Where do We Go from Here: Thoughts about 2020

R. Allen Straw

Grower / Crop Consultant

Where are We?

to

Fall of 2019

- Generally a hot/dry fall
- Most operations planted on time
- A few producers were very late planting
  - Following other crop
  - Too dry, then 6 to 8 inches of rain
- First Case
  - Should plant Sept. 20
  - Planted Late October
  - Mt. Airy, NC
- Second Case
  - Should plant late September – 1st week in October
  - Planted October 29 – November 6
  - Just above Chatanooga

Row Covers applied 11/6/2019

1.2 oz material ‘Typar” – spun bound

Chandler March 1, 2020

Covered

Uncovered

Fronteras

Row Covers Applied in Fall

- Cold snap 3rd week of November
  - Temperatures had been mild
  - Plants were “actively” growing
- Row cover should be applied to protect from cold
- Remove cover after acclimation

Some Growers left Covers Applied

- Several growers in the Mid-South – AR, MO, West TN left covers on all winter
- This was the wrong year to do this
- In the last 2 or so weeks, covers were removed

Some Growers left Covers Applied

- What was Found
  - Blooms
  - Green Fruit
  - A Few Ripe Berries
  - Heavy Pressure of Botrytis Crown Rot
    - Rovral - no bloom
    - Switch

Row Covers / Freeze Protection Management

- Row Covers from this point on:
  - Maturity Enhancement
  - Frost /Freeze Protection
    - Emerged Buds and Flowers
- Overhead Water
  - Frost/Freeze Protection
- Use the combination of row covers and overhead water when:
  - Deploying wet row covers
  - Extremely cold temperatures are forecast
  - Windy conditions / advective freeze situation

Irrigation / Freeze Protection

- Many growers utilize overhead sprinklers for Frost / Freeze Protection
- Row Covers
- Combination of overhead water and row covers is the “Cadillac” combination

- Usually out minimum water applications are 67 to 70 gallons of water per acre per minute
  - 0.15” per hour
- In extreme conditions
  - 0.20” per hour
  - 0.25” per hour
  - 0.33” per hour

Strawberry Irrigation

- Spring
  - Once growth begins in late winter or early spring
  - Increase as temperatures increase
- Amount of Water
  - Early
    - 1” per acre per week
  - Warmer
    - 1 ½” per acre per week
  - Hot
    - 3 to 4 hours per day
    - Between 11:00 a.m. and 4:00 p.m.

Spring Irrigation

- Sign of Growth
  - Usually watering twice a week is sufficient
  - So generally, irrigate every 3 to 4 days
- What to do if it rains?
  - In plasticulture production we keep irrigating.
- As Temperatures Increase
  - 1” to 1.5” / A / week
    - Monday
      - 1/3” to ½”
    - Wednesday
      - 1/3” to ½”
    - Friday
      - 1/3” to ½”

Tissue Sampling

- Take tissue samples in the late winter or early spring when plants begin to actively grow
  - Take a representative amount of samples from each field (20 to 25 samples)
  - The most recent fully expanded trifoliate is the best indicator of nutritional status
  - Remove petioles near the crown of the plant, partial petioles do not yield reliable results

Tissue Sampling (cont.)

- Remove the leaves from the petioles
  - The leaves are used to determine concentrations of essential nutrients
    - Unless there are deficiencies, this could be the only sample of leaves you will need to take
    - Some growers continue on a bi-weekly schedule
  - Petioles are used to measure Nitrate Nitrogen
    - Measures nitrate concentration
    - Should be sampled on a weekly or bi-weekly basis

Tissue Analysis Labs

- Public
  - North Carolina Department of Agriculture, 1040 Mail Service Center, Raleigh, NC 27699-1040 or 4300 Reedy Creek Rd, Raleigh, NC 27607
  - Other State Universities
- Private
  - Micro-Macro International, Inc., 183 Paradise Blvd., Suite 108, Athens, GA 30607

    Phone: 706-548-4557

    Fax: 706-548-4891
  - Waypoint Analytical
    - Richmond, VA
    - Memphis, TN

Sufficiency Ranges

- N 3.0 – 4.0 %
- P 0.2 – 0.4 %
- K 1.1 – 2.5 %
- Ca 0.5 – 1.5 %
- Mg 0.25 – 0.45 %
- S 0.15 – 0.40 %

- Fe 50 – 300 ppm
- Mn 30 – 300 ppm
- Zn 15 – 60 ppm
- Cu 3 – 15 ppm
- B 25 – 50 ppm

Petiole Nitrate Nitrogen Levels

Week	Low	High
1	600	1,500
2 - 3	4,000	6,000
4	3,500	6,000
5 – 8	3,000	5,000
9	2,000	4,500
10	2,000	4,000
11	1,500	3,000
12	1,000	2,000

Petiole Levels – Cardy Meter

- Nitrate Nitrogen (NO_3-N)
  - October 800 – 900
  - November 600 – 800
  - March 600 – 800
  - April 10 300 – 500
  - May 10 200 – 500
  - June 1 200 – 500
- Potash (K_2O)
  - October 3000-5000
  - November 3000-3500
  - March 2500-3500
  - April 10 2000-2500
  - May 10 1800-2500
  - June 1 1500-2000

Irrigation and Fertigation

- Irrigation
  - Spring
    - Once growth begins in late winter or early spring
- Fertigation
  - Once growth begins in late winter or early spring or at least by early bloom
    - Apply 5 lb of N/A/week
    - ¾ lb of N/A/day
    - For 8 to 10 weeks
  - Some areas / growers like to “wake” the plants up with higher rates

Common Questions

- How often do I fertilize?
  - Every week?
  - Every other week?
- How much fertilizer do I apply?
  - How often are you going to fertilize?
- What N source do I use?

Answer

- Fertilize every two weeks
  - Too much N at one time
  - Soft berries
  - Poor Flavor
- Fertilize every week
  - Rotation
    - 50 lb of calcium nitrate / A
    - 50 lb of potassium nitrate / A
    - 50 lb of 20-20-20 /A
  - Lower rate once harvest begins (?) (25 lb/A)

N Source in Spring

- Ammonium Nitrate and Urea
  - Pro's
    - Cheap
    - Water Soluble
    - Quick Growth Response
    - Large Fruit
  - Con's
    - Soft Fruit
    - Bland Fruit
- Nitrates
  - Calcium Nitrate
  - Potassium Nitrate
    - Pro's
      - Firmer Fruit
      - Good Flavor
    - Con's
      - More Expensive
      - KNO_3 Hard to dissolve
    - Liquid K sources
- 20-20-20

Spring Irrigation / Fertigation

- Irrigation
  - 1” to 1.5” / A / week
    - Monday
      - 1/3” to ½”
    - Wednesday
      - 1/3” to ½”
    - Friday
      - 1/3” to ½”
- Fertigation
  - Monday
    - 15 - 25 lb of calcium nitrate/A
  - Wednesday
    - 15 - 25 lb of potassium nitrate/A
  - Friday
    - 15 - 25 lb of 20-20-20/A

Spring Irrigation / Fertigation Carry-Over Plants

- Irrigation
  - 1” to 1.5” / A / week
    - Monday
      - 1/3” to 2/3”
    - Wednesday
      - 1/3” to 2/3”
    - Friday
      - 1/3” to 2/3”
- Fertigation
  - Monday
    - 25 - 50 lb of calcium nitrate/A
  - Wednesday
    - 25 - 50 lb of potassium nitrate/A
  - Friday
    - 25 - 50 lb of 20-20-20/A

Spring Irrigation / Fertigation Day Neutral Varieties

- Irrigation
  - 1” to 1.5” / A / week
    - Monday
      - 1/3” to 2/3”
    - Wednesday
      - 1/3” to 2/3”
    - Friday
      - 1/3” to 2/3”
- Fertigation
  - Monday
    - 20 lb of calcium nitrate/A
  - Wednesday
    - 20 lb of potassium nitrate/A
  - Friday
    - 20 lb of 20-20-20/A
  - At least 1 lb of N/A/day

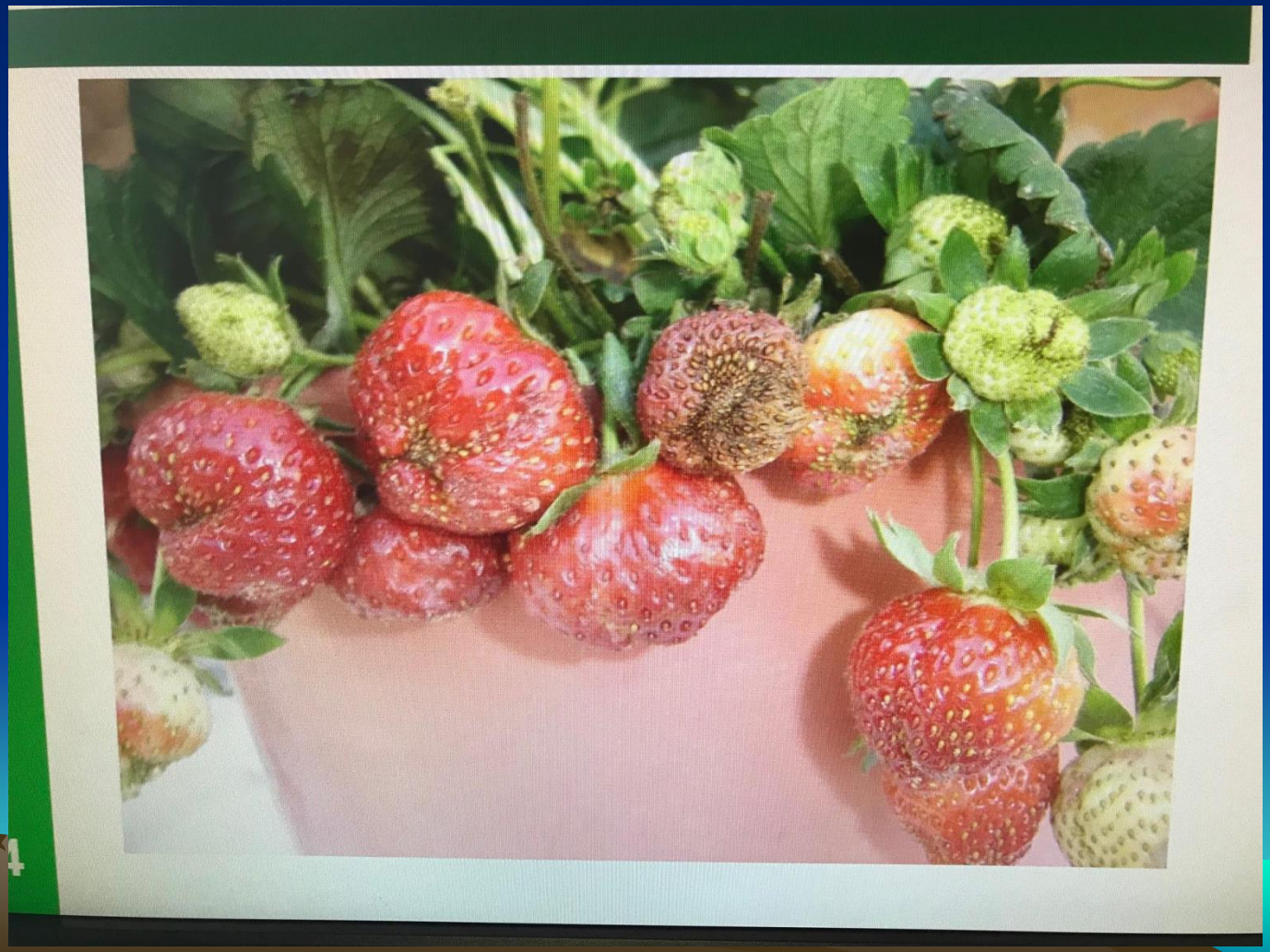
Nitrogen and Varieties

- Chandler
  - 1 lb of N / A / day
- Camarosa
  - ¾ lb of N /A / day
- Flavorfest
  - ½ lb of N / A / day
- Albion
  - 1 lb of N / A / day
- Ruby June ?
  - ¾ lb of N /A / day ?

Micronutrients in Spring

- Boron
  - Drip applications
  - **1/8** to ¼ lb of actual B / A / application
- Mg / S
- Epson Salts
  - Foliar
    - 2 to 4 lb of Epson Salt /A every 1 to 2 weeks
  - Drip
    - 25 lb of Epson Salts / A every 2 weeks
- Foliar Magnesium Products

Boron Deficiency



Severe Boron Deficiency

Boron Deficiency

- 1 lb of actual Boron/A Preplant
- ¼ lb of actual Boron/A every 3 weeks in the spring
  - Foliar
  - Drip

Evaporative Cooling with Drip?

- When the temperatures start heading toward the mid-80's we worry about plants going vegetative.
- Most of us don't like to overhead irrigate while ripe fruit is on the plant.
- Can we drip irrigate in the middle of the day to cool the plants?
- Two growers that drip irrigate daily in the heat of the day and extended 'Chandler' harvest 2 to possibly 3 weeks.
- Daily Fertilization

Two-Spotted Spider Mites

- Fall
  - Pay close attention if using row covers
- Spring
  - Are becoming a problem every year?

Spider Mite Bronzing

Spider Mite Condominiums

Spider Mite Control

- Agri-Mek 0.15EC @ 16 fl oz/A (3)
- Kanemite 15SC @ 31 fl oz/A (1)
- Acramite 50WP @ 1 lb/A (1)
- Zeal @ 3 oz/A (1)
- Portal @ 2 pints/A (1)
- Savey 50WP @ 7 oz/A (3)
- Oberon 2SC @ 16 fl oz/A (3)
- Danitol @ 21 2/3 fl oz/A (2)
- Brigade @ 16 – 32 oz/A (0)

EPA Review of Captan

- Public comment period extended until March 15, 2019
- Comments
  - Growers
  - Associations
  - Industry
  - Academia
- Content
  - Why is it Captan important to you?
  - Resistance Management
    - Anthracnose resistance to strobilurin fungicides
  - 24 hr PHI or less
  - 24 hr REI strawberries
  - Need in other fruit crops - Peaches

Captan vs. Thiram

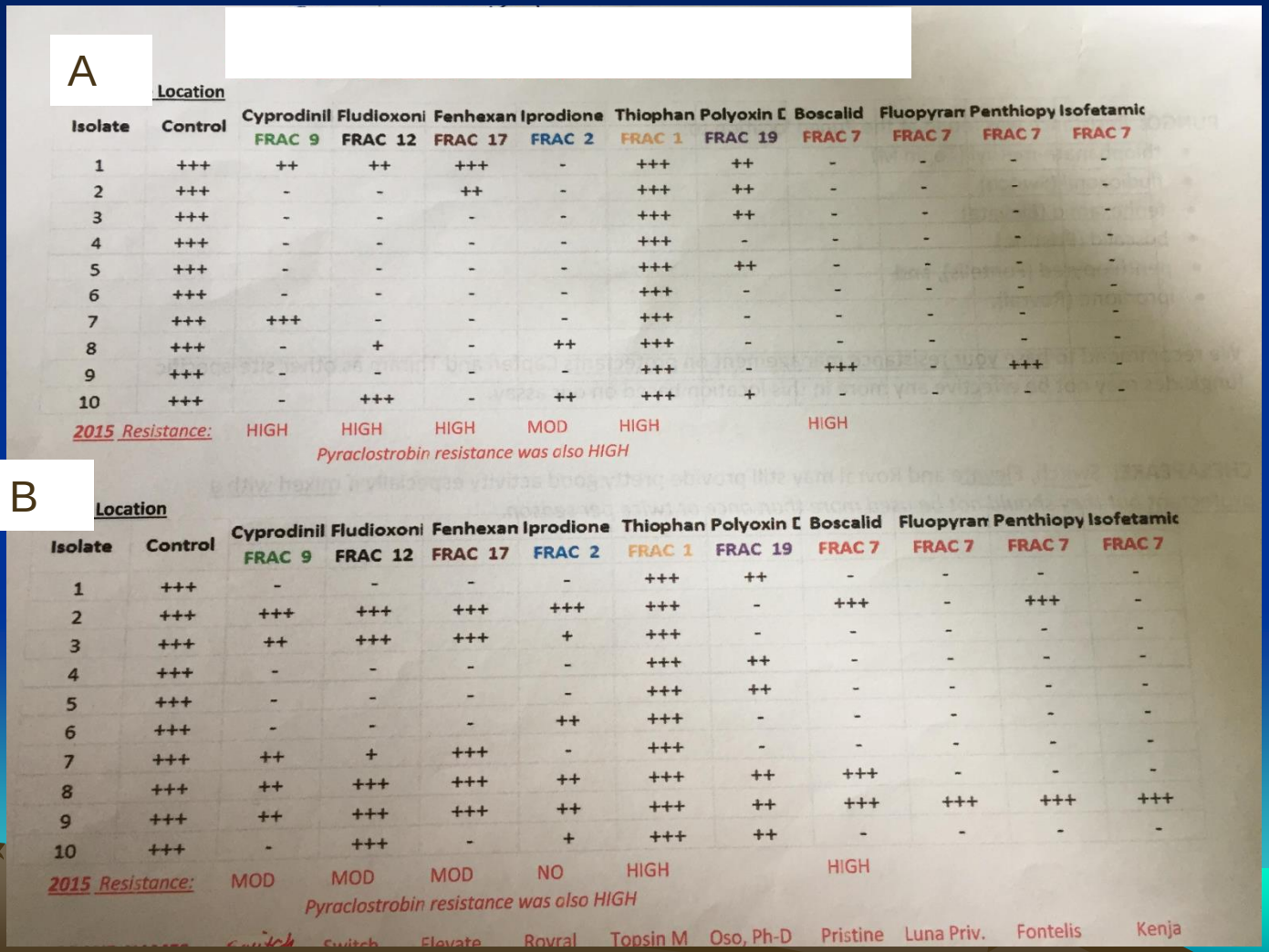
- Captan is more active on Anthracnose than Thiram
- Thiram is more active on Botrytis than Captan
- Thiram has repellent characteristics.
  - Deer
  - Rabbits

- Therefore,
  - Use Thiram as a tank mix partner is targeting Botrytis early in the season
  - Use Captan as a tank mix Partner nearer harvest, especially if concerned about Anthracnose Fruit Rot

Formulations of Thiram

- Thiram 24/7
- Thiram SC
  - Soluble Concentrate
  - 2.6 quarts/A
  - 1 day PHI
  - 24 hour REI
- Thiram Granulfo
  - WDG
  - 4.4 lb/A
  - 2.2 lb/100 gallon
  - 3 day PHI
  - 24 hour REI

2016 Profile



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Location											
Isolate	Control	Cyprodinil FRAC 9	Fludioxoni FRAC 12	Fenhexan FRAC 17	Iprodione FRAC 2	Thiophan FRAC 1	Polyoxin D FRAC 19	Boscalid FRAC 7	Fluopyram FRAC 7	Penthiopy FRAC 7	Isofetamic FRAC 7
1	+++	++	++	+++	-	+++	++	-	-	-	-
2	+++	-	-	++	-	+++	++	-	-	-	-
3	+++	-	-	-	-	+++	++	-	-	-	-
4	+++	-	-	-	-	+++	-	-	-	-	-
5	+++	-	-	-	-	+++	++	-	-	-	-
6	+++	-	-	-	-	+++	-	-	-	-	-
7	+++	+++	-	-	-	+++	-	-	-	-	-
8	+++	-	+	-	++	+++	-	-	-	-	-
9	+++	-	-	-	-	+++	-	+++	-	+++	-
10	+++	-	+++	-	++	+++	+	-	-	-	-
2015 Resistance:		HIGH	HIGH	HIGH	MOD	HIGH		HIGH			

Pyraclostrobin resistance was also HIGH

B

Location											
Isolate	Control	Cyprodinil FRAC 9	Fludioxoni FRAC 12	Fenhexan FRAC 17	Iprodione FRAC 2	Thiophan FRAC 1	Polyoxin D FRAC 19	Boscalid FRAC 7	Fluopyram FRAC 7	Penthiopy FRAC 7	Isofetamic FRAC 7
1	+++	-	-	-	-	+++	++	-	-	-	-
2	+++	+++	+++	+++	+++	+++	-	+++	-	+++	-
3	+++	++	+++	+++	+	+++	-	-	-	-	-
4	+++	-	-	-	-	+++	++	-	-	-	-
5	+++	-	-	-	-	+++	++	-	-	-	-
6	+++	-	-	-	++	+++	-	-	-	-	-
7	+++	++	+	+++	-	+++	-	-	-	-	-
8	+++	++	+++	+++	++	+++	++	+++	-	-	-
9	+++	++	+++	+++	++	+++	++	+++	+++	+++	+++
10	+++	-	+++	-	+	+++	++	-	-	-	-
2015 Resistance:		MOD	MOD	MOD	NO	HIGH		HIGH			

Pyraclostrobin resistance was also HIGH

Switch Switch Elevate Royral Topsin M Oso, Ph-D Pristine Luna Priv. Fontelis Kenja

2017/2016 Profile - A

2017

	Isolate	Control	Cyprodinil FRAC 9	Fludioxor FRAC 12	Fenhexam FRAC 17	Iprodione FRAC 2	Thiophar FRAC 1	Boscalid FRAC 7	Fluopyra FRAC 7	Penthiopyr FRAC 7	Isofetamid FRAC 7	Pyraclostrobin FRAC 11
Camarosa	1	+++	-	-	-	-	+++	-	-	-	-	+++
Chandler	2	+++	-	-	-	-	+++	-	-	-	-	+++
	3	+++	-	-	-	-	+++	-	-	-	-	-
	4	+++	-	-	-	-	+++	-	-	-	-	-
	5	+++	-	-	-	-	+++	-	-	-	-	+++
	6	+++	-	-	-	-	+++	-	-	-	-	+++
	7	+++	-	-	-	-	+++	-	-	-	-	+++
	8	+++	-	-	-	-	+++	-	-	-	-	+++
	9	+++	-	-	-	-	+++	-	-	-	-	-

(Spring 2016)

2016

Location

Isolate	Control	Cyprodinil FRAC 9	Fludioxoni FRAC 12	Fenhexan FRAC 17	Iprodione FRAC 2	Thiophan FRAC 1	Polyoxin D FRAC 19	Boscalid FRAC 7	Fluopyran FRAC 7	Penthiopy FRAC 7	Isofetamic FRAC 7
1	+++	++	++	+++	-	+++	++	-	-	-	-
2	+++	-	-	++	-	+++	++	-	-	-	-
3	+++	-	-	-	-	+++	++	-	-	-	-
4	+++	-	-	-	-	+++	-	-	-	-	-
5	+++	-	-	-	-	+++	++	-	-	-	-
6	+++	-	-	-	-	+++	-	-	-	-	-
7	+++	+++	-	-	-	+++	-	-	-	-	-
8	+++	-	+	-	++	+++	-	-	-	-	-
9	+++	-	-	-	-	+++	-	+++	-	+++	-
10	+++	-	+++	-	++	+++	+	-	-	-	-
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Pungo Location

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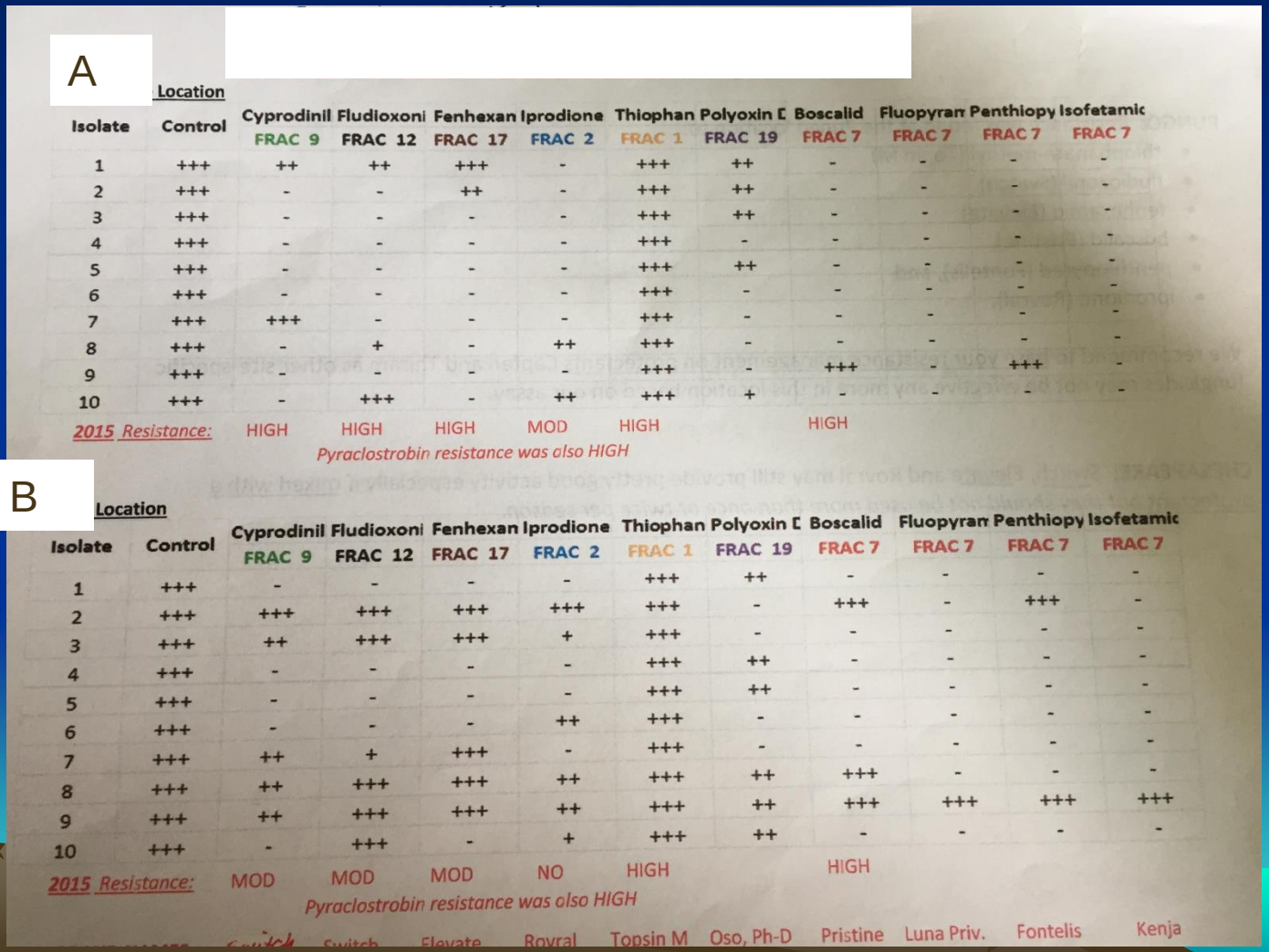
1	+++	-	-	-	-	+++	++	-	-	-	-
2	+++	+++	+++	+++	+++	+++	-	+++	-	+++	-

2016 Profile -B



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2	+++	-	-	++	-	+++	++	-	-	-	-
3	+++	-	-	-	-	+++	++	-	-	-	-
4	+++	-	-	-	-	+++	-	-	-	-	-
5	+++	-	-	-	-	+++	++	-	-	-	-
6	+++	-	-	-	-	+++	-	-	-	-	-
7	+++	+++	-	-	-	+++	-	-	-	-	-
8	+++	-	+	-	++	+++	-	-	-	-	-
9	+++	-	-	-	-	+++	-	+++	-	+++	-
10	+++	-	+++	-	++	+++	+	-	-	-	-
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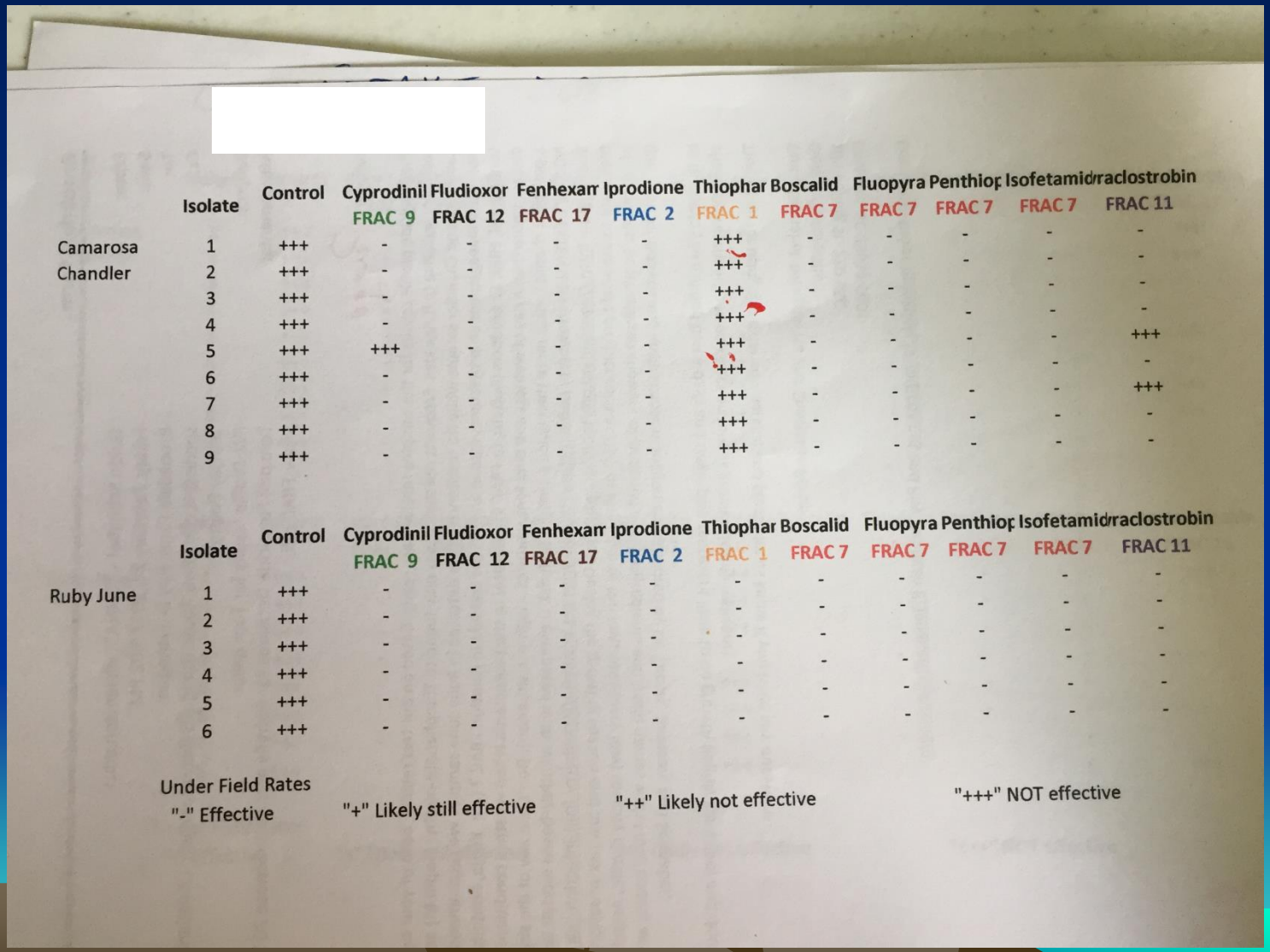
3	+++	++	+++	+++	+	+++	-	-	-	-	-
4	+++	-	-	-	-	+++	++	-	-	-	-
5	+++	-	-	-	-	+++	++	-	-	-	-
6	+++	-	-	-	++	+++	-	-	-	-	-
7	+++	++	+	+++	-	+++	-	-	-	-	-
8	+++	++	+++	+++	++	+++	++	+++	-	-	-
9	+++	++	+++	+++	++	+++	++	+++	+++	+++	+++
10	+++	-	+++	-	+	+++	++	-	-	-	-
2015 Resistance:		MOD	MOD	MOD	NO	HIGH		HIGH			

Pyraclostrobin resistance was also HIGH

Switch Switch Elevate Royral Topsin M Oso, Ph-D Pristine Luna Priv. Fontelis Kenja

2017 Profile - B



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Camarosa Chandler	1	+++	-	-	-	-	+++	-	-	-	-	-
	2	+++	-	-	-	-	+++	-	-	-	-	-
	3	+++	-	-	-	-	+++	-	-	-	-	-
	4	+++	-	-	-	-	+++	-	-	-	-	-
	5	+++	+++	-	-	-	+++	-	-	-	-	+++
	6	+++	-	-	-	-	+++	-	-	-	-	-
	7	+++	-	-	-	-	+++	-	-	-	-	+++
	8	+++	-	-	-	-	+++	-	-	-	-	-
	9	+++	-	-	-	-	+++	-	-	-	-	-

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Ruby June	1	+++	-	-	-	-	-	-	-	-	-	-
	2	+++	-	-	-	-	-	-	-	-	-	-
	3	+++	-	-	-	-	-	-	-	-	-	-
	4	+++	-	-	-	-	-	-	-	-	-	-
	5	+++	-	-	-	-	-	-	-	-	-	-
	6	+++	-	-	-	-	-	-	-	-	-	-

Under Field Rates
"-" Effective
"+" Likely still effective
"++" Likely not effective
"+++" NOT effective

Botrytis Resistance "Issues" Grower Experiences

- Sources of Resistance
  - Plant Supplier
    - Canada
  - Nursery
    - Party growing plugs
  - Your Farm
  - Your Neighbors
- Changing products
  - Changing FRAC's
  - Changing AI's
- No documented cases of cross-resistance in FRAC 7

Resistance Management

- Tank mix with Captan or Thiram
- Use a minimum of a 3-way rotation
- Change Products from year to year
- Pristine – Merivon or Luna Sensation
- Elevate – Fontelis or Kenja
- Add Triazole in the rotation
  - Quadris Top
    - Difenconazole
  - Tilt
  - Rhyme

Lorsban / Chlorpyrifos Update

- Last night the Department of Justice petitioned for a rehearing of the 9th Circuit Court of Appeals decision from August 9, 2018 against Chlorpyrifos. This decision stays (halts) the 9th Circuit Court of Appeals decision until a new hearing takes place. We will continue to provide updates on Chlorpyrifos as they become available. At this point there is no timeline for a new hearing and all registered uses of Chlorpyrifos remain in place. (10/1/18)

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Lorsban / Chlorpyrifos Update

- Unfortunately, we are losing Lorsban
- You will be able to use what you have purchased.
- Purchase what you can before it is gone.

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Weed Control

- A weakness of many of the MB alternatives is consistent weed control.
- So we have been evaluating herbicides applied to the bed top under the plastic.
- Dual may also be an option.

- Prowl H_2O at 2 pints/A

  plus

- Spartan 4F at 8 fl oz/A
  - (Make sure it is labeled in your state)
- Apply to bed top with minimal soil disturbance.

Rain-Flo Bedder

Rain-Flo Tank

Rain-Flo “Red Neck”

“Red Neck” Tank

Spartan

- FMC
- Spartan 4F
  - sulfentrazone
- Spartan Charge
  - carfentrazone-ethyl
  - sulfentrazone
- Spartan Elite
  - s-metolachlor
  - sulfentrazone
- Spartan FL 4F
  - sulfentrazone
  - Florida only label

Spartan 4F

- Strawberry
  - 4 – 8 fl oz/A
- Tomato, Transplanted
  - 2.25 – 8 fl oz/A
  - 4 – 8 fl oz/A
- Lima Beans, TN only
  - 2.25 – 6 fl oz/A
- Dry Peas
  - 2.25 – 8 fl oz/A
- Sunflowers
  - 3 – 8 fl oz/A

Spartan FL 4F

• Blueberry	• 8 – 12 fl oz/A
• Bushberry	• 8 – 12 fl oz/A
• Caneberry	• 8 – 12 fl oz/A
• Cabbage,transplanted	• 2.25 – 12 fl oz/A
• Dry Peas	• 2.25 – 8 fl oz/A
• Grapes	• 8 – 12 fl oz/A
• Strawberry	• 2.25 – 8 fl oz/A
• Tomato, transplanted	• 2.25 – 8 fl oz/A

Zeus

- FMC
- Active Ingredient
  - sulfentrazone
- Same ai as Spartan
- Zeus
  - Asparagus
    - 4.5 – 12 fl oz/A
  - Cabbage
    - 2.25 – 12 fl oz/A
- Zeus Prime XC
  - carfentrazone-ethyl
- Zeus XC
  - Apples
  - Blueberries
  - Caneberries
  - Grapes
  - Citrus
  - Walnuts

Paraquat

- EPA has added new restrictions for products containing paraquat
  - Firestorm 3SL
  - Gramoxone 2SL
  - Parazone 3SL
- Were to have started in 2019
- But due to the government shutdown will likely begin in 2020 (?)
- Backpack applications (?)

Paraquat Restrictions

- New closed-system packaging designed to prevent transfer or removal of the pesticide except directly into proper application equipment. This will prevent spills, mixing, pouring the pesticide into other containers or other actions that could lead to paraquat exposure.
- Specialized training for certified applicators who use paraquat to emphasize that the chemical should not be transferred to or stored in improper containers.

Paraquat Restrictions (cont.)

- Changes to the pesticide label and distribution of supplemental warning materials to highlight the toxicity and risks associated with paraquat products.
- Restricting the use of paraquat to certified pesticide applicators only. Individuals working under the supervision of a certified applicator are prohibited from using paraquat.

Paraquat Alternatives

- Glyphosate
  - Roundup
  - Hooded applications
  - Sensitivity depending on plant development
- Glufosinate
  - Liberty / Ignite / Rely
  - Precise direction
  - Relatively safe
- Carfentrazone-ethyl
  - Aim
  - Broadleaves only
  - Non-systemic
  - Relatively safe

Strawberry Runners as Weeds

- Runners
  - Increase foliage
    - Reduce air movement
  - Increase disease (?)
  - Are expensive to remove
    - Labor situation
  - Take energy from "primary plant" (?)
  - Are weeds!

Runner Removal / Plant Clean Up

Apogee

- Prohexadione Calcium
  - Growth Regulator
    - Stops growth of plants
  - Apples, Peanuts, Grass grown for seed
  - Is in the IR-4 Program
    - Should be labeled in the next two years
    - Evaluated the last two years

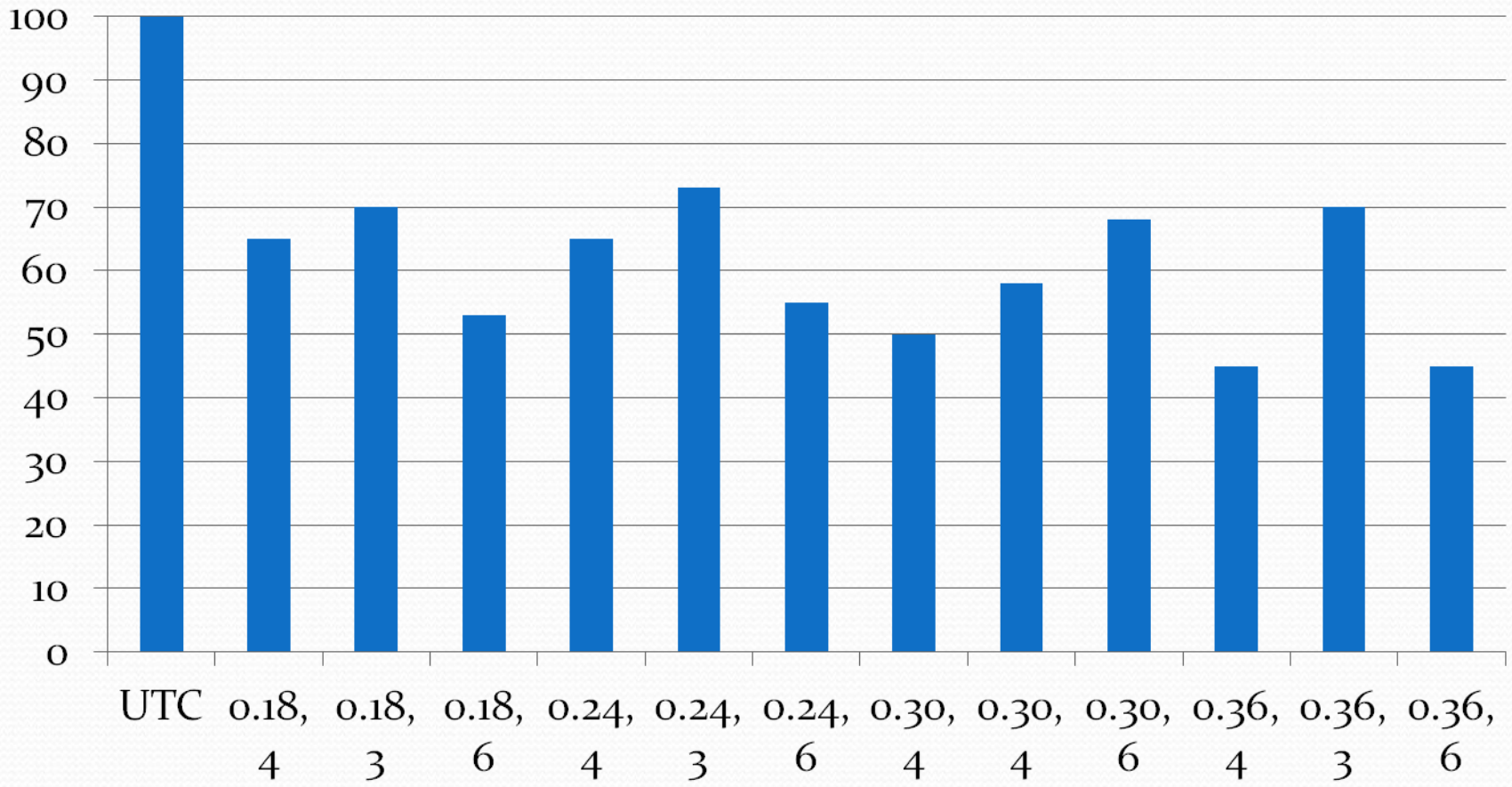
Apogee / Strawberry

- Rates
  - UTC
  - 0.18 lb ai/A
  - 0.24 lb ai/A
  - 0.30 lb ai/A
  - 0.36 lb ai/A
- Frequency
  - UTC
    - 0
  - Weekly
    - 6 applications
  - Bi-weekly
    - 4 applications
  - Every 3 weeks
    - 3 applications

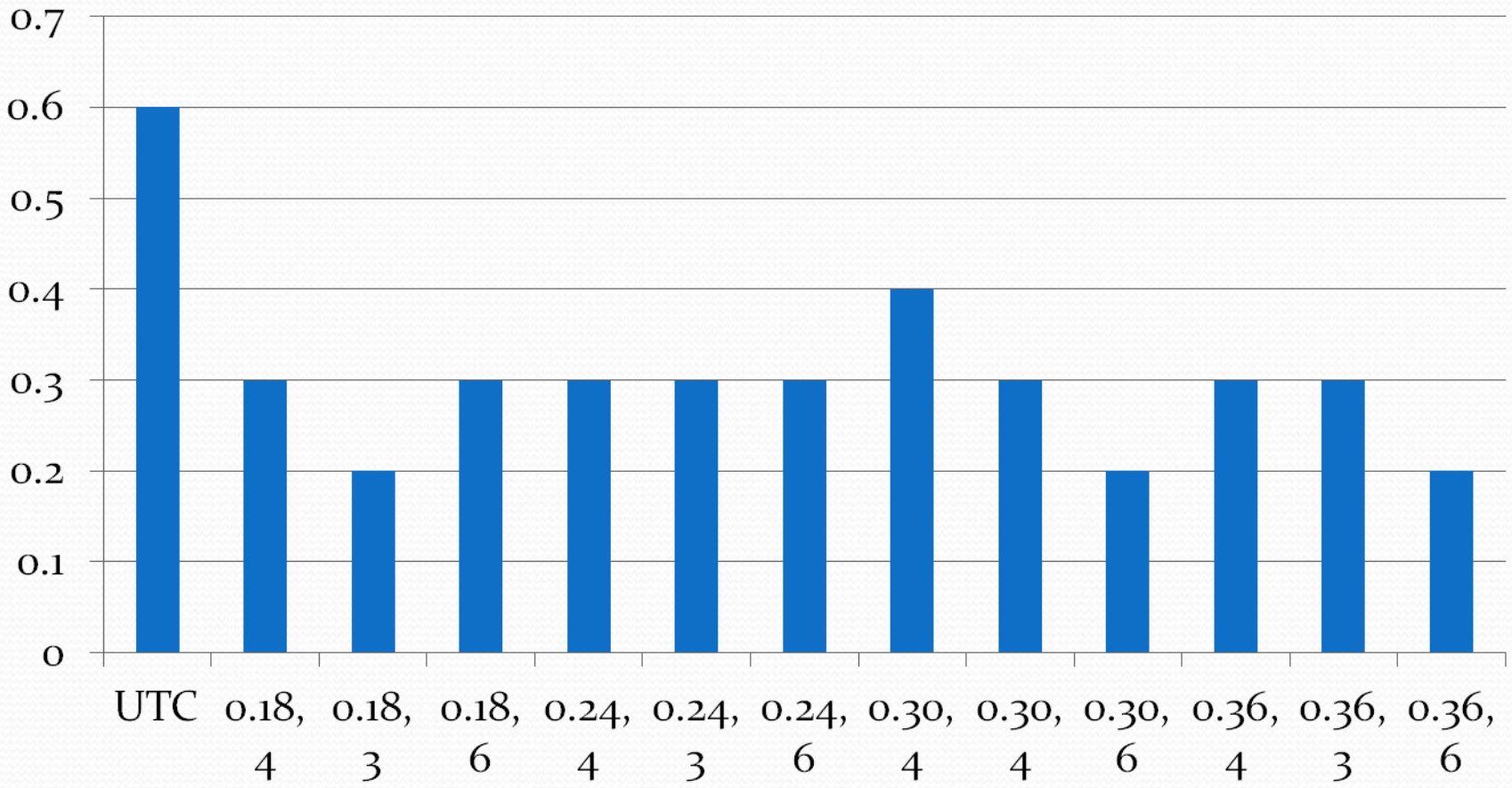
Apogee / Strawberry

- Applications were to begin when runners were obvious
- Actually, once runners started all runners were removed by hand from test plot area
- Treatments were started immediately after runner removal

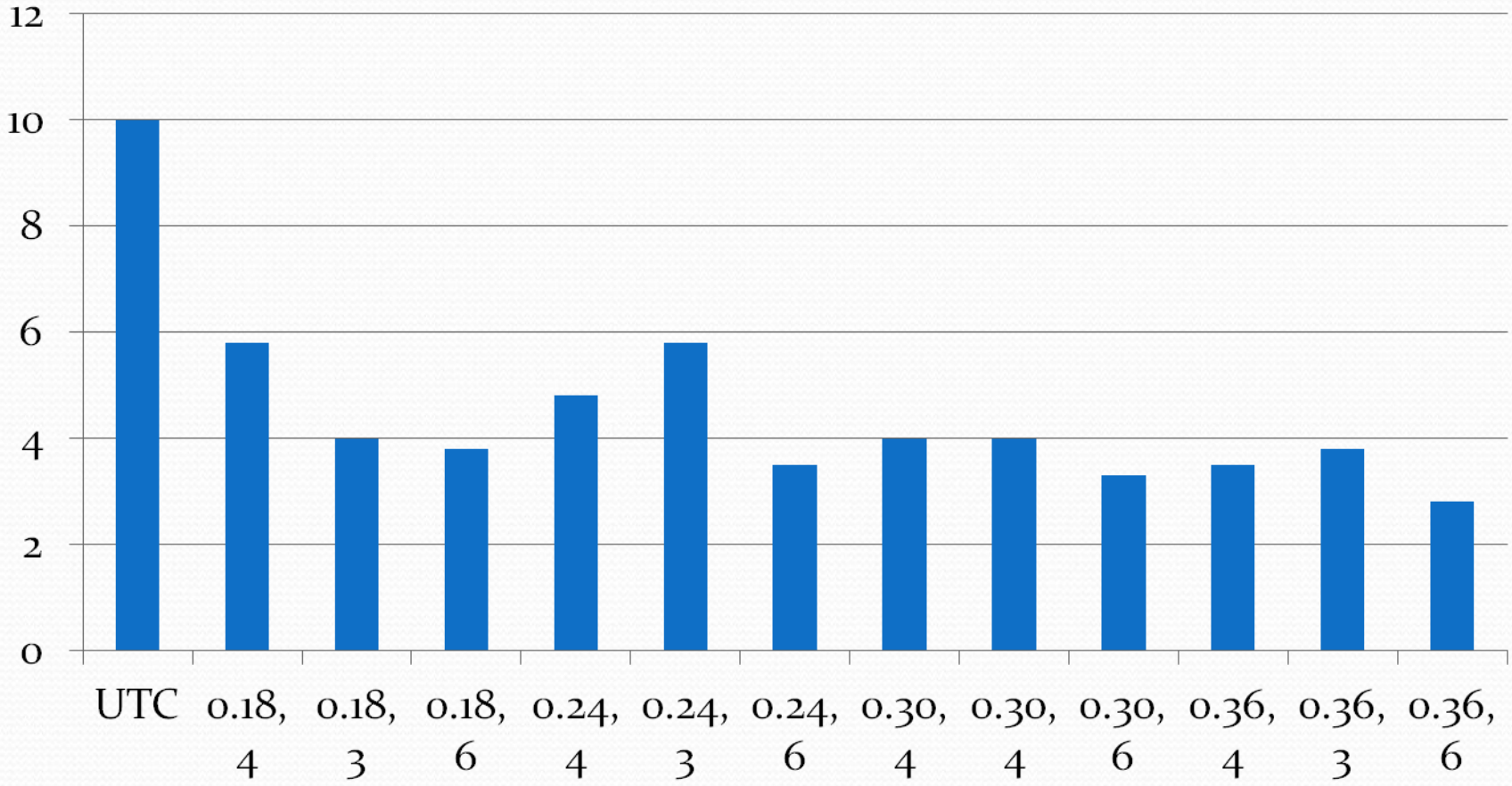
Plant Vigor (%) – 12/14/09



Runners per Plant – 12/14/09



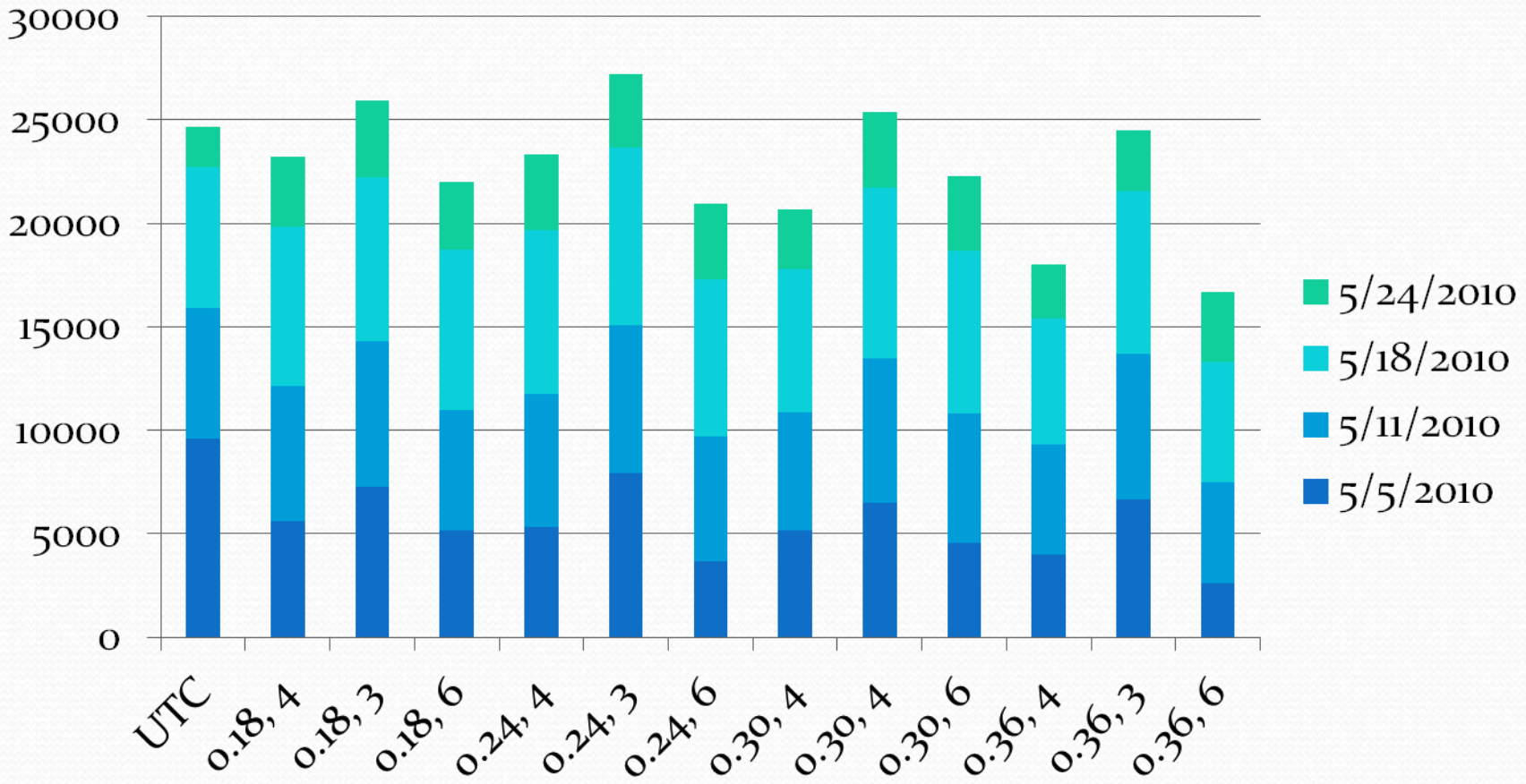
Runner Vigor (0-10) – 12/14/09



Spring – UTC

Spring – Apogee Treated

Berry Yield (quarts/A)



Conclusions

- Apogee applied at 0.18, 0.24 or 0.30 lb ai/A appears to be effective in reducing runners without reducing yield
- Apogee applied at the aforementioned rates every 3 weeks for a total of 2 to 3 applications is the right balance of runner reduction and plant growth
- Once labeled, Apogee appears to be a valuable tool for runner control in annual plasticulture strawberry production.

Early Varieties

- Sweet Charlie
  - Was the standard
  - Lower Yields
  - Phytophthora Crown Rot
- Potential Varieties
  - Rocco
    - Maybe earlier
  - Ruby June
    - Possibly 3 days behind
  - Liz
    - Between Sweet Charlie and Chandler
    - Similar to Ruby June in maturity

Procedure

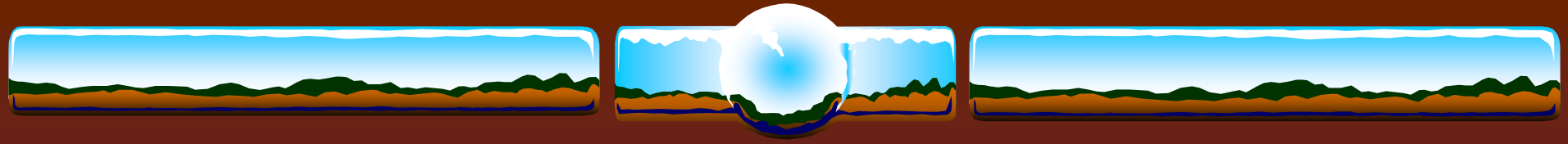
- Collected runners
  - Early July
  - Mid-July
- Started tips for 14 to 17 days and then started conditioning treatments
- Two planting dates
  - Early August
  - Mid August
- Treatments
  - UTC
  - 14 hours of darkness every day
  - 14 hours of darkness at 50 –55^{0}F
  - Water stress
  - Normal planting date

UTC

14 Hours of Darkness

Darkness and Cold

Water Stressed



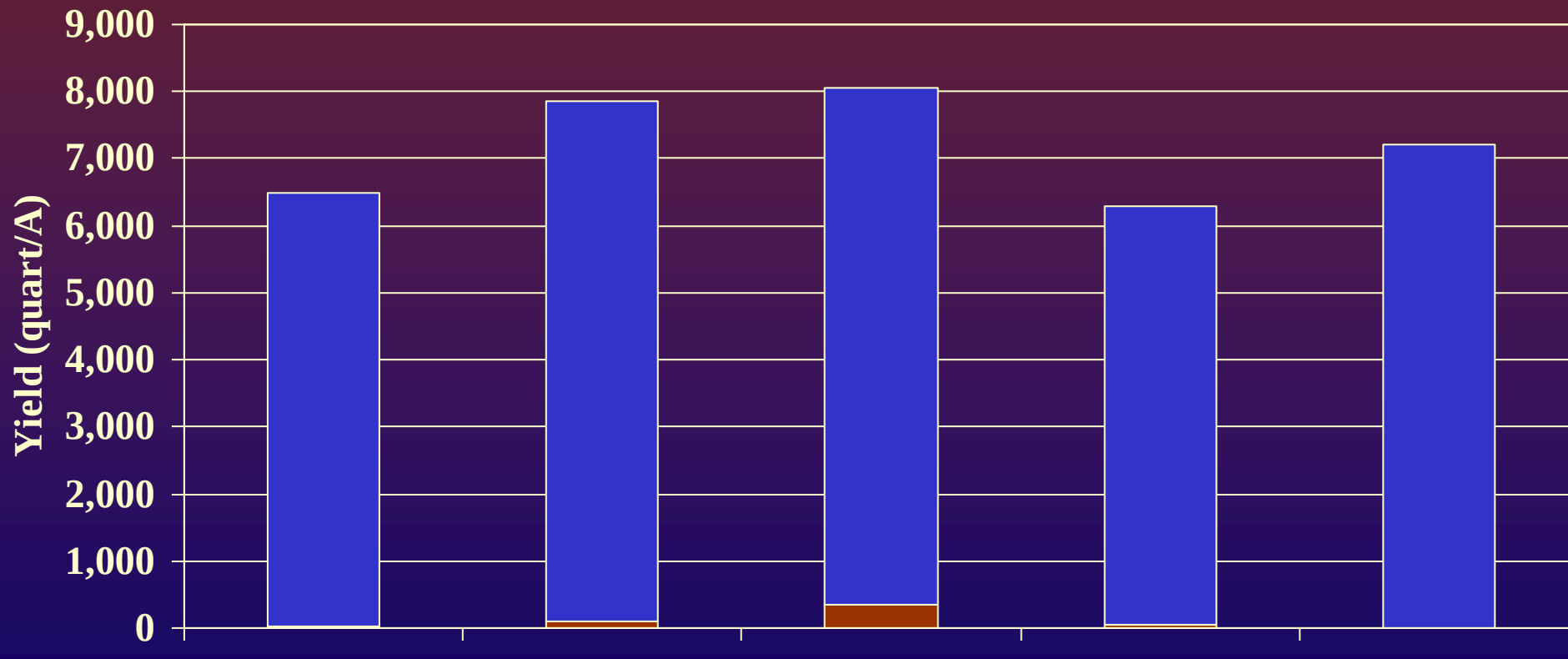
% Blooms – 9/24/02

Treatment	1st planting	2nd planting
UTC	3 b	6
Dark	9 b	1
Cold & Dark	46 a	0
Water	5 b	0
Normal	0 b	0

% Blooms – 10/8/02

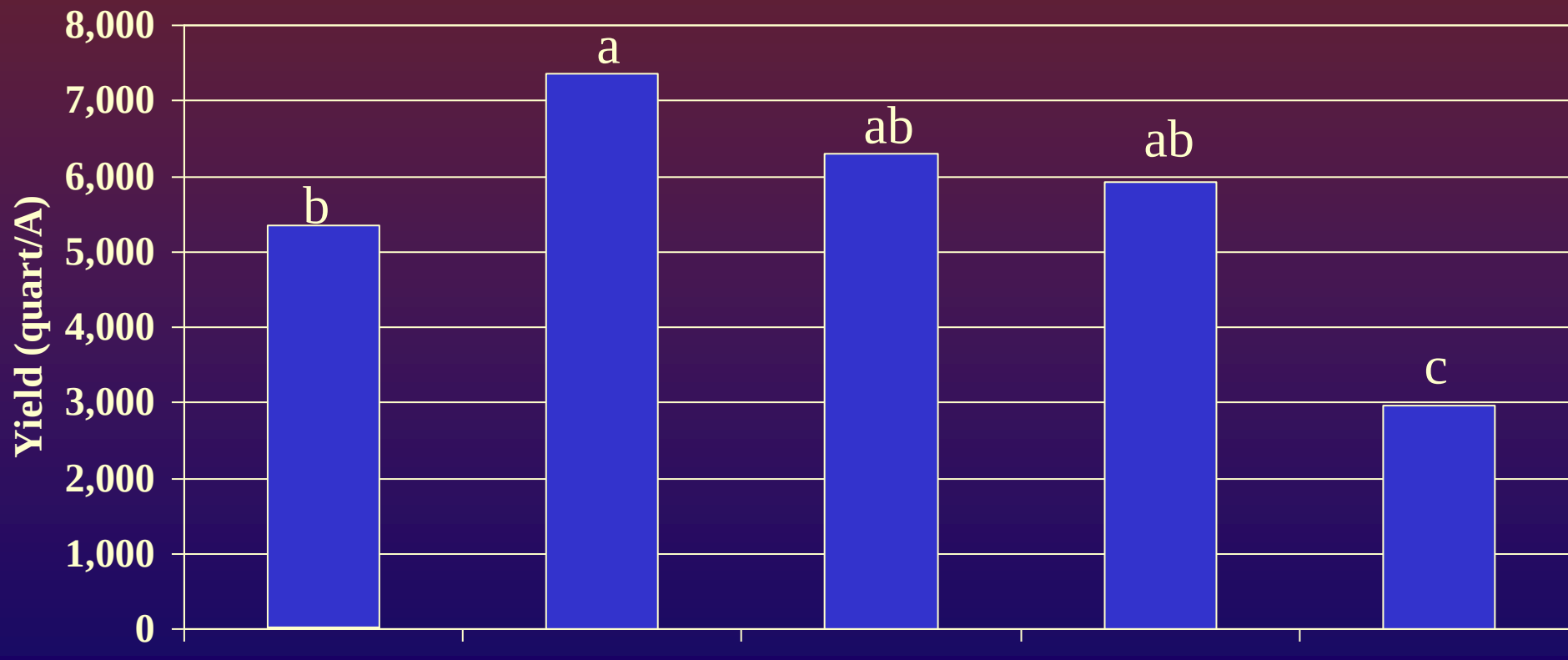
Treatment	1st planting	2nd planting
UTC	5 c	16 b
Dark	28 b	3 b
Cold & Dark	66 a	55 a
Water	8 c	11 b
Normal	0 c	0 b

Fall Fruiting Treatments (8/13/02)
PES, Crossville, 2002 - 2003



Yield based on 1.25 lb/quart

Fall Fruiting Treatments (8/29/02)
PES, Crossville, 2002 - 2003



Yield based on 1.25 lb/quart

Yield and Conclusions

- Yield
  - Some fruit, but very sparse
  - Probably not enough to make it economically feasible!
- Conclusions
  - Might wok at a lower elevation
  - Plants need to be dark and cold conditioned
  - Plugs need to be in the field in early to mid-August

Recommendations

- Manual cleaning of dead tissue
- Rovral spray soon
- Start fertilizing in the next few days
- Lorsban spray (?)
- Ridomil application in about 2 weeks
- Maintain Fungicide Program
  - Rotation
  - Tank mix with Captan
- Maintain Irrigation / Fertilizer Program
- Ridomil application right before harvest – if needed

Questions?

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