

# Evaluation of contact and local-systemic sucker control products on flue-cured tobacco in Canada

M.D. RICHMOND; A.D. SHEARER; E. ELLENBERGER; C. SAUDE; S. MISHRA; G.A. AMANKWA



# Canadian Tobacco Production

- ▶ 2019 Total Production - Southwestern Ontario
  - ▶ 24,000,000 kg (52,000,000 lbs)
    - ▶ 22,500,000 kg of flue-cured tobacco (FCV)
    - ▶ 1,250,000 kg of non flue-cured (Non-FCV)
  - ▶ 8,100 hectares (20,000 acres)
  - ▶ 200 tobacco producers (155 FCV and 45 Non-FCV)

<https://www.fin.gov.on.ca/en/tax/tt/rawleaf.html>





# Canadian Tobacco Season

- ▶ Greenhouse - March through May
- ▶ Transplanting - late May/early June
- ▶ Topping - late July/early August
- ▶ Harvest - August through early/mid October
  - ▶ 2018 and 2019 frost date = around October 15<sup>th</sup>

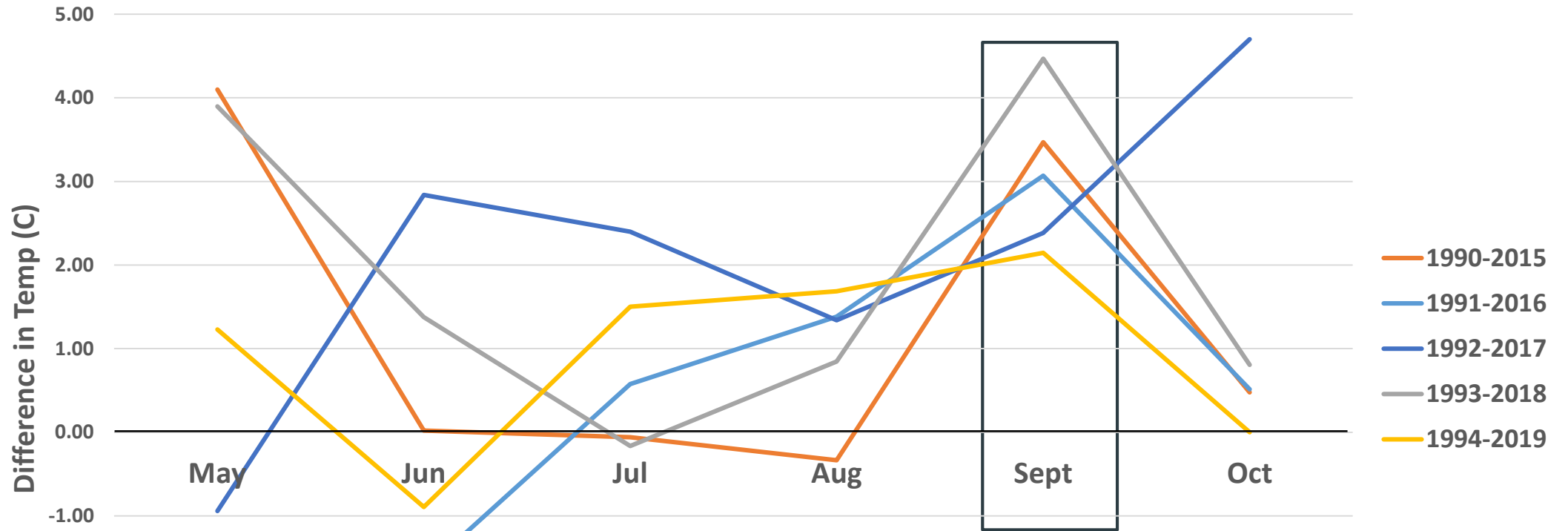


# Current grower practices for sucker control

- ▶ Rely solely on contact-type sucker control products
  - ▶ All products are n-decanol (C10)
    - ▶ Pfizol-10, Emtrol-10, Chiptac, Delete and Fair Tac
      - ▶ First registered in 1973
- ▶ First application is prior to or shortly after topping (17 L ha<sup>-1</sup>) and applied again 5-7 days after initial application (20 L ha<sup>-1</sup>)
- ▶ Labeled for two applications per season



## 25 Year Difference in Avg. Temperature (C) for May - October in London, ON CA



Transplanting

Loss of Apical Dominance = ~12 weeks

Sucker Growth

Topping

Harvest

# Materials & Methods

- ▶ Variety - CT157 was Transplanted on June 1, 2019
- ▶ Topped on July 26, 2019 (55 days after transplanting (DAT))
- ▶ Harvested:
  - ▶ P1- August 20, 2019 (80 DAT)
  - ▶ P2- August 30, 2019 (90 DAT)
  - ▶ P3- September 6, 2019 (97 DAT)
  - ▶ P4- September 26, 2019 (117 DAT)
- ▶ Treatments applied with directed nozzle configuration (TG3-TG5-TG3)
  - ▶ 468 l/ha
- ▶ Samples were collected from 10 plants/plot
  - ▶ August 23 (Axillary)
  - ▶ September 25 (Axillary and Ground)
- ▶ Data were subject to general linear mixed model (GLIMMIX) with SAS 9.4
  - ▶ Means were separated using Fisher's LSD at alpha=0.05



# Materials & Methods

Product Name	Active Ingredient
Pfizol-10	n-decanol (C10)
Drexalin Plus	flumetralin
Antak	n-decanol (C10)
Tak-Plus	n-decanol (C10) + flumetralin
Beloukha	Pelargonic Acid





# Treatments

Aug/23=First sucker control evaluation prior to application

Treatment Number	Treatment Name	Appl #	Rate	Rate Unit	Date of Application
1	Pfizol-10	1	17.00	L/ha	July/26
	Pfizol-10	2	20.00	L/ha	Aug/01
	Pfizol-10	3	20.00	L/ha	Aug/13
	Pfizol-10	4	20.00	L/ha	Aug/23
2	Pfizol-10	1	17.00	L/ha	July/26
	Pfizol-10	2	20.00	L/ha	Aug/01
	Drexalin Plus	3	4.68	L/ha	Aug/13
3	Antak	1	3.00	% v/v	July/26
	Antak	2	3.00	% v/v	Aug/01
	Tak-Plus	3	18.71	L/ha	Aug/13
4	Antak	1	3.00	% v/v	July/26
	Antak	2	3.00	% v/v	Aug/01
	Tak-Plus	3	18.71	L/ha	Aug/13
	Tak-Plus	4	18.71	L/ha	Aug/23
5	Beloukha	1	0.75	% v/v	July/26
	Beloukha	2	1.00	% v/v	Aug/01
	Beloukha	3	1.00	% v/v	Aug/09
	Beloukha	4	1.00	% v/v	Aug/15
	Beloukha	5	1.00	% v/v	Aug/23



# Results

- ▶ **No phytotoxicity was visually observed for any treatment**
- ▶ Tip leaf measurements (top four leaves) were not significantly different across treatments
- ▶ Sucker control effectiveness:
  - ▶ First Evaluation (Aug 23/19)
    - ▶ Beloukha had significantly less sucker control effectiveness
      - ▶ However, all treatments were comparable after the first 2 applications
  - ▶ Second Evaluation (End of Season)
    - ▶ Treatments with flumetralin significantly decreased the number of axillary and ground suckers/plant
    - ▶ Tak-plus treatments performed better than Drexalin-Plus alone for axillary sucker weight per plant (additive effect of C10 tank mixed with flumetralin)
    - ▶ Beloukha was not effective at 1.0% v/v at controlling later season sucker growth
    - ▶ There was not an added benefit with applying a second application of Tak-Plus
    - ▶ Drexalin-Plus numerically reduced sucker number and weight when used after Pfizol-10



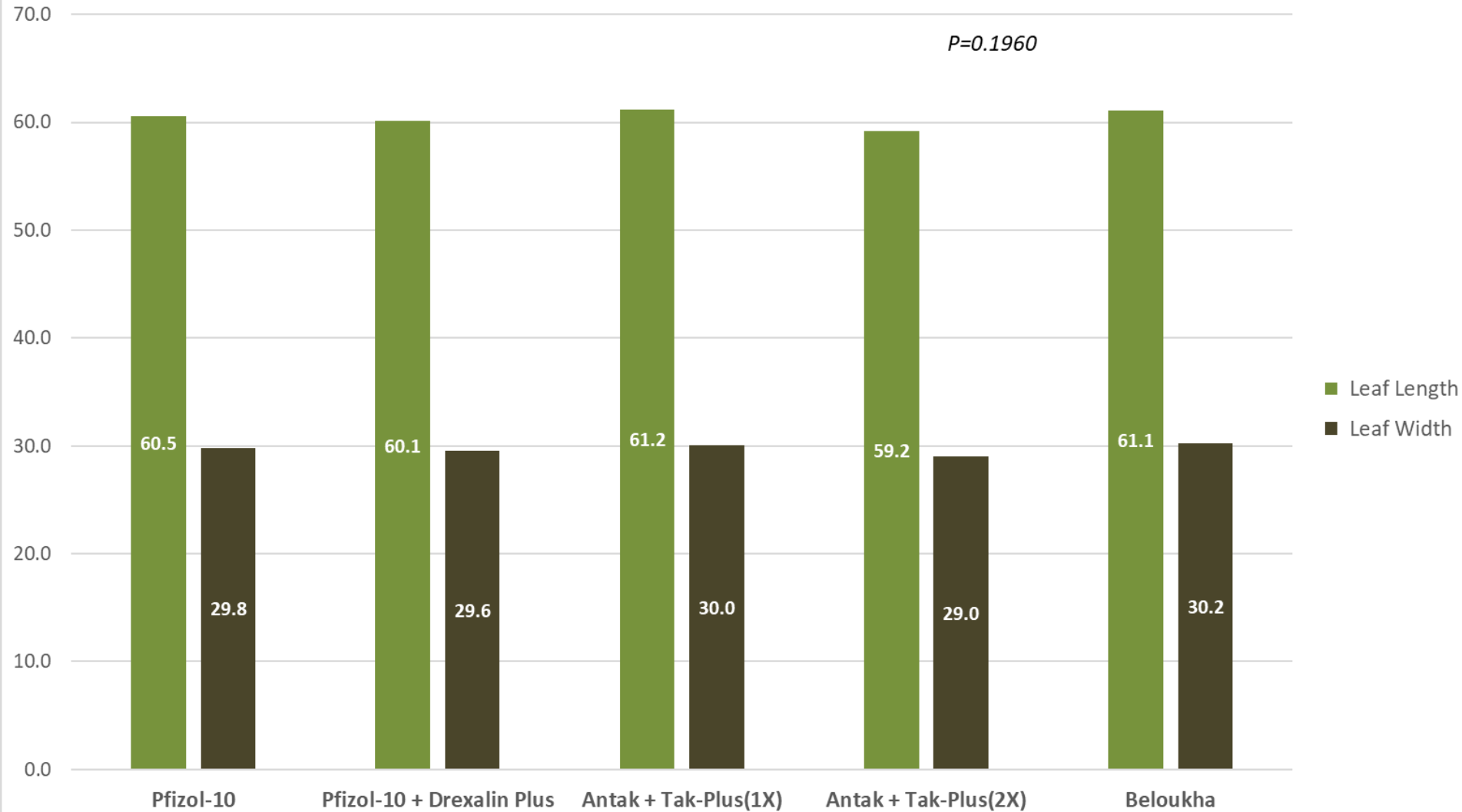
# Results

- ▶ No phytotoxicity was visually observed for any treatment
- ▶ **Tip leaf measurements (top three leaves) were not significantly different across treatments**
- ▶ Sucker control effectiveness:
  - ▶ First Evaluation (Aug 23/19)
    - ▶ Beloukha had significantly less sucker control effectiveness
      - ▶ However, all treatments were comparable after the first 2 applications
  - ▶ Second Evaluation (End of Season)
    - ▶ Treatments with flumetralin significantly decreased the number of axillary and ground suckers/plant
    - ▶ Tak-plus treatments performed better than Drexalin-Plus alone for axillary sucker weight per plant (additive effect of C10 tank mixed with flumetralin)
    - ▶ Beloukha was not effective at 1.0% v/v at controlling later season sucker growth
    - ▶ There was not an added benefit with applying a second application of Tak-Plus
    - ▶ Drexalin-Plus numerically reduced sucker number and weight when used after Pfizol-10



# Results: Tip Leaf Length and Width

Tip Leaf Measurements (cm) by Treatment



# Results

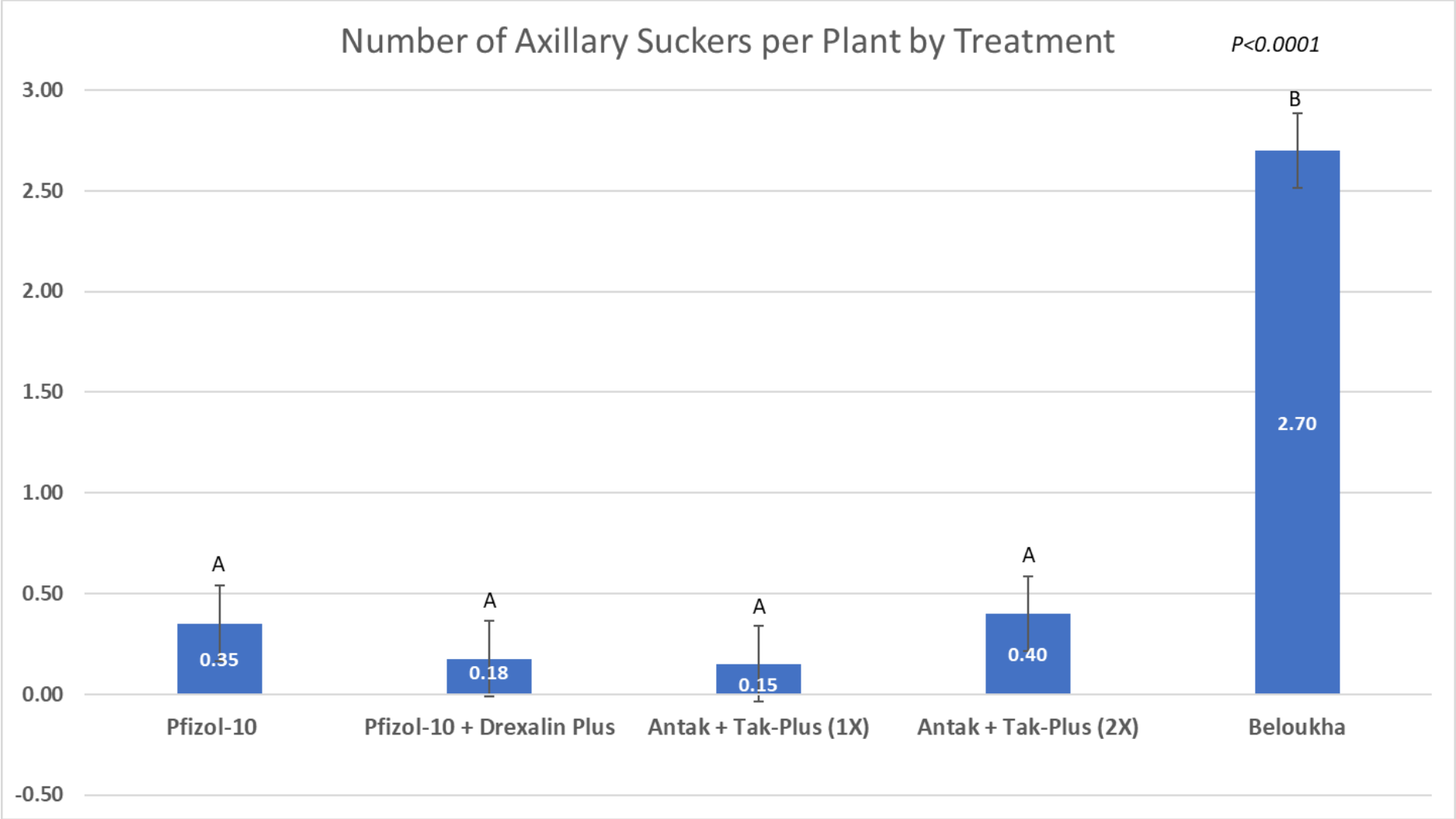
- ▶ No phytotoxicity was visually observed for any treatment
- ▶ Tip leaf measurements (top four leaves) were not significantly different across treatments
- ▶ **Sucker control effectiveness:**
  - ▶ **First Evaluation (Aug 23/19)**
    - ▶ Beloukha had significantly less sucker control effectiveness
      - ▶ However, all treatments were comparable after the first 2 applications
  - ▶ **Second Evaluation (End of Season)**
    - ▶ Treatments with flumetralin significantly decreased the number of axillary and ground suckers/plant
    - ▶ Tak-plus treatments performed better than Drexalin-Plus alone for axillary sucker weight per plant (additive effect of C10 tank mixed with flumetralin)
    - ▶ Beloukha was not effective at 1.0% v/v at controlling later season sucker growth
    - ▶ There was not an added benefit with applying a second application of Tak-Plus
    - ▶ Drexalin-Plus numerically reduced sucker number and weight when used after Pfizol-10



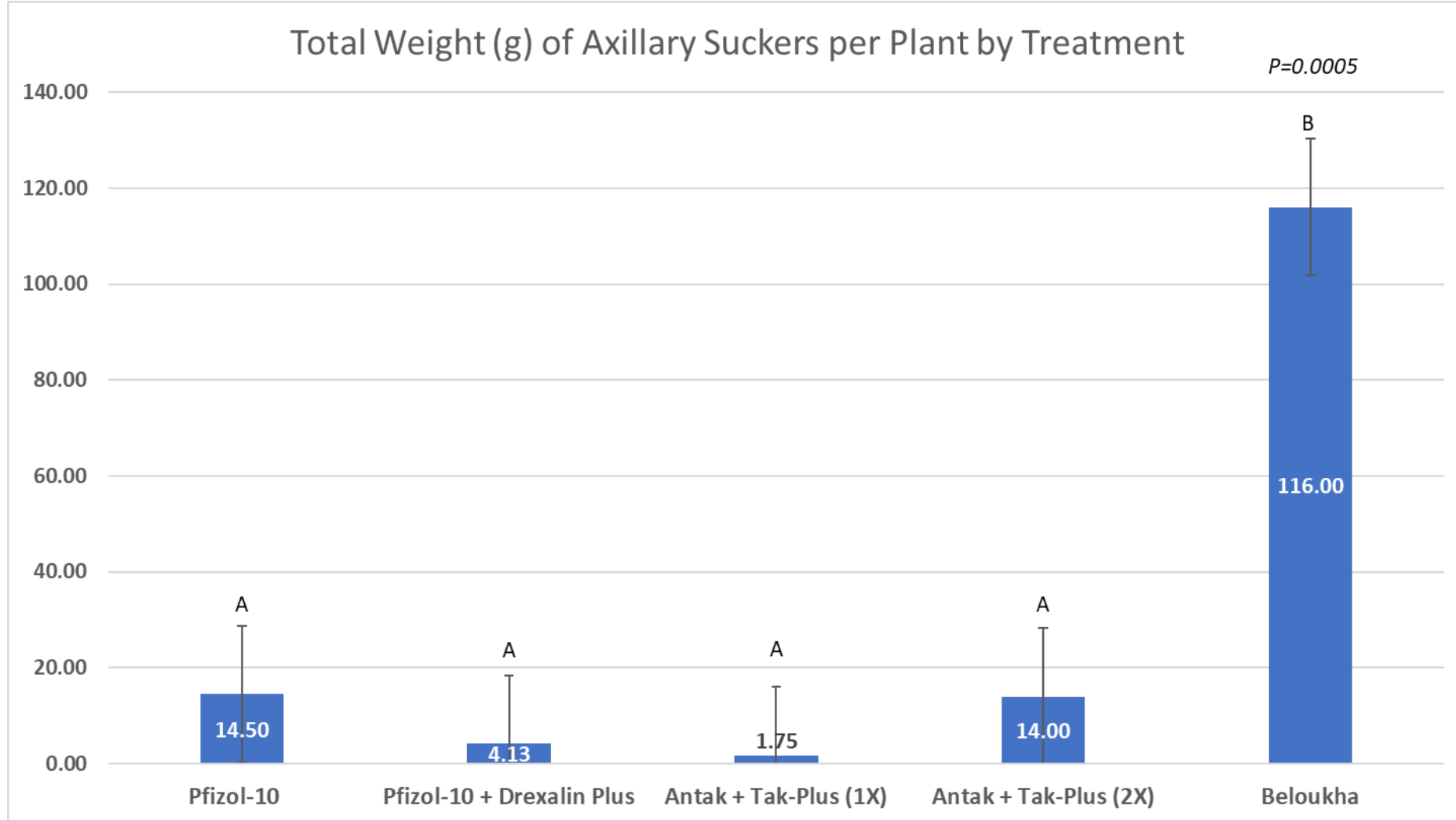
# August 23, 2019 - First Evaluation



# Results: Axillary Suckers - Aug. 23, 2019



# Results: Axillary Suckers - Aug. 23, 2019





# Results

- ▶ No phytotoxicity was visually observed for any treatment
- ▶ Tip leaf measurements (top four leaves) were not significantly different across treatments
- ▶ **Sucker control effectiveness:**
  - ▶ **First Evaluation (Aug 23/19)**
    - ▶ Beloukha had significantly less sucker control effectiveness
      - ▶ However, all treatments were comparable after the first 2 applications
  - ▶ **Second Evaluation (End of Season)**
    - ▶ Treatments with flumetralin significantly decreased the number of axillary and ground suckers/plant
    - ▶ Tak-plus treatments performed better than Drexalin-Plus alone for axillary sucker weight per plant (additive effect of C10 tank mixed with flumetralin)
    - ▶ Beloukha was not effective at 1.0% v/v at controlling later season sucker growth
    - ▶ There was not an added benefit with applying a second application of Tak-Plus
    - ▶ Drexalin-Plus numerically reduced sucker number and weight when used after Pfizol-10



# September 25, 2019 - End of Season



**Pfizol-10**



**Pfizol-10 + Drexalin Plus**



**Antak + Tak-Plus (1X)**



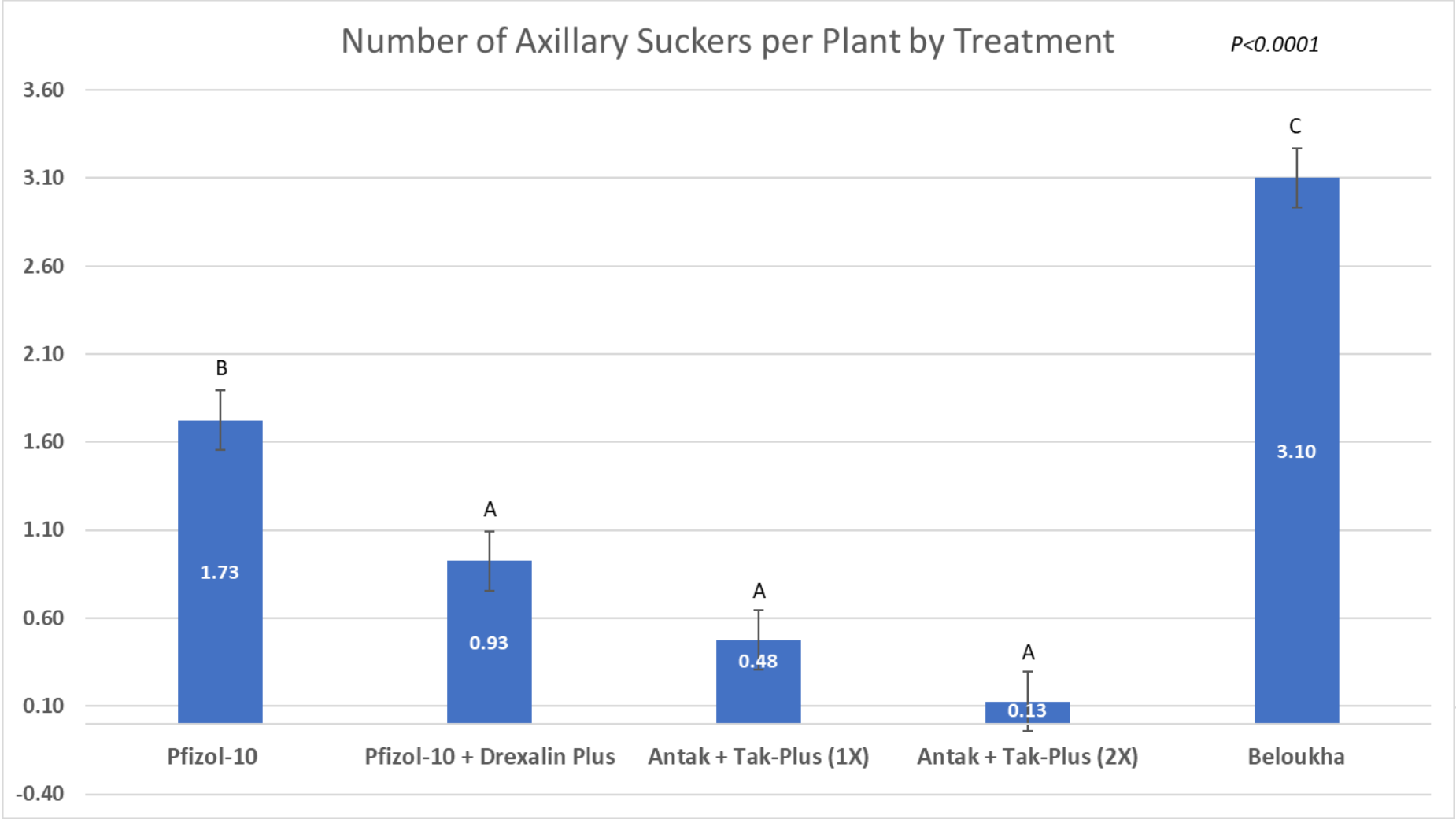
**Antak + Tak-Plus (2X)**



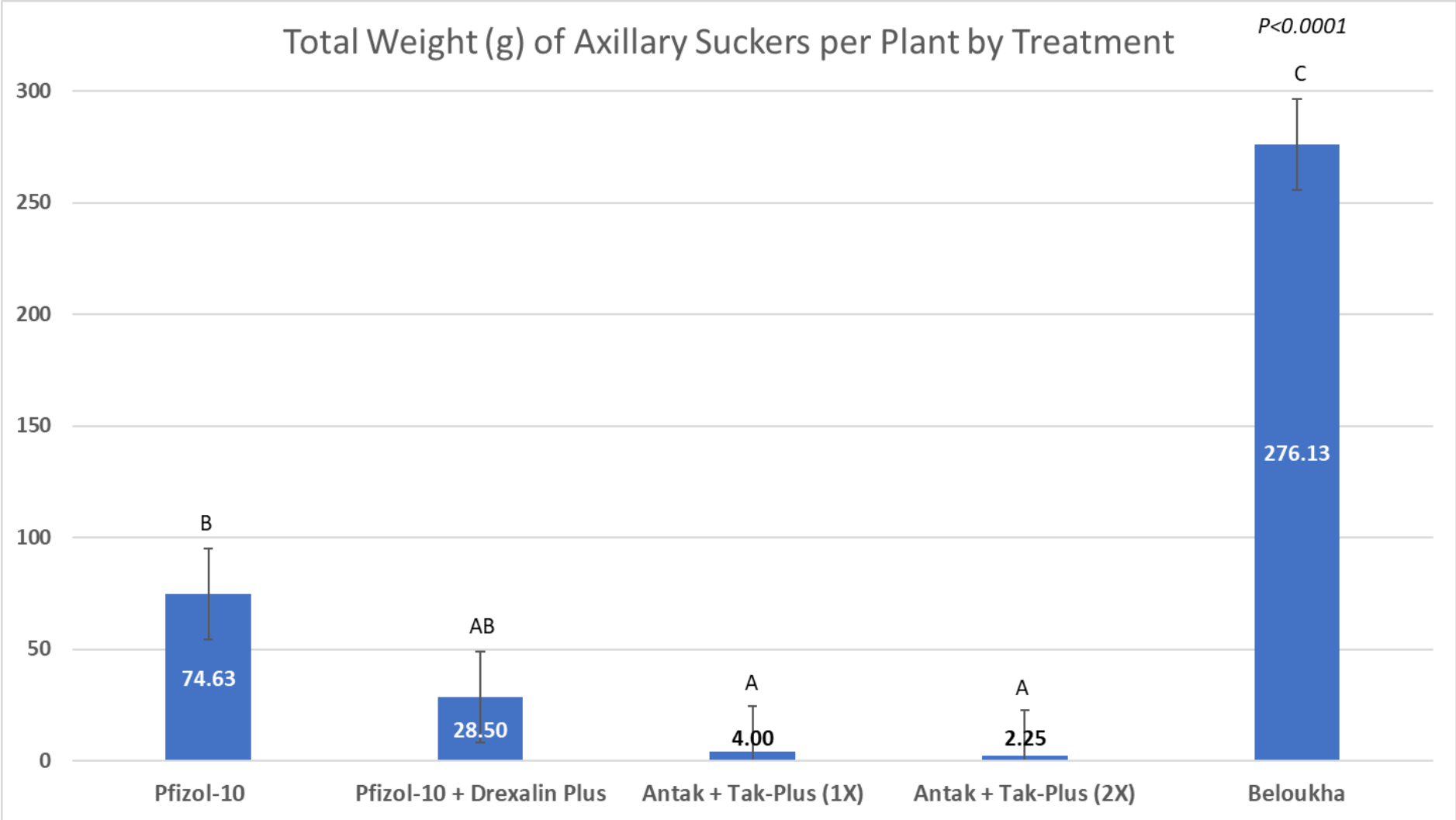
**Beloukha**



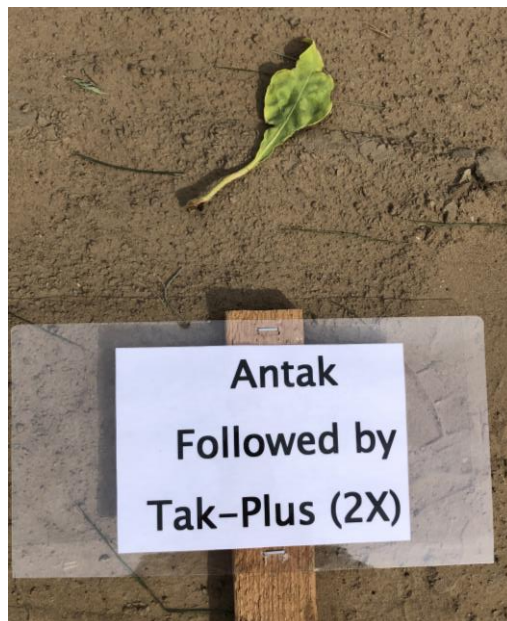
# Results: Axillary Suckers - End of Season



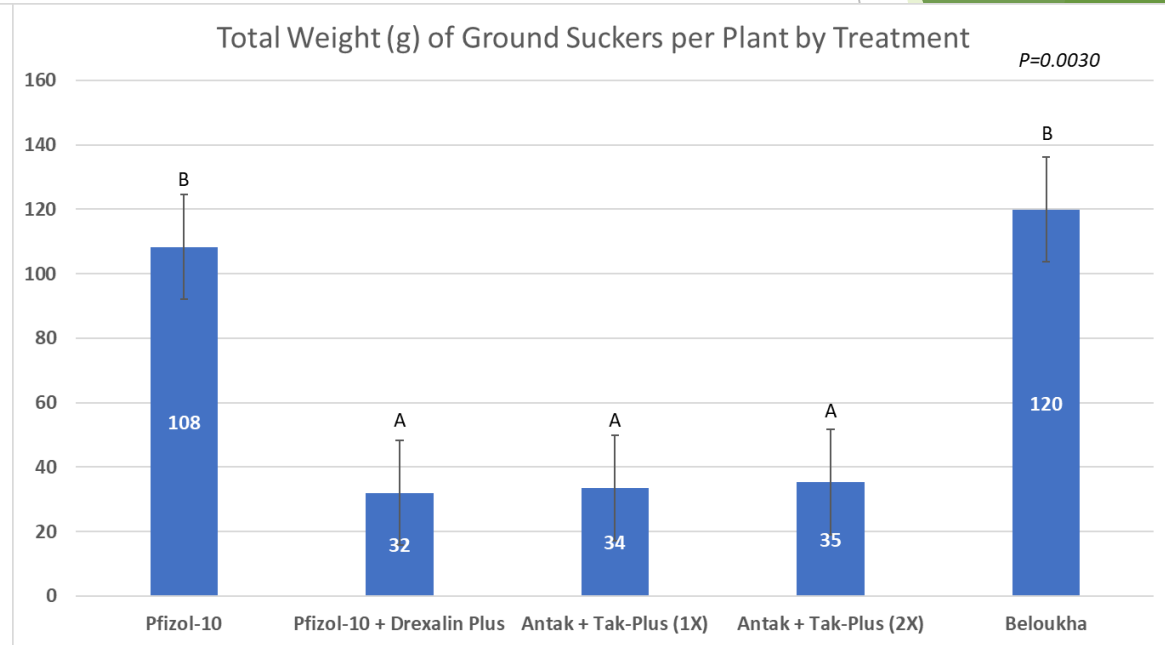
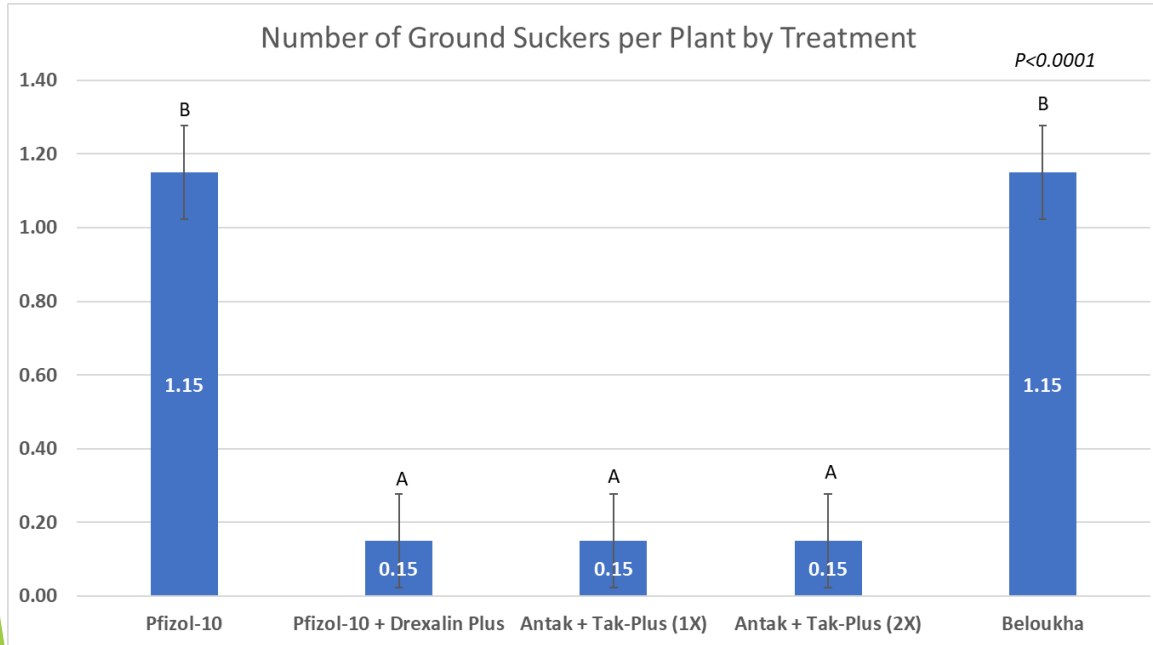
# Results: Axillary Suckers - End of Season



# September 25, 2019 - End of Season



# Results: Ground Suckers - End of Season

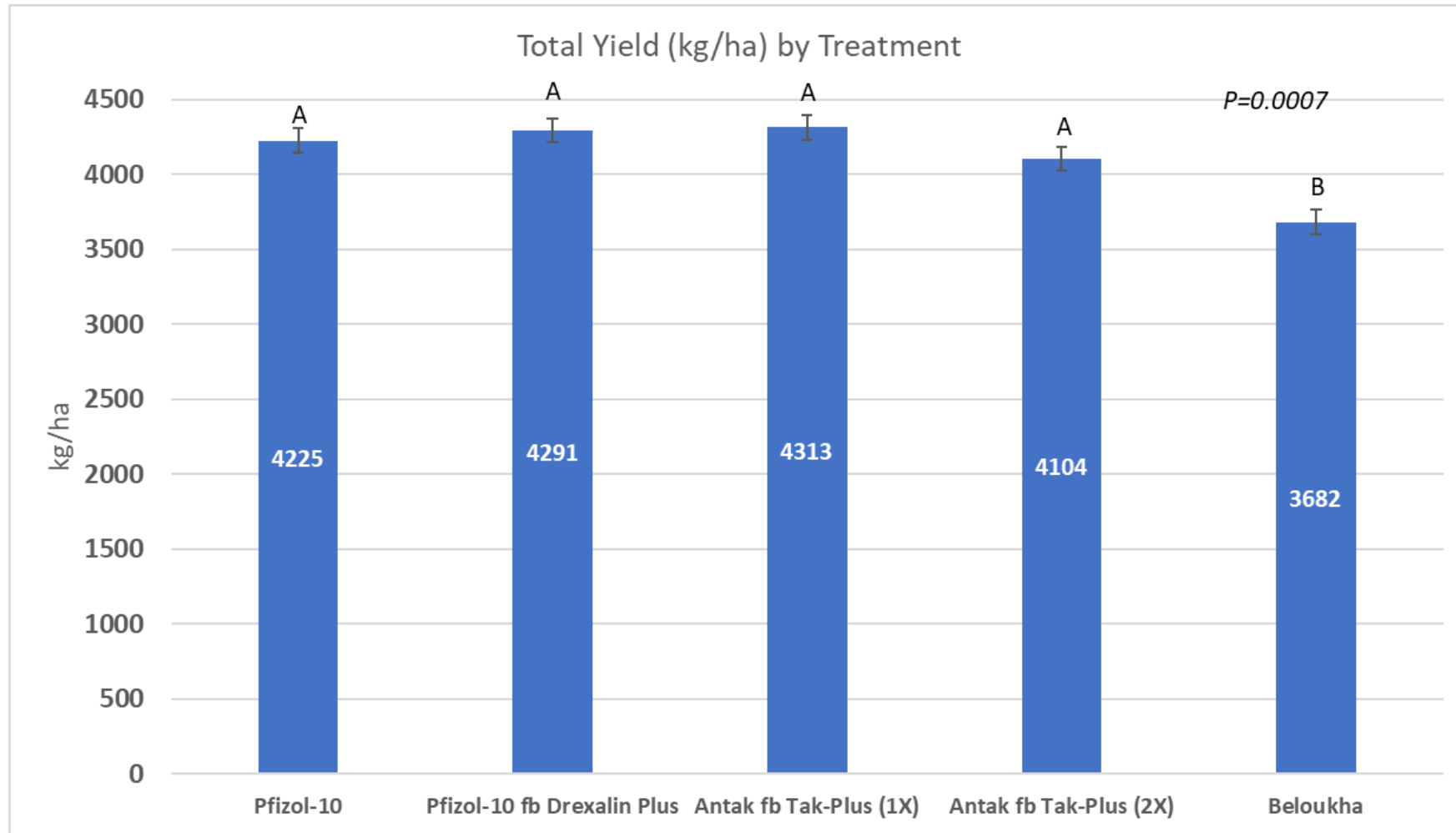


# Results

- ▶ There was a significant effect of treatment on total yield ( $P=0.0007$ )
  - ▶ Reduction in yield for Beloukha
  - ▶ All other treatments were not significantly different
    - ▶ Reminder: all plots were manually suckered August 23, 2019 and the last application of Pfizol-10, Beloukha and the treatment with two applications of Tak-Plus were applied
    - ▶ Without manually removing all suckers, contact products would have not been efficacious at this time
- ▶ Leaf Quality Grade Index was not significantly different
  - ▶ Range = 41.35 to 46.40 (Scale = 0-100)
- ▶ Index return was not significantly different among treatments
  - ▶ Formula =  $(\text{Yield} \times \text{Grade Index}) / 100$
  - ▶ Range = 1644 to 2005 (higher number associated with better performance)



# Results: Total Yield and Leaf Quality



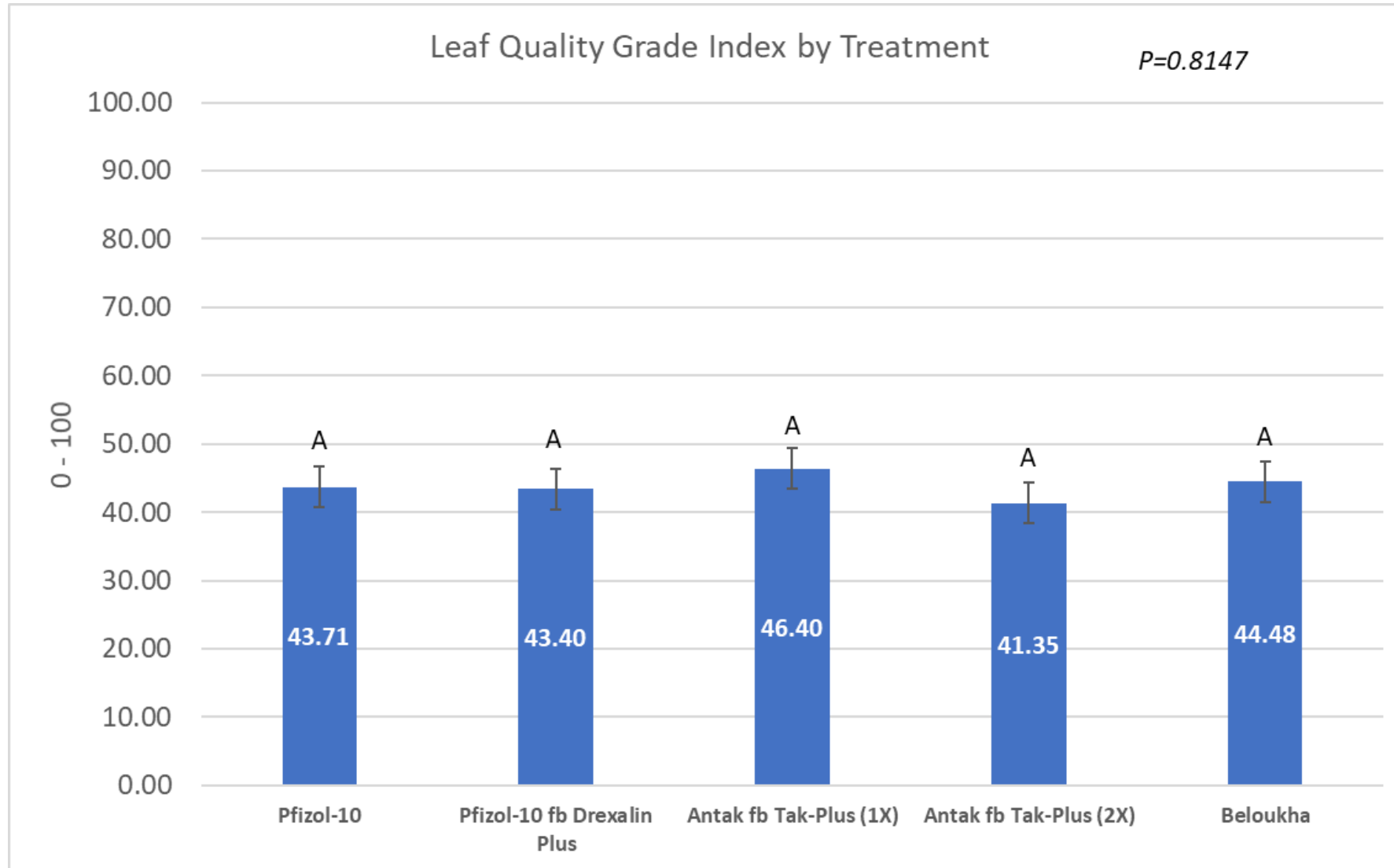


# Results

- ▶ There was a significant effect of treatment on total yield ( $P=0.0007$ )
  - ▶ Reduction in yield for Beloukha
  - ▶ All other treatments were not significantly different
    - ▶ Reminder: all plots were manually suckered August 23, 2019 and the last application of Pfizol-10, Beloukha and the treatment with two applications of Tak-Plus were applied
    - ▶ Without manually removing all suckers, contact products would have not been efficacious at this time
- ▶ Leaf Quality Grade Index was not significantly different
  - ▶ Range = 41.35 to 46.40 (Scale = 0-100)
- ▶ Index return was not significantly different among treatments
  - ▶ Formula =  $(\text{Yield} \times \text{Grade Index}) / 100$
  - ▶ Range = 1644 to 2005 (higher number associated with better performance)



# Results: Total Yield and Leaf Quality

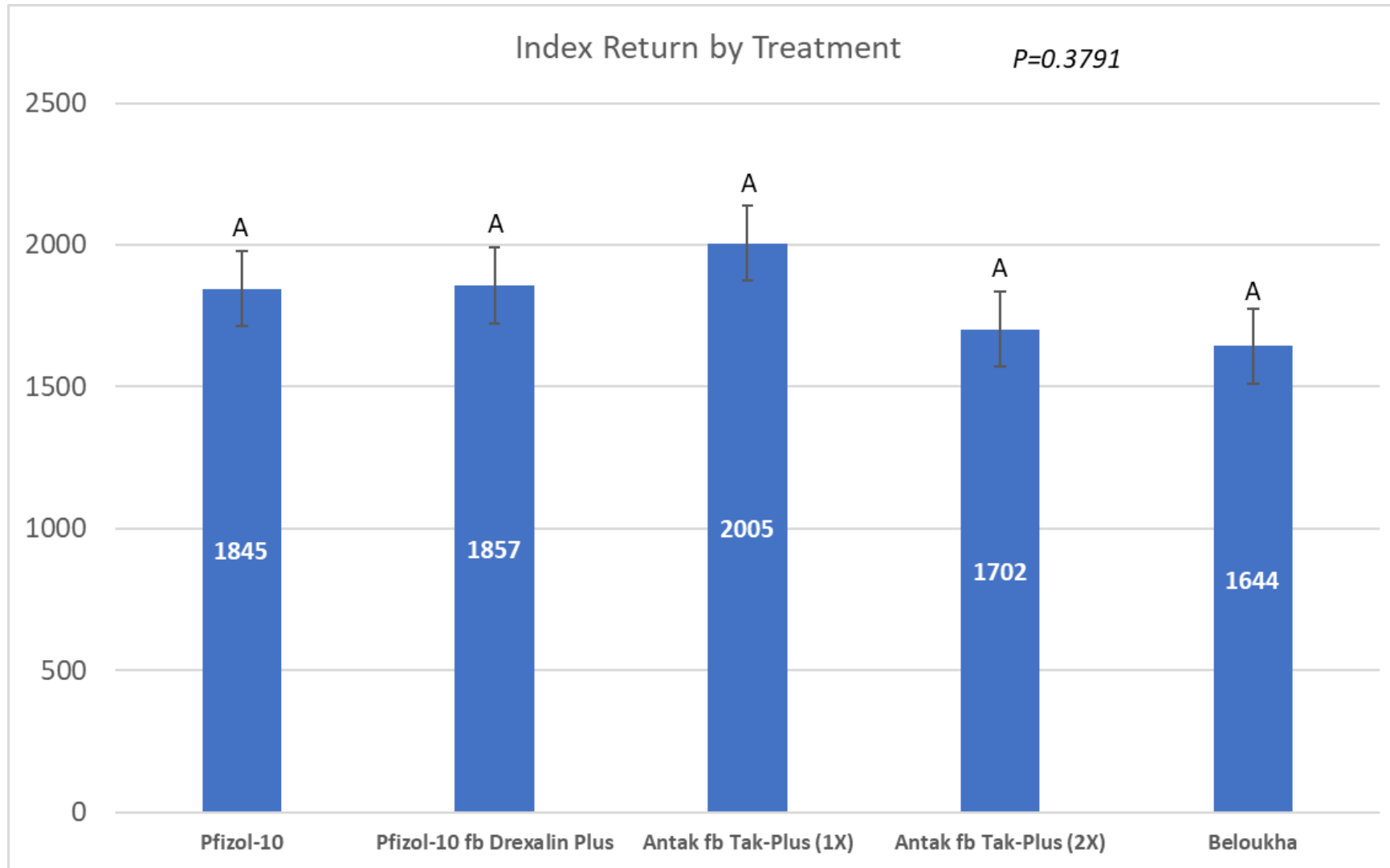


# Results

- ▶ There was a significant effect of treatment on total yield ( $P=0.0007$ )
  - ▶ Reduction in yield for Beloukha
  - ▶ All other treatments were not significantly different
    - ▶ Reminder: all plots were manually suckered August 23, 2019 and the last application of Pfizol-10, Beloukha and the treatment with two applications of Tak-Plus were applied
    - ▶ Without manually removing all suckers, contact products would have not been efficacious at this time
- ▶ Leaf Quality Grade Index was not significantly different
  - ▶ Range = 41.35 to 46.40 (Scale = 0-100)
- ▶ Index return was not significantly different among treatments
  - ▶ Formula =  $(\text{Yield} \times \text{Grade Index}) / 100$
  - ▶ Range = 1644 to 2005 (higher number associated with better performance)



# Results: Total Yield and Leaf Quality



# Conclusion

- ▶ Treatments with flumetralin reduced total number and weight of axillary and ground suckers per plant
- ▶ Beloukha:
  - ▶ No phytotoxicity
  - ▶ Successful at controlling axillary suckers on the first two applications but was not acceptable for mid- to late-season sucker control
    - ▶ Possibly room to explore increased rates and combination treatments
    - ▶ 1.5% - 2.0% v/v application rates for later applications
    - ▶ Two applications of Beloukha fb flumetralin
- ▶ Flumetralin could be a useful tool in the toolbox for Canadian tobacco producers if registered



# Acknowledgements

- ▶ CTRF Foundation Advisory Committee and Board of Directors
- ▶ Cooperating tobacco growers
- ▶ Drexel Chemical Company
- ▶ Belchim Crop Protection Canada
- ▶ United Agri Products Canada Inc.
- ▶ Thank you for your attention



# Questions or comments?

