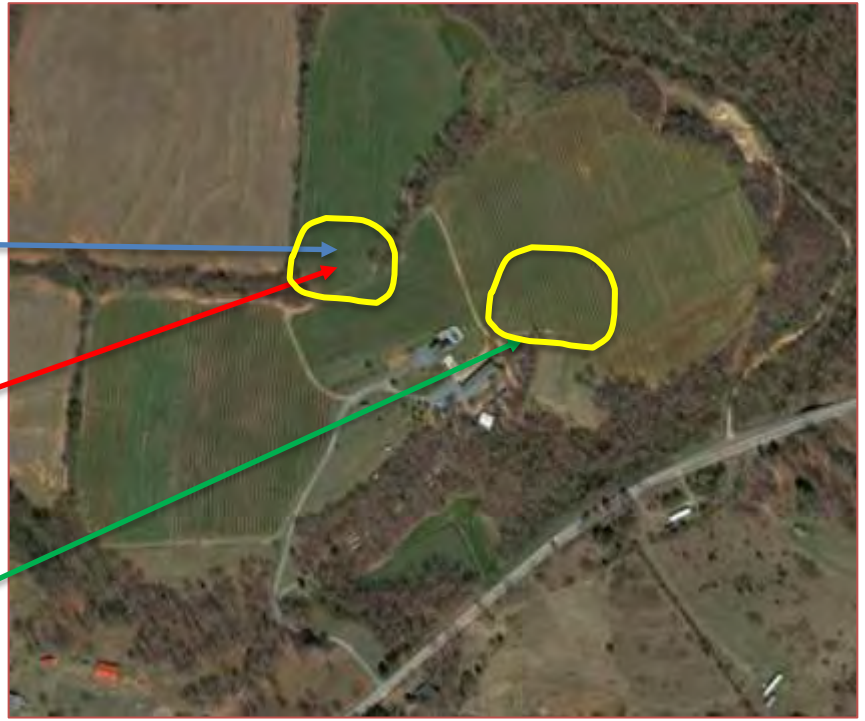
- Location
  - Shelby, NC
- Elevation
  - 863 ft (263 m)
- Soil type
  - Pacolet sandy clay loam
- Prime-Ark ® 45

On Farm logisitics

- 2 reps Traveler 4 reps APF45
- Leaf samples collected
  - Single Crop Primocane, field mowed to ground and only has one fruit crop in late summer (SP)
  - Double Crop Primocane, floricane crop fruit in June/July, primocane crop fruit in Aug/Sept (DF, DP)

Leaf samples

- Every 2-3 weeks
- Double cropped floricane leaf DCF
- Double crop primocane leaf DCP
- Single crop primocane leaf SCP



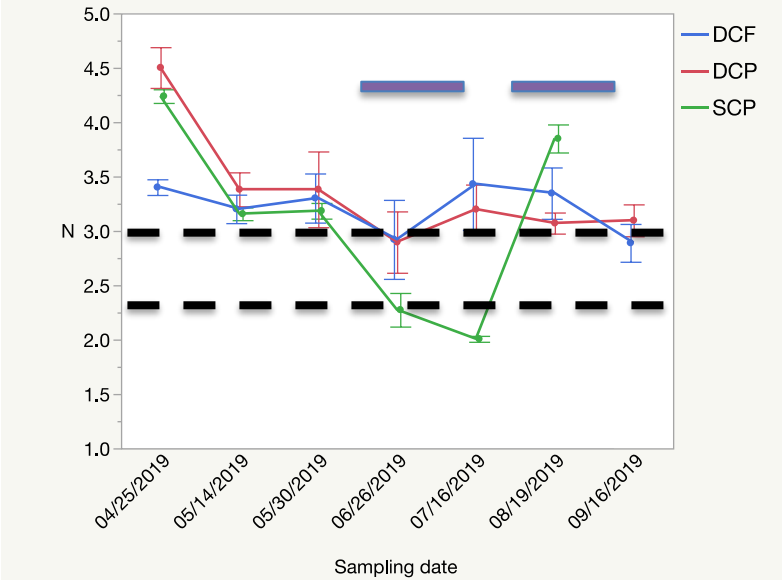
Summary 2018

- Sufficiency/survey levels do not follow those of floricane-fruiting only types
- Most differences are evident between single and double cropped plants (primocanes)
- June stable period for N and K
- Early season not a good time for leaf sampling
- Cultivars are different

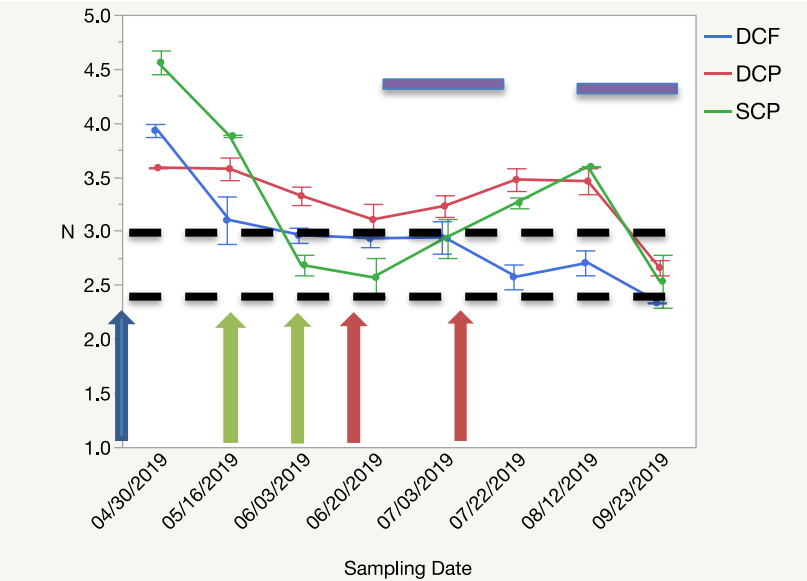
Results 2019

Nitrogen

Prime-Ark ® 45



Traveler



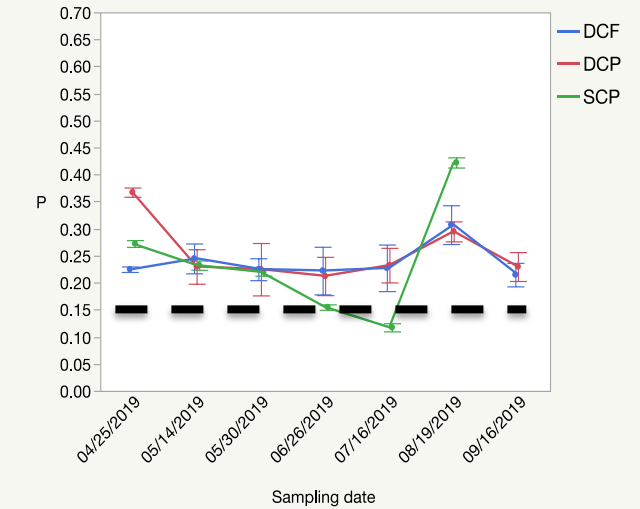
All above sufficiency early season
SC Primocane below Sufficiency before fruiting

Nitrogen

- Early season high (after input of N)
- DCP and SCP had different levels through the season
- Most stable right before harvest in DC system?

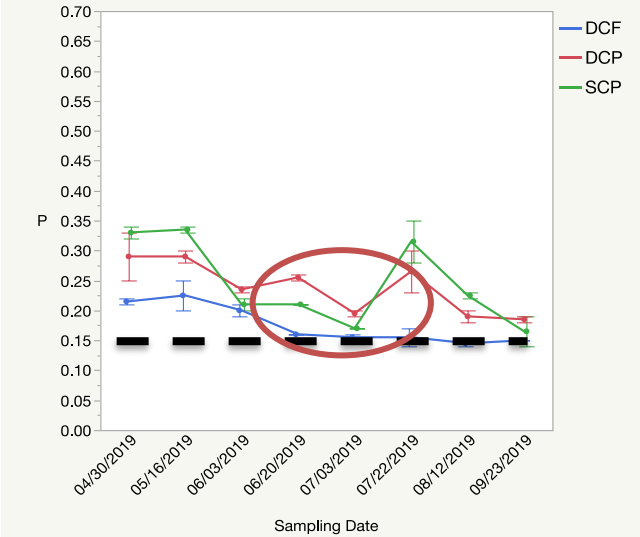
Phosphorus

Prime-Ark ® 45



SC Primocane below Sufficiency before fruiting

Traveler



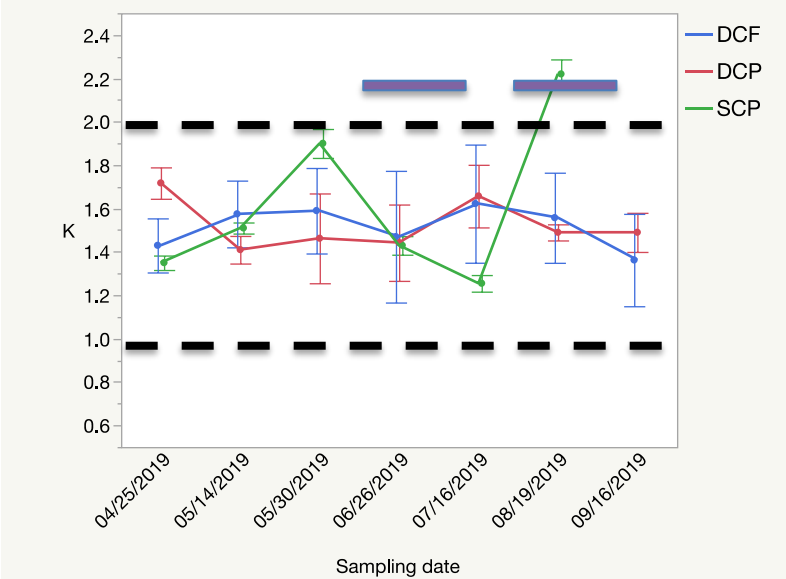
Sufficient P regardless of leaf or growth stage

Phosphorous

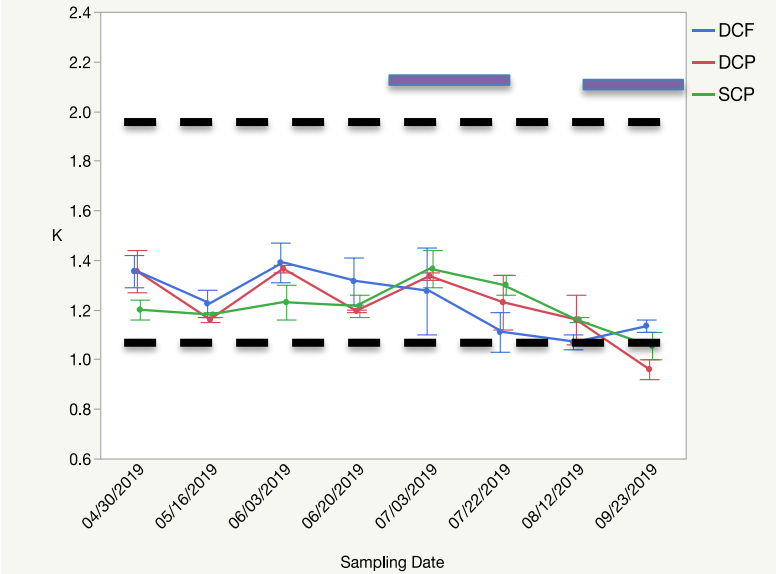
- Below sufficiency in SC Prime Ark 45 during fruiting
- Increases in SCP/DCP after mid summer low
- Dip in levels mid summer
  - Mobile, reallocated from older leaves
  - Normal process

Potassium

Prime-Ark ® 45



Traveler



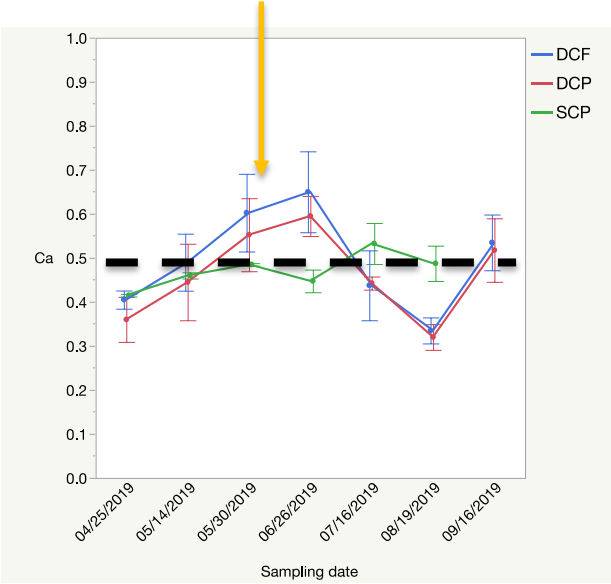
Looks good

Potassium

- K generally good
- Often drops over the season
- Below sufficiency in Traveler late season
  - DON’T apply more K, competes with Ca
- May lower K requirement in Traveler

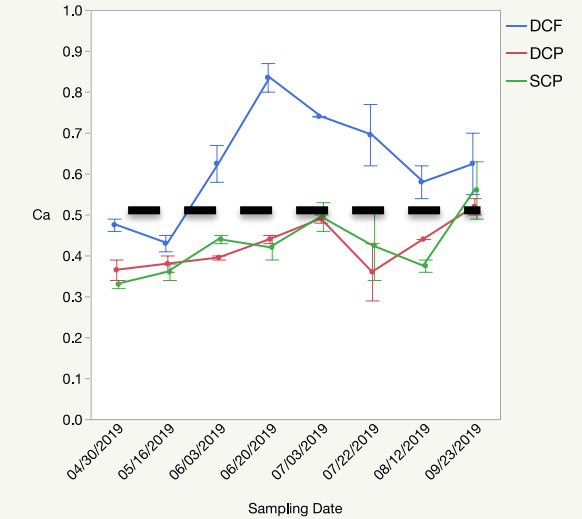
Calcium in leaf over season in PF varieties

Prime-Ark ® 45



Below Suff in DCP and some SCP at fruiting

Traveler



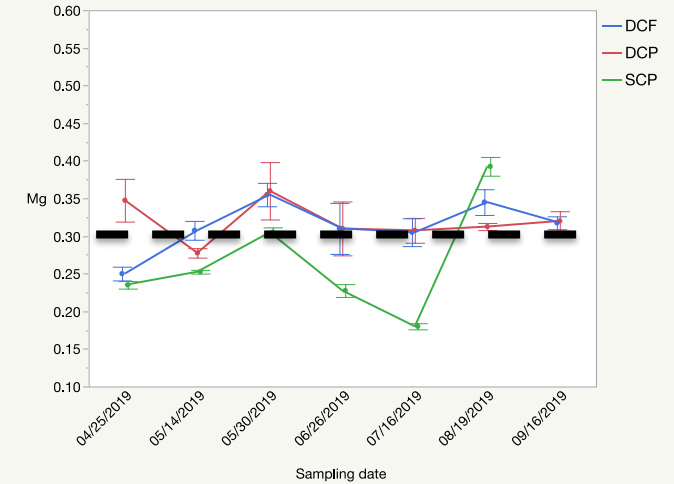
Below Suff in primocanes for SC and DC

Calcium

- Higher in floricanes than primocanes
- DCF below sufficiency most dates (is this important?)
- Ca immobile, moves only by root uptake and xylem flow, susceptible to uneven watering and TIPPING
- Zig zag of Ca may be due to different age leaves before and after tipping

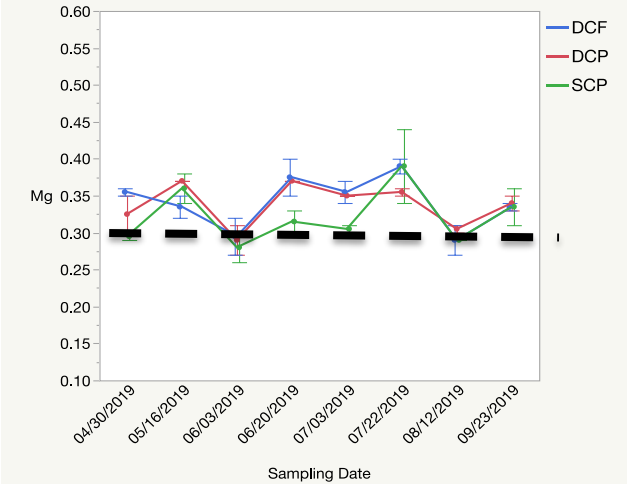
Magnesium

Prime-Ark ® 45



SCP below Suff

Traveler



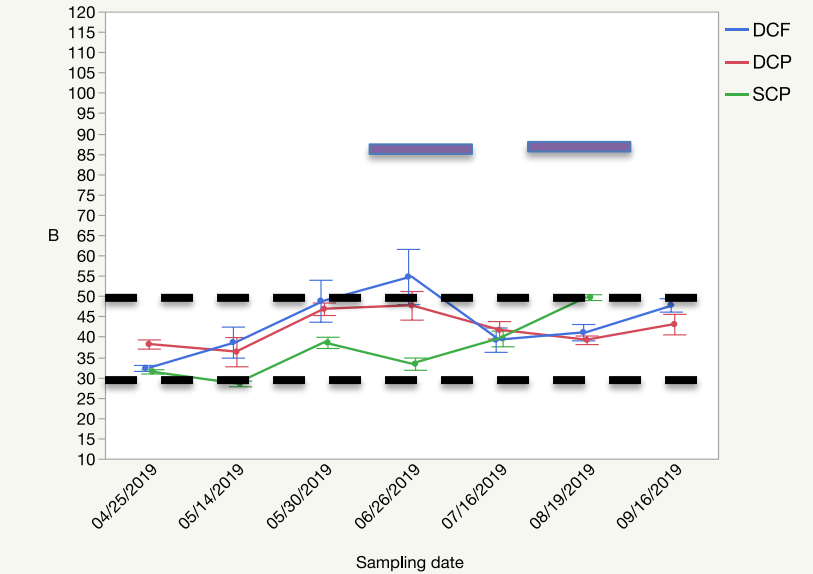
Mostly all Suff

Magnesium

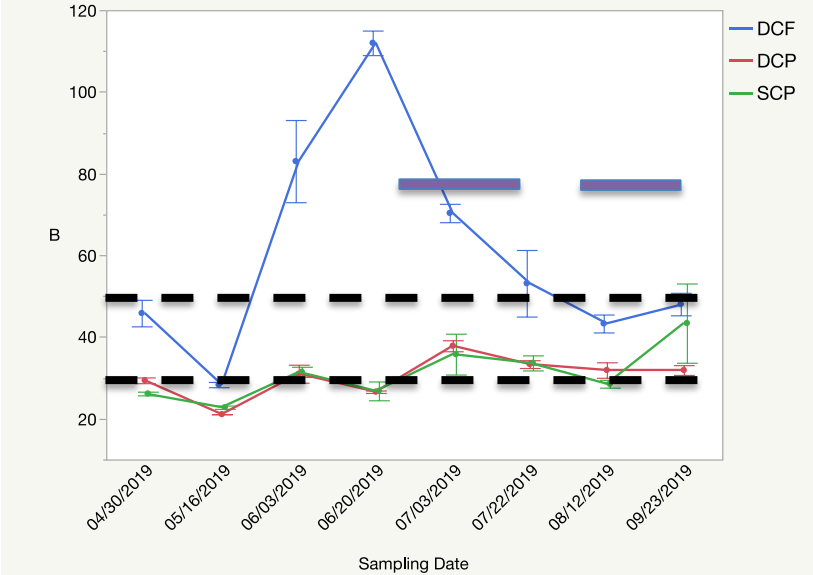
- Magnesium levels were below sufficiency for multiple sampling dates, both varieties and multiple cropping systems but especially low in the Prime-Ark 45, single-cropped system at fruiting (July).
- Adequate Mg is essential for supporting photosynthesis.
- An evaluation of Mg fertility recommendations in blackberry merits further study.

Boron

Prime-Ark ® 45



Traveler



Boron

- Sufficient in Prime-Ark 45 at all sampling dates except at early growth in the single-cropped system
- Below sufficiency in the primocanes of Traveler at most sampling dates.
- Essential for flower formation and fruit quality and blackberries need adequate levels of B in actively growing areas (e.g. primocane leaves, flowers) in order to produce high levels of quality fruit.
- Recommendations in primocane-fruiting blackberry require further study.

Summary

- Primocane single crop plants v double cropped: nutrients are different
- Single crop leaves more often below sufficiency than double crop. May be different fertilization levels. Evaluating this.
- Some nutrients not different between primocane and floricane
- N, P and Mg tissue levels mostly within sufficiency range

Summary

- Time of sampling?
  - Phenology based
- Lower sufficiency levels?
- Cultivars (and years) are different!

Phenology

Next steps?

- Continue analysis Stats 542
- Correlate phenology and sufficiency levels
- Re-evaluate recommendations for sufficiency and timing of leaf sampling?
- SC and DC will have different recommendations
- Cultivars are different

Thanks

the Southern Region small fruit consortium

North Carolina Department of Agriculture & Consumer Services

NC COOPERATIVE EXTENSION

N.C. A&T STATE UNIVERSITY

NC STATE UNIVERSITY

M&M Farm

Faith Farm