Improving the management of Fusarium and Aphanomyces root rots in field peas

Collaborative research:

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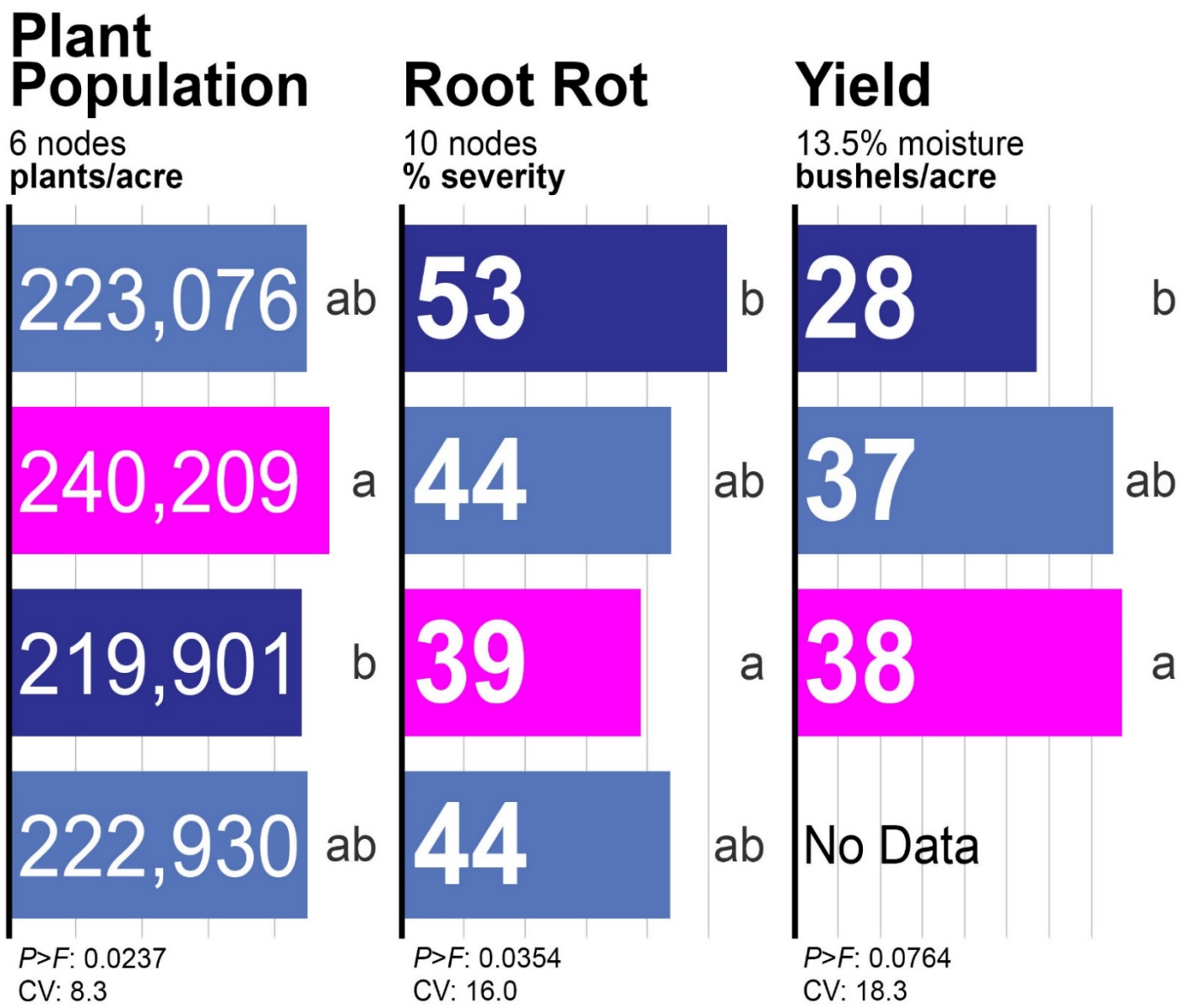
Fusarium & Aphanomyces root rots of field peas: Impact of crop rotation

Carrington, ND
2018

Field with a history of severe field pea root rot



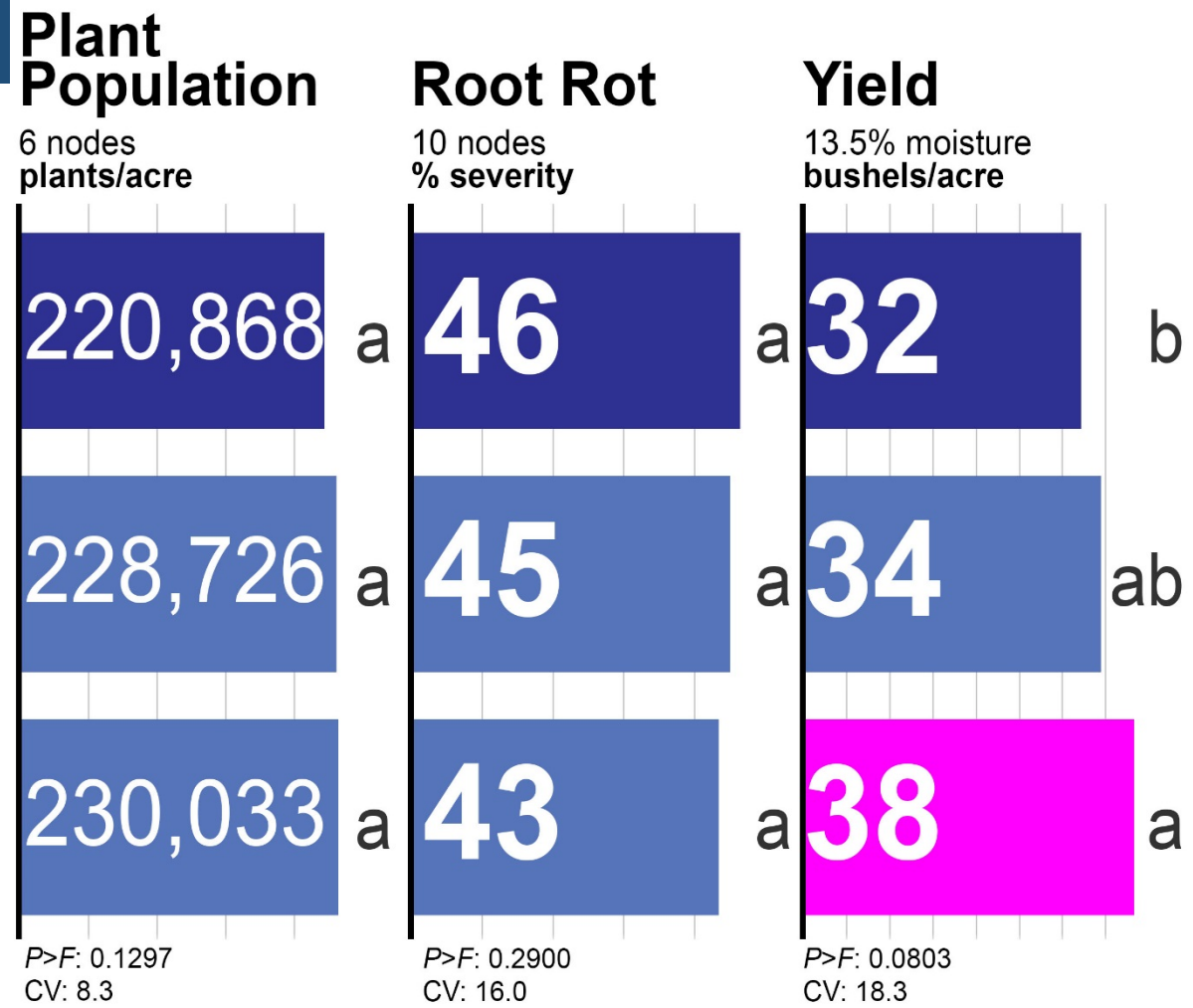
Variety: 'Salamanca' (yellow-cotyledon type) **Seeding rate:** 300,000 pure live seeds/acre

Within-column means followed by different letters are significantly different: $P < 0.05$ (plant population, root rot), $P < 0.10$ (yield), Tukey multiple comparison procedure.

Fusarium & Aphanomyces root rots of field peas:
Impact of fungicide seed treatment across crop rotation treatments

Carrington, ND
2018

Field with a history of severe field pea root rot



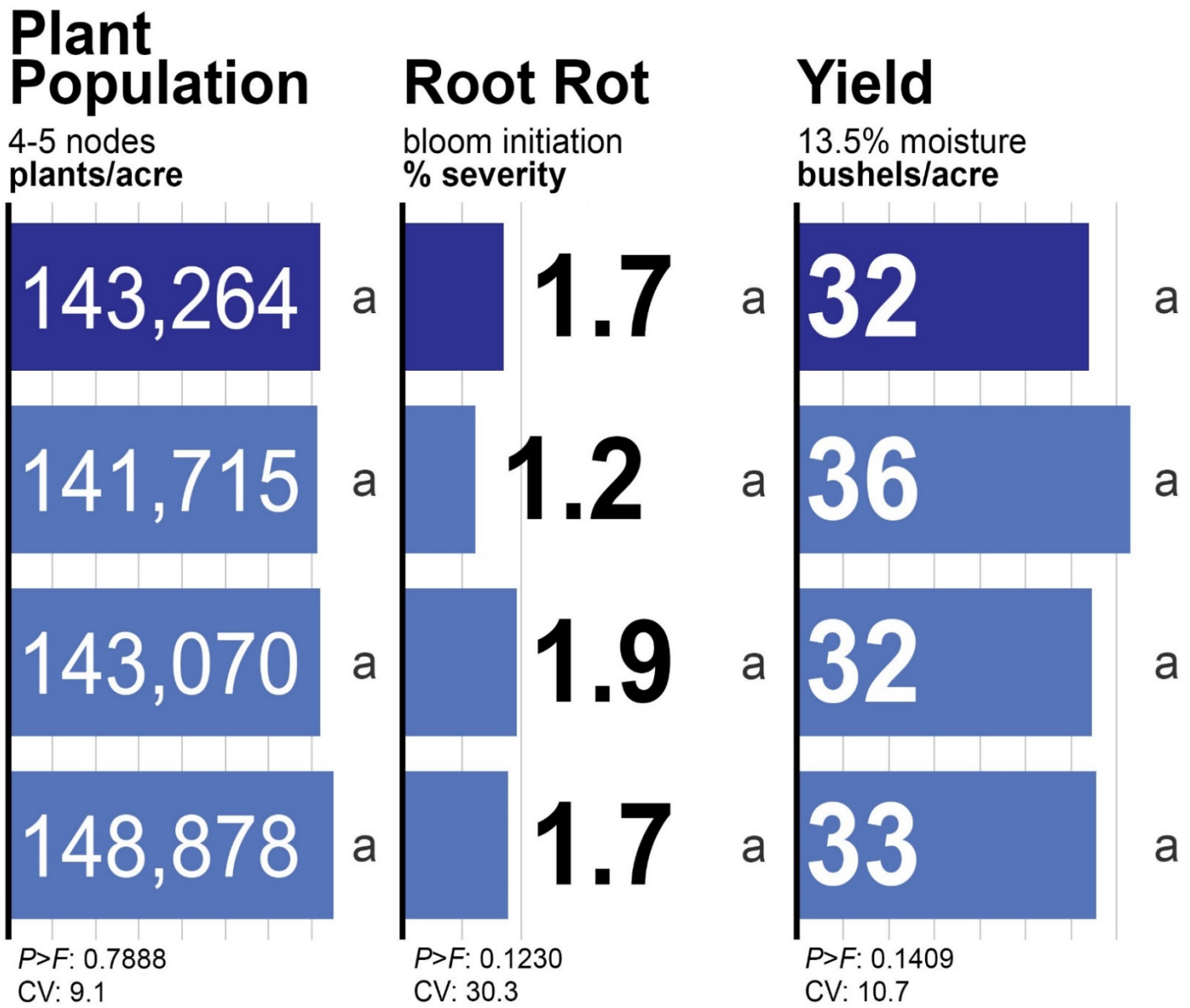
Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 300,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.10$; Tukey multiple comparison procedure)

Fusarium & Aphanomyces root rots of field peas: Impact of crop rotation

Hettinger, ND
2018

Field with no previous field pea production



Variety: 'Bridger' (yellow-cotyledon type) **Seeding rate:** 300,000 pure live seeds/acre

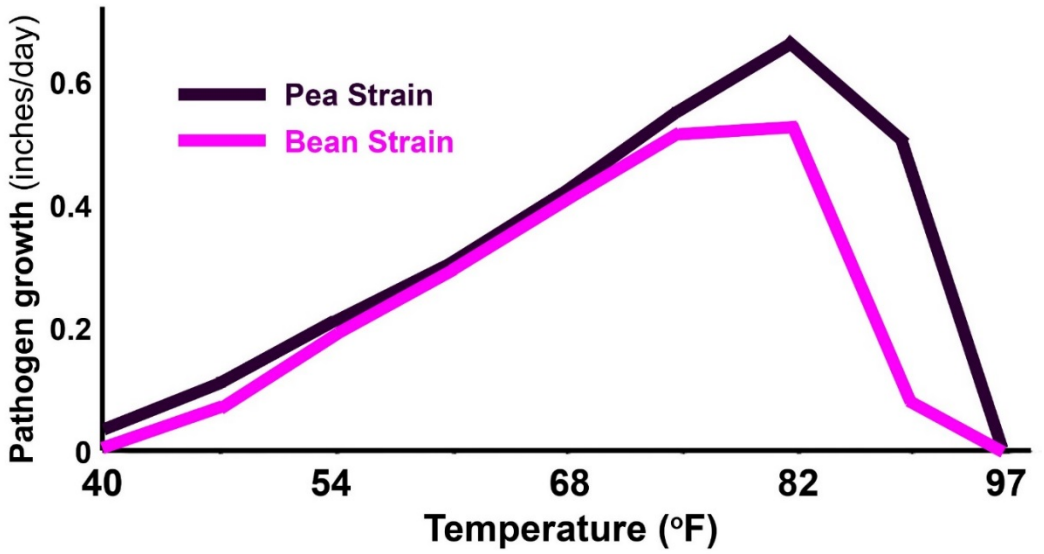
Within-column means followed by different letters are significantly different: $P < 0.05$, Tukey multiple comparison procedure.

Aphanomyces root rot of field peas:
Biology

Causal pathogen: *Aphanomyces euteiches*
(an oomycete; “water mold”)

Conditions that favor infection:

- Soil moisture: high
- Soil temperature: high

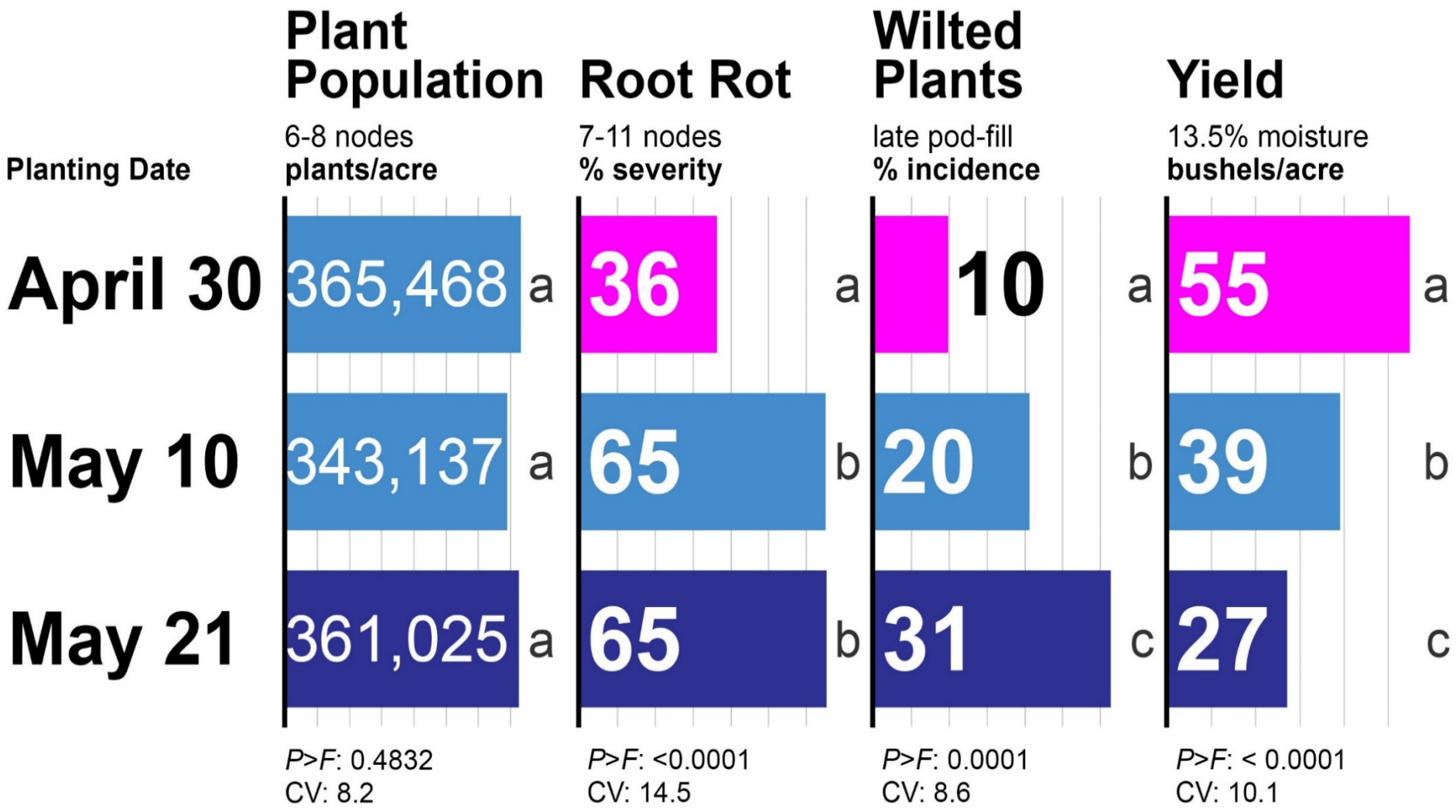


Pfender and Hagedorn 1982
Phytopathology 72:306-310

Aphanomyces root rot of field peas: Impact of planting date

No-till production – Carrington, ND

2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant)

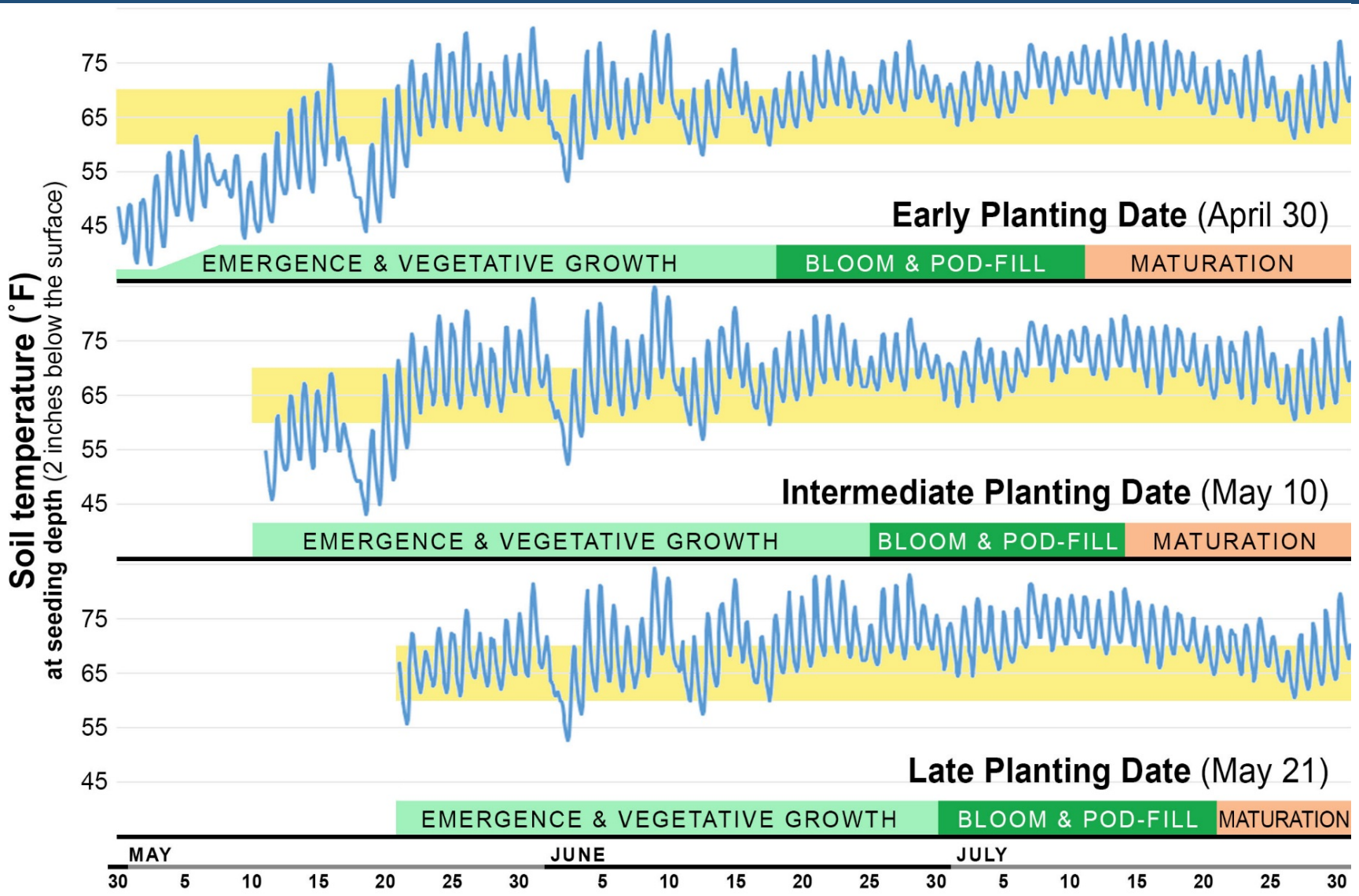


Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 385,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

Aphanomyces root rot of field peas: Planting date studies (2018)
Impact of soil temperature on root rot severity

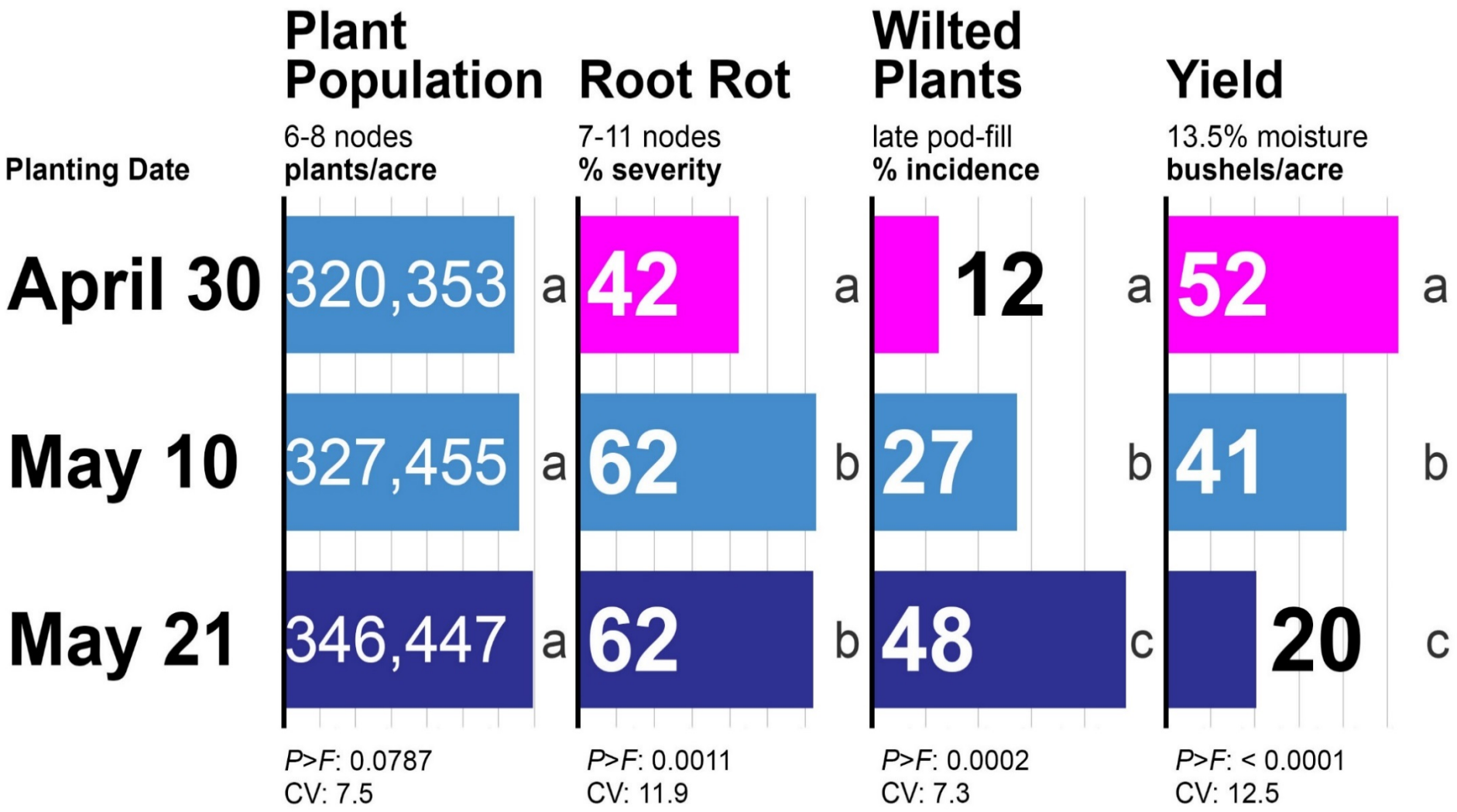
2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant) Carrington, ND. Data from study conducted under no-till production.



Aphanomyces root rot of field peas: Impact of planting date

Conventional tillage – Carrington, ND

2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant)

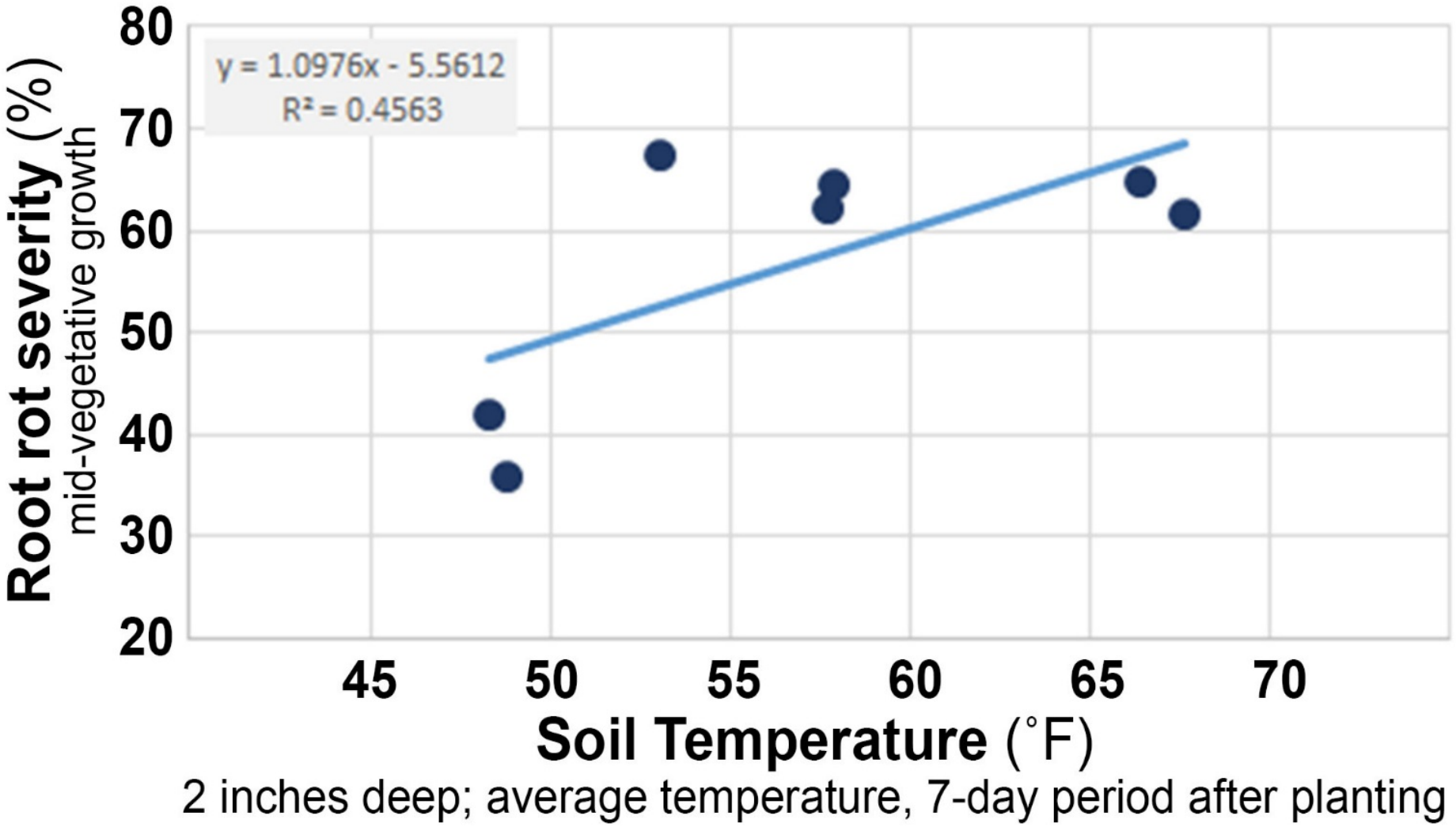


Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 385,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

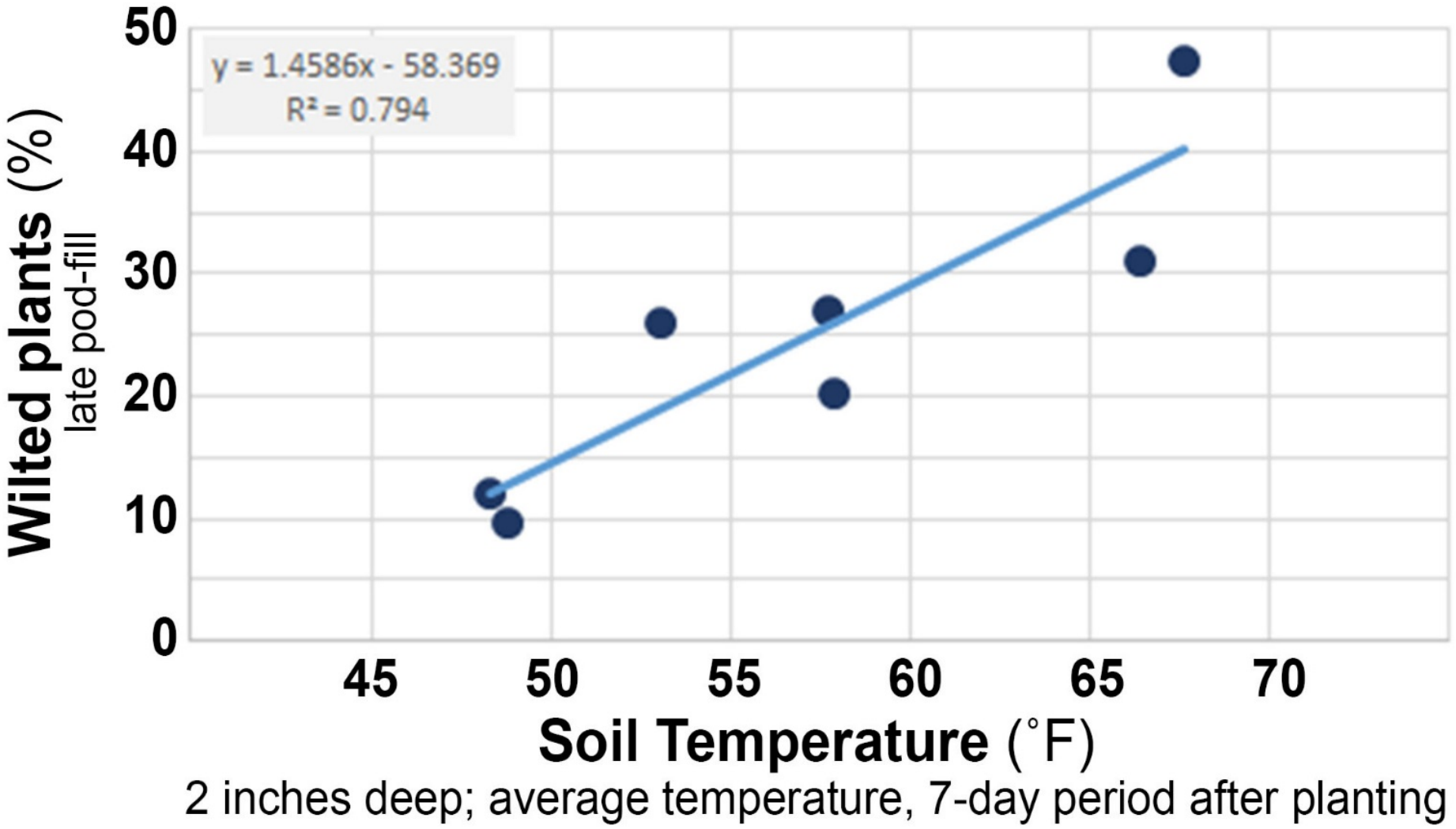
Aphanomyces root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and root rot severity

2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant) Carrington, ND. Data from no-till and conventional-till production.



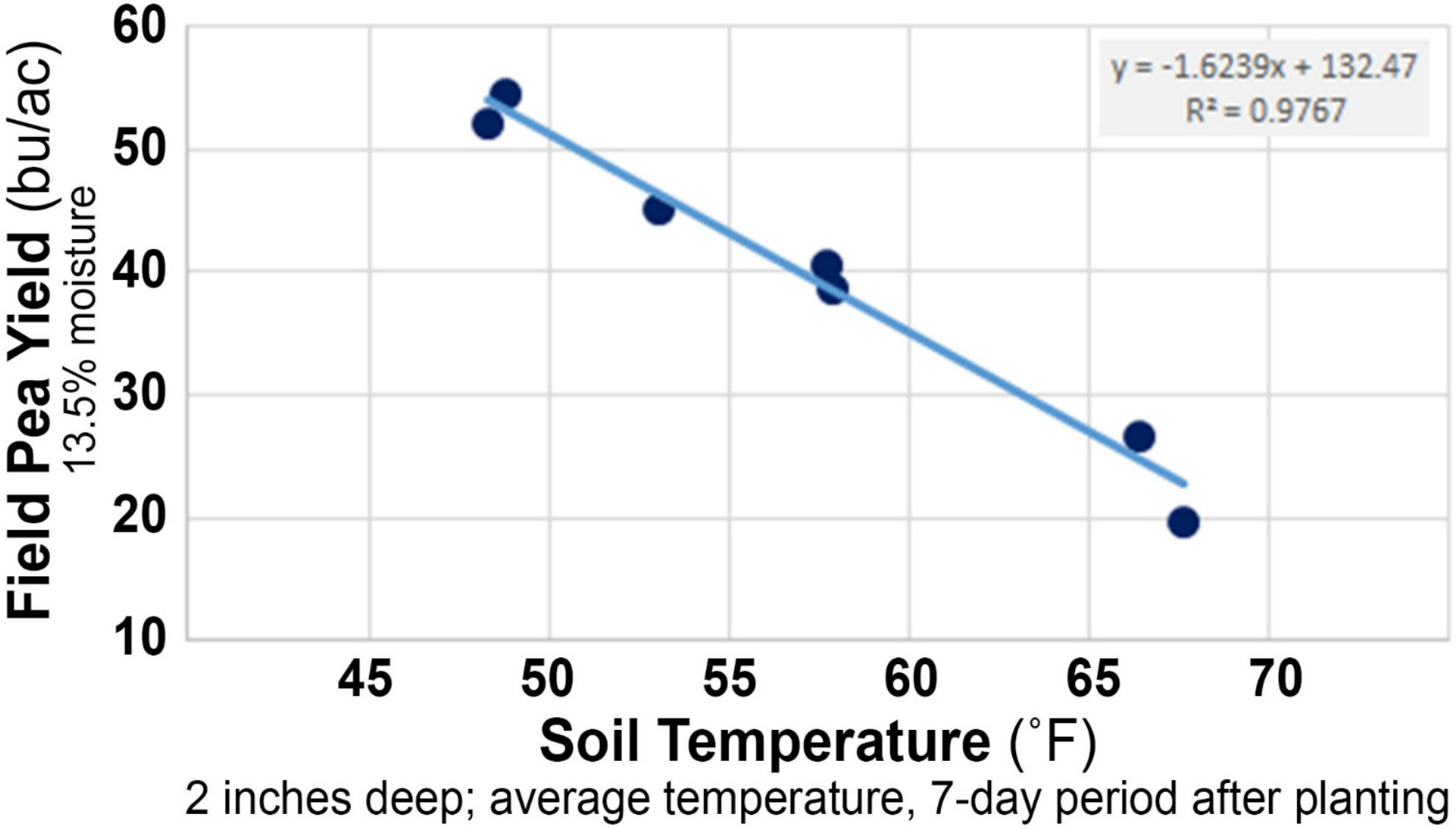
Aphanomyces root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and wilt symptom development

2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant) Carrington, ND. Data from no-till and conventional-till production.



Aphanomyces root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and yield

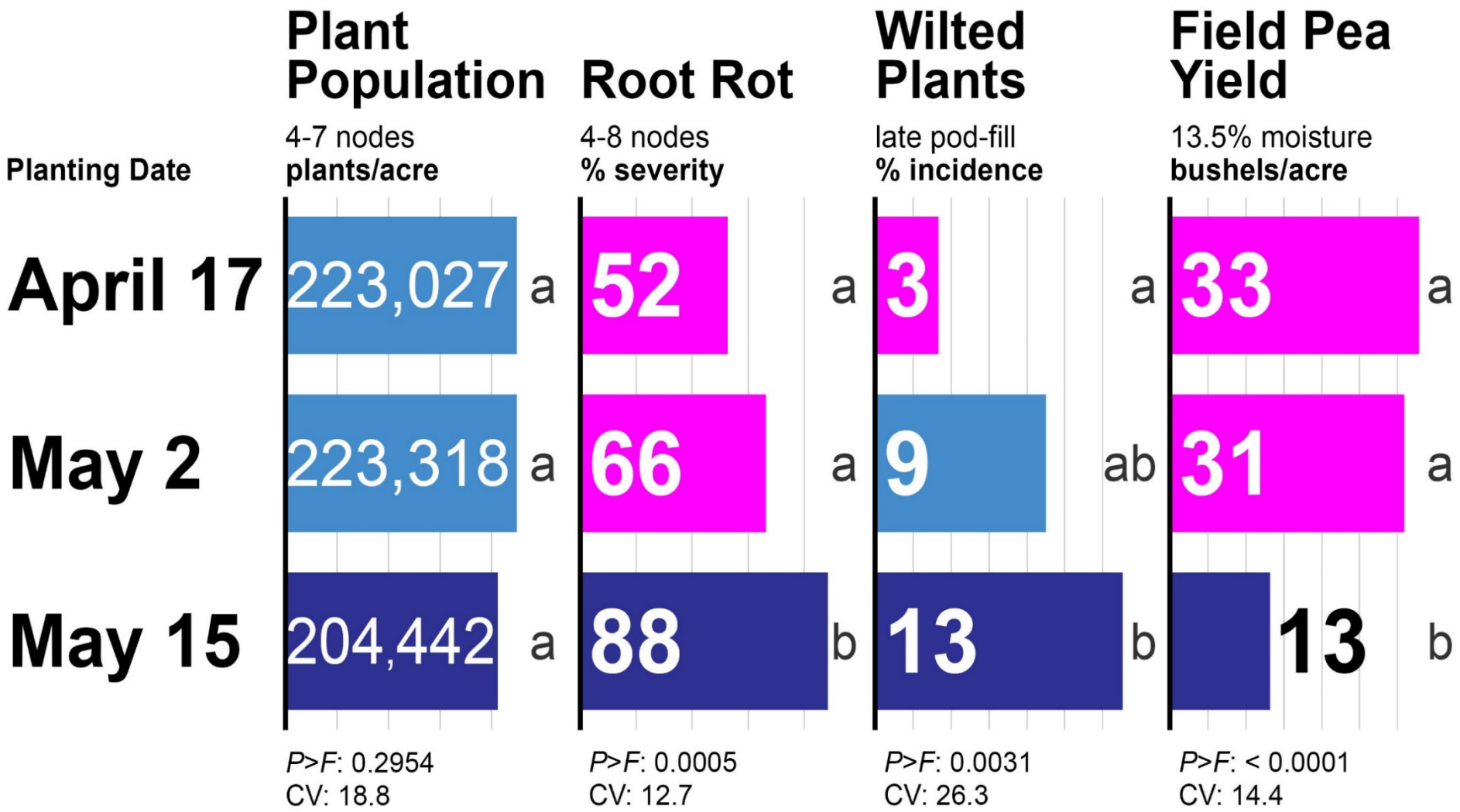
2018 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant) Carrington, ND. Data from no-till and conventional-till production.



Aphanomyces root rot of field peas: Impact of planting date

No-till production – Carrington, ND

2017 Field with history of severe field pea root rot (Aphanomyces & Fusarium, Aphanomyces predominant)



Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 300,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

Aphanomyces root rot of field peas:
Efficacy of seed treatments

Seed treatments:

- Metalayxl and mefenoxam: ineffective.
- Ethaboxam (Intego Solo): registered on lentils and chickpeas.

Control of Aphanomyces with seed treatments is difficult:

- Aphanomyces root rot develops during vegetative growth and bloom, when the concentration of fungicide active ingredients in the target tissues (tap root, epicotyl) is low.

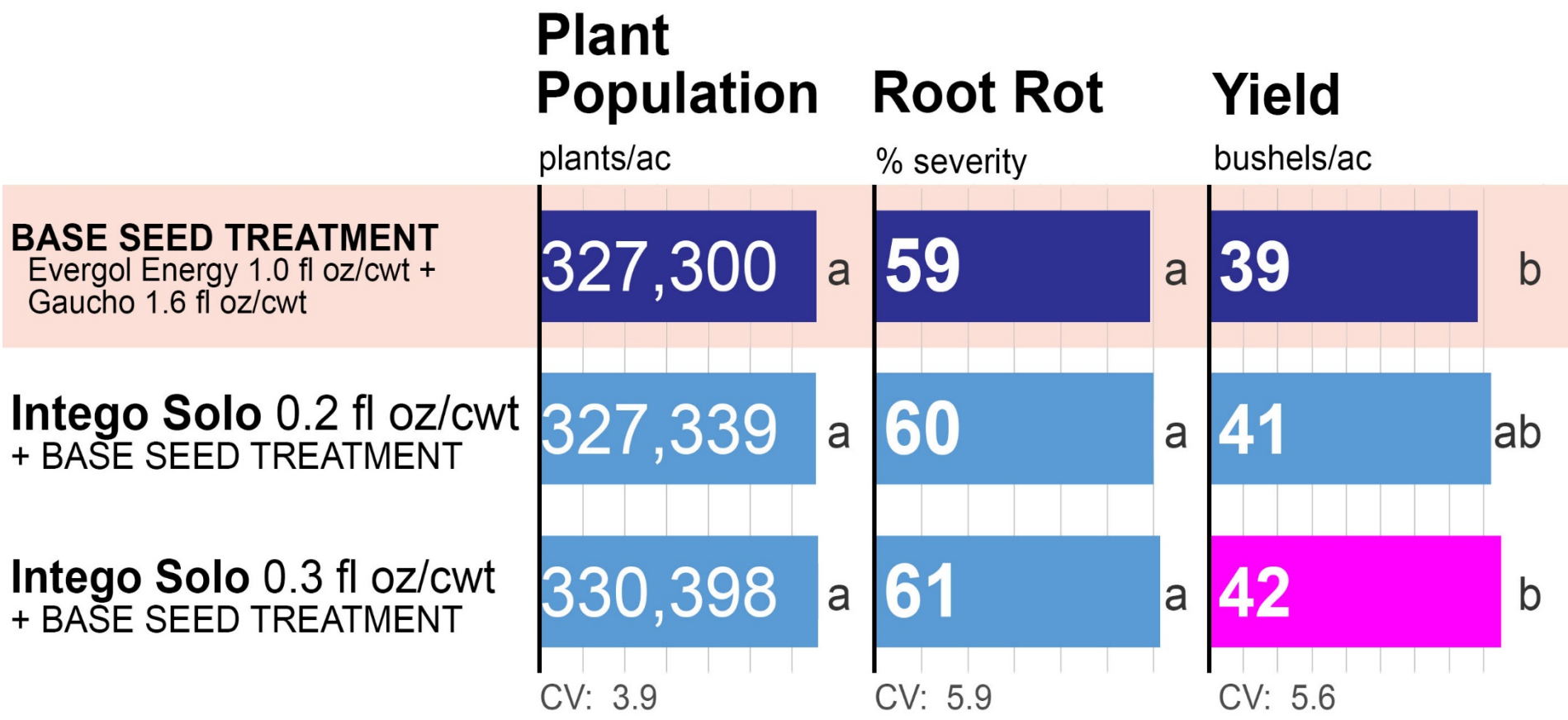
Aphanomyces root rot of field peas:

Efficacy of seed treatments

Intego Solo

combined analysis across nine **field pea** studies

active ingredient: ethaboxam



Fusarium root rot:

Biology

Causal pathogens:

- *Fusarium* spp. (fungal pathogens)

Conditions that favor infection:

- Soil moisture: low to high
- Soil temperatures: high

Fusarium root rot:

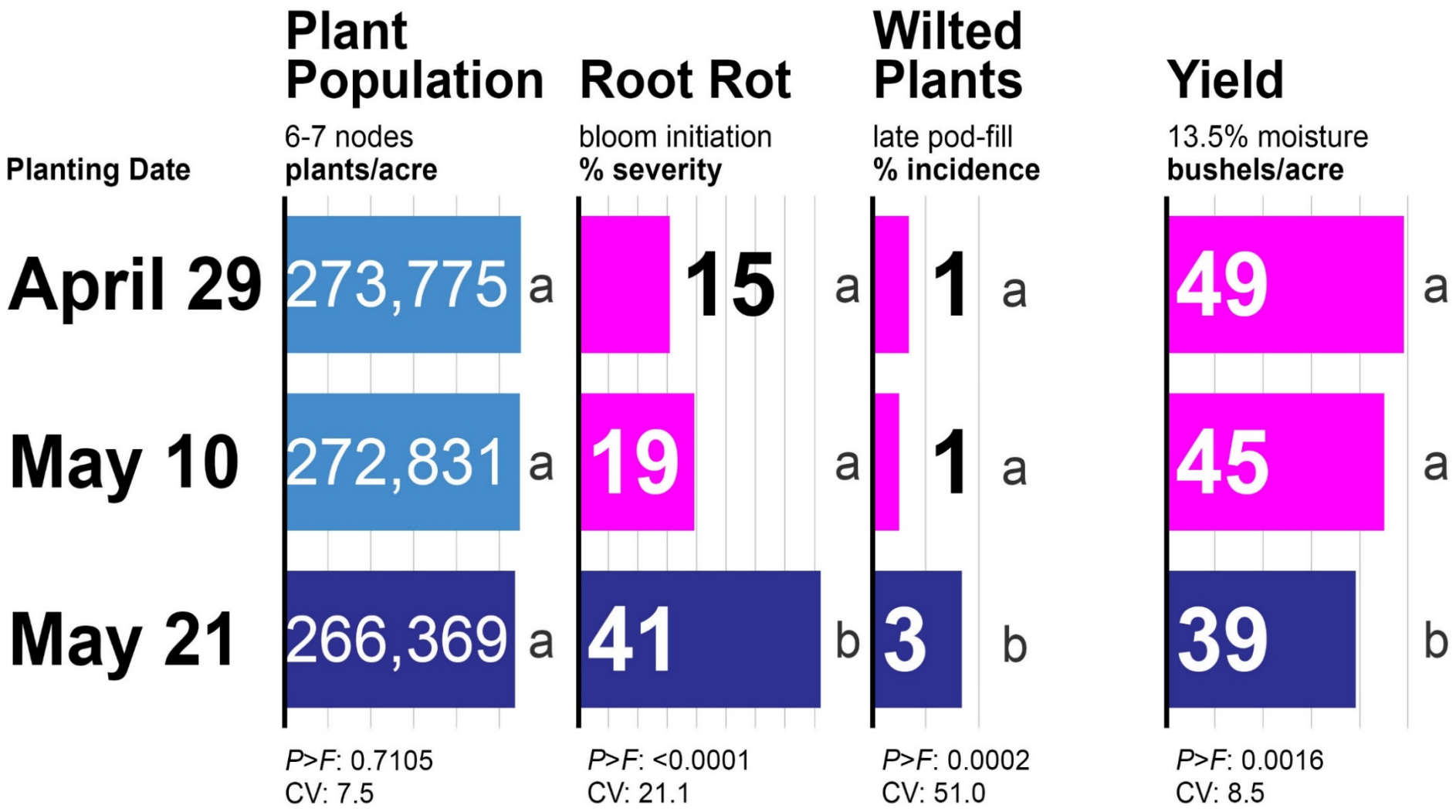
Biology

Symptoms:

- *When soil temperatures are high prior to emergence:* Poor stand establishment due to seed decay and damping-off
- Root rot: lesions that are initially brick-red to brown and later necrotic
- Wilt: plants yellowing from the bottom up

Fusarium root rot of field peas: Impact of planting date
Direct-seeded – Carrington, ND

2018 Inoculated with *Fusarium solani, F. avenaceum*. Symptoms suggest Aphanomyces pressure was low.



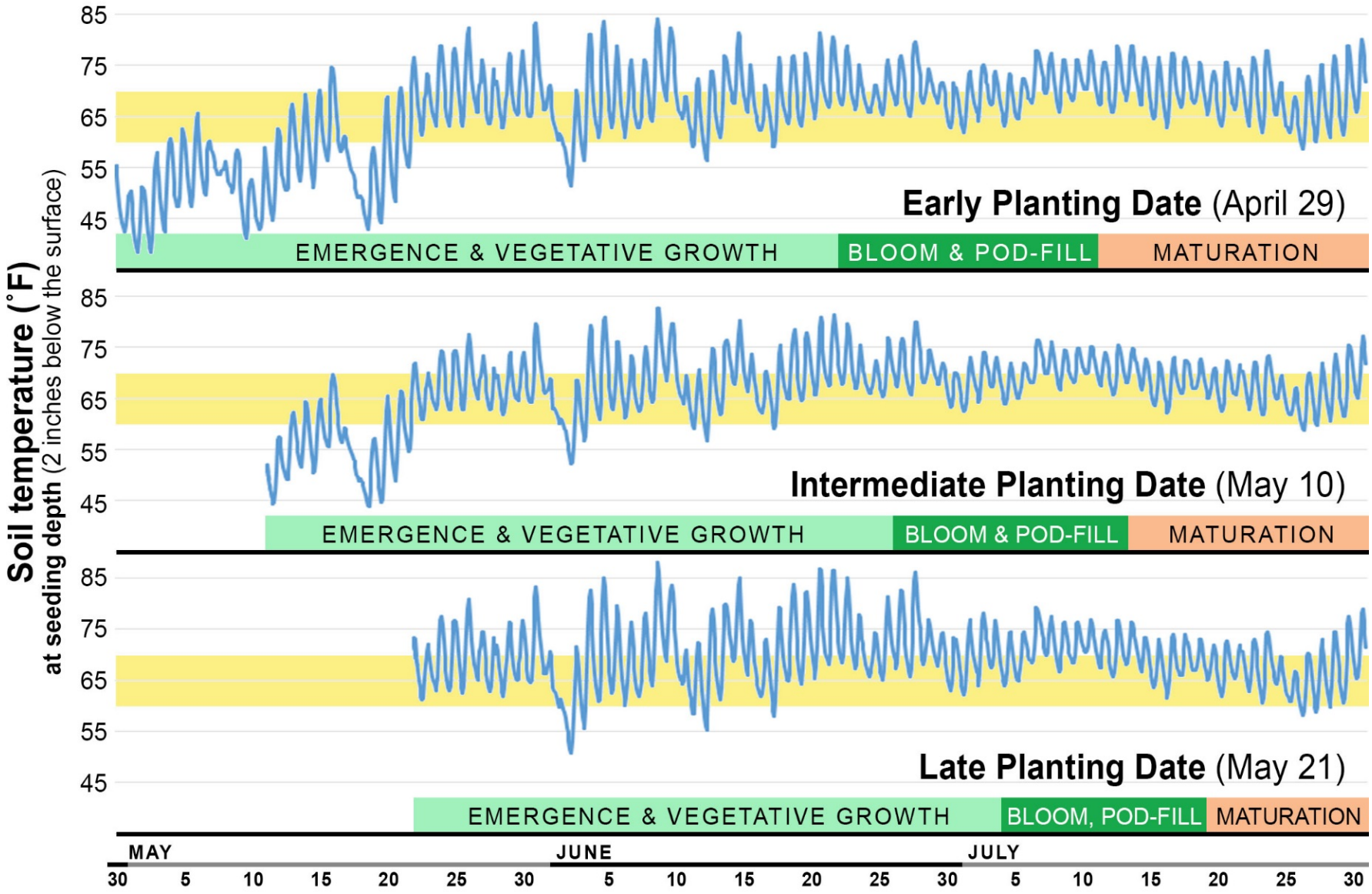
Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 308,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

Fusarium root rot of field peas: Impact of planting date

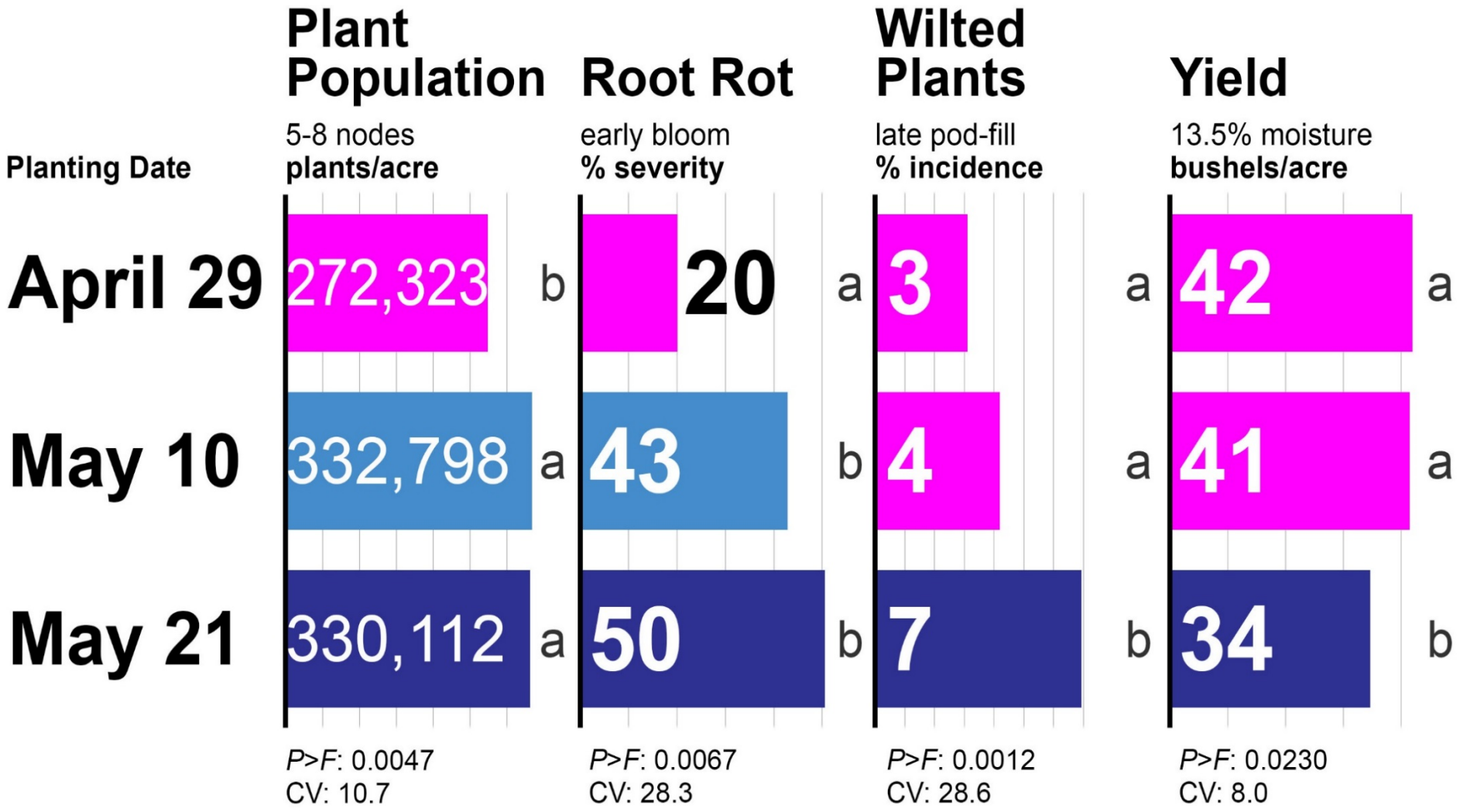
Direct-seeded – Carrington, ND

2018 Inoculated with *Fusarium solani, F. avenaceum*. Symptoms suggest Aphanomyces pressure was low.



Fusarium root rot of field peas: Impact of planting date
Conventional tillage – Carrington, ND

2018 Inoculated with *Fusarium solani, F. avenaceum*. Symptoms: Aphanomyces pressure likely moderate.



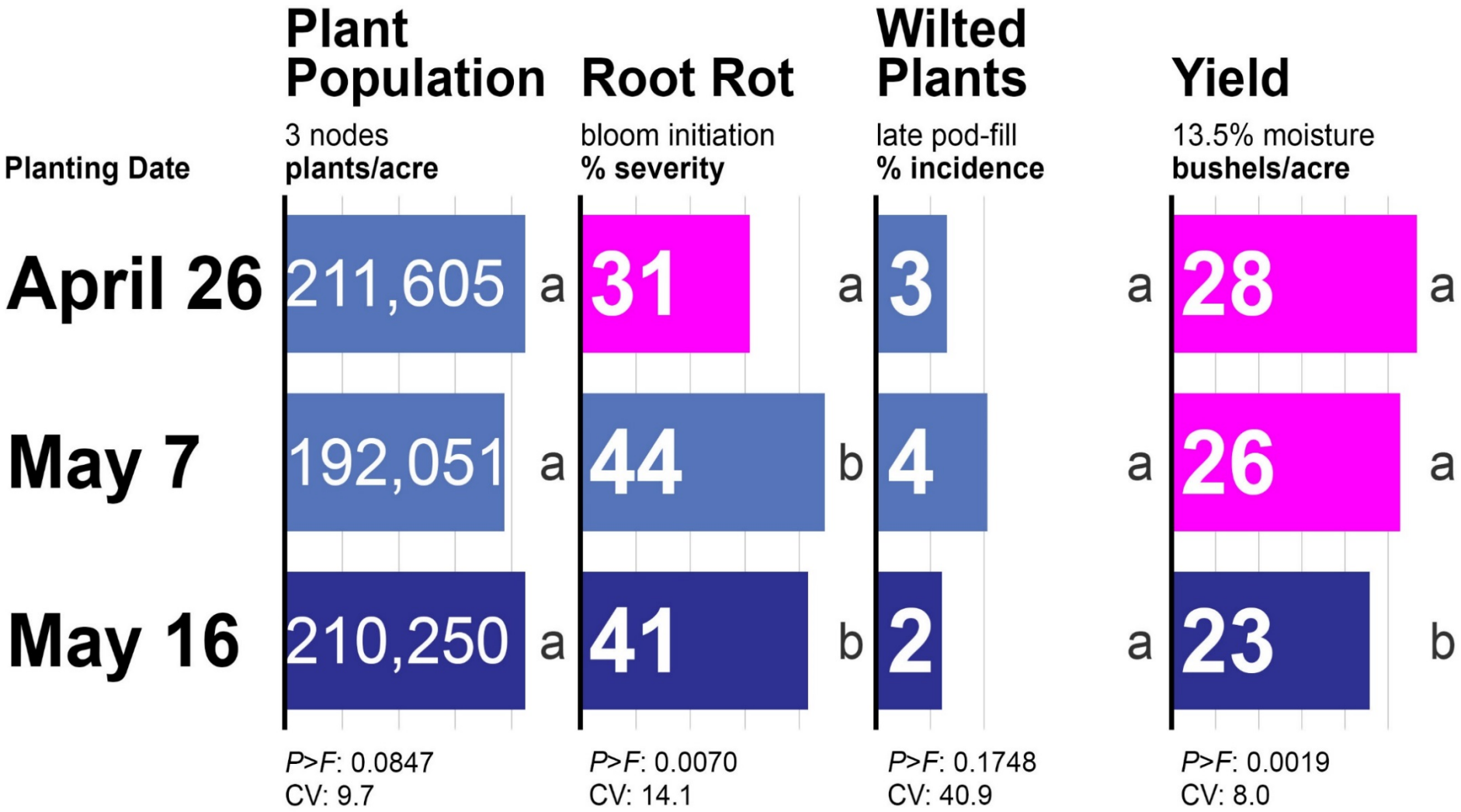
Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 308,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

Fusarium root rot of field peas: Impact of planting date

No-till production – Williston, ND

2018 Inoculated with *Fusarium solani, F. avenaceum*. Aphanomyces pressure unknown.

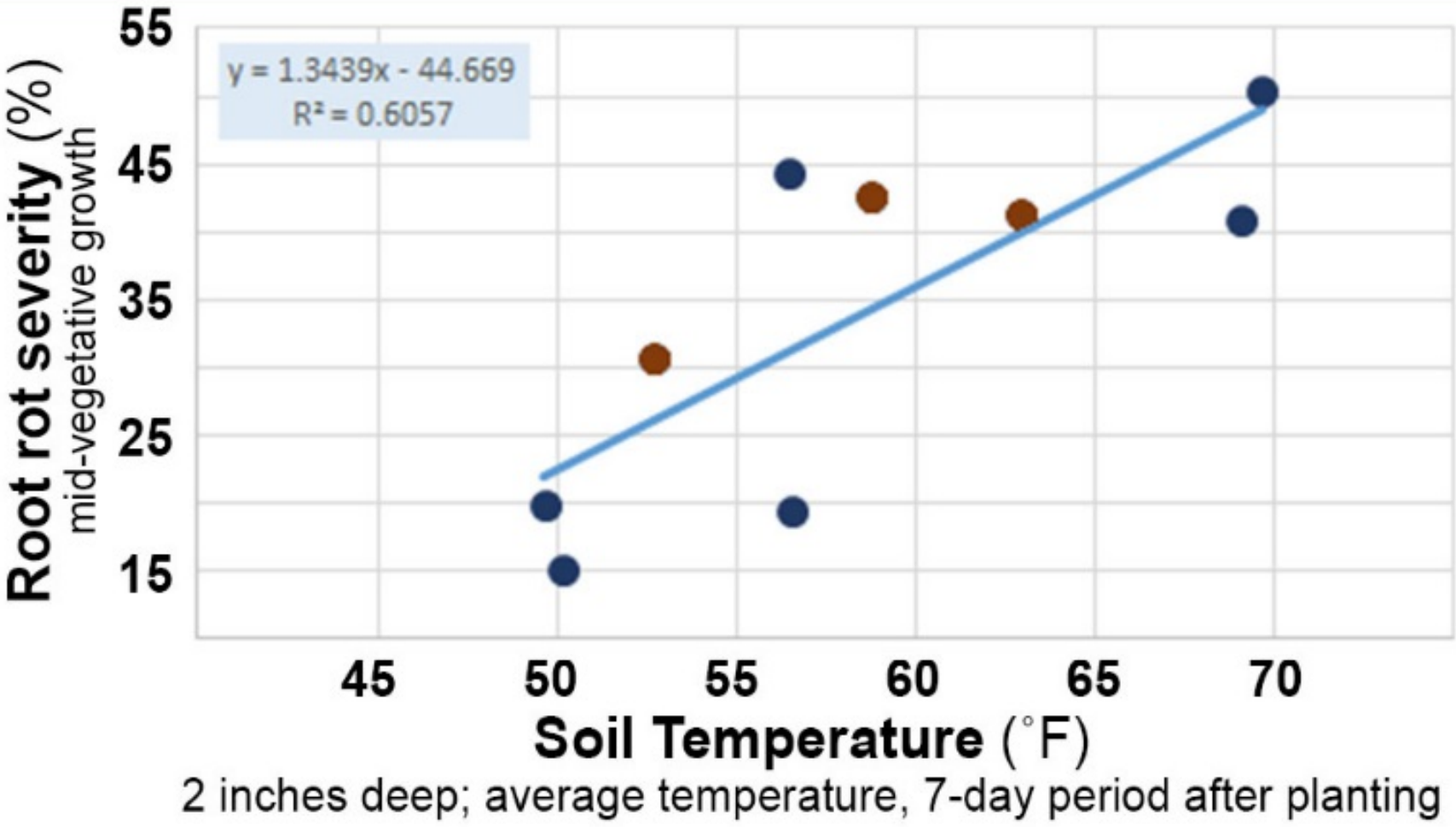


Variety: 'DS Admiral' (yellow-cotyledon type) **Seeding rate:** 330,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

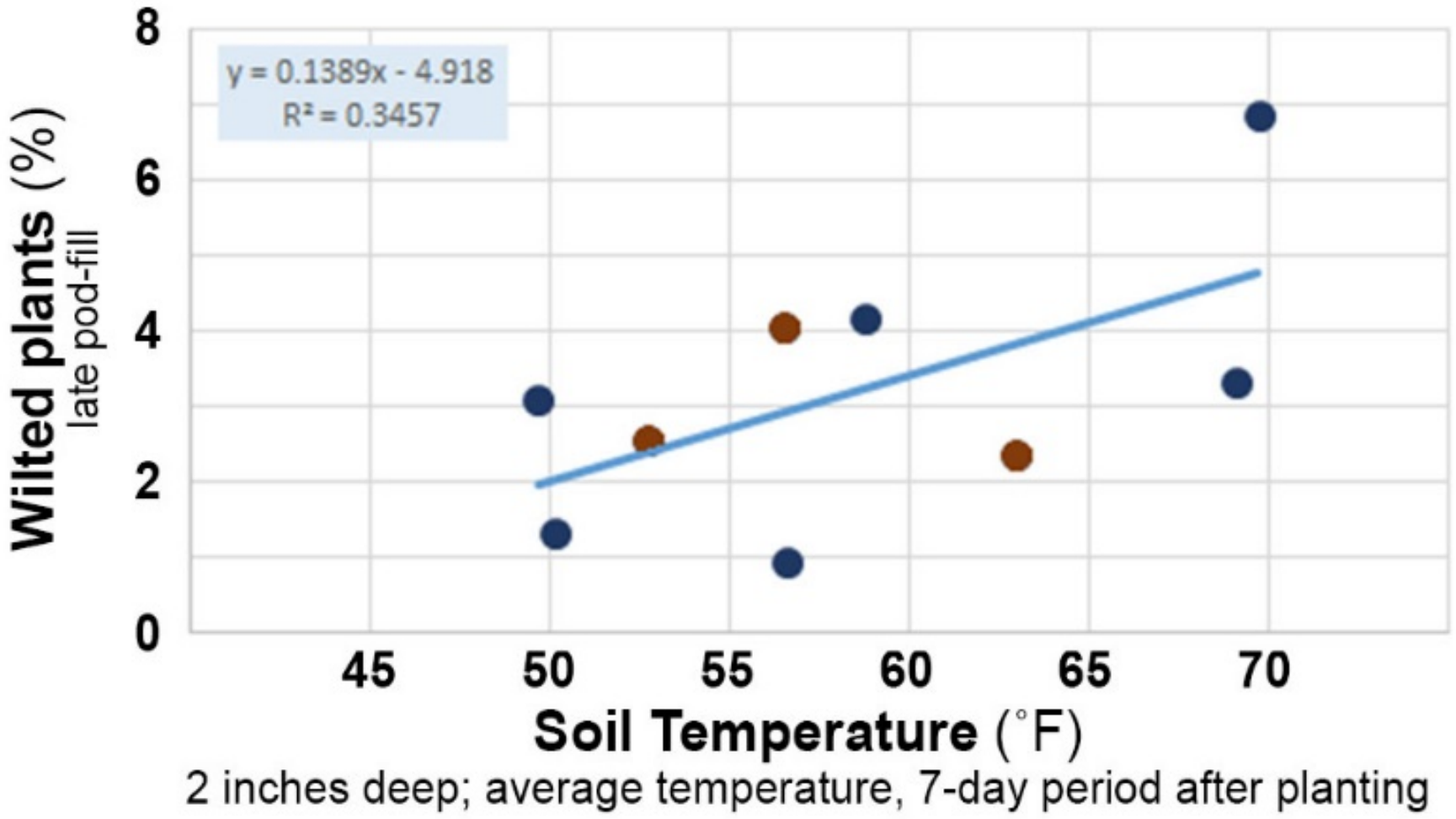
Fusarium root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and root rot severity

2018 Field peas inoculated with *Fusarium solani, F. avenaceum.* Aphanomyces pressure low to moderate. Carrington and Williston, ND. Data from no-till and conventional-till production.



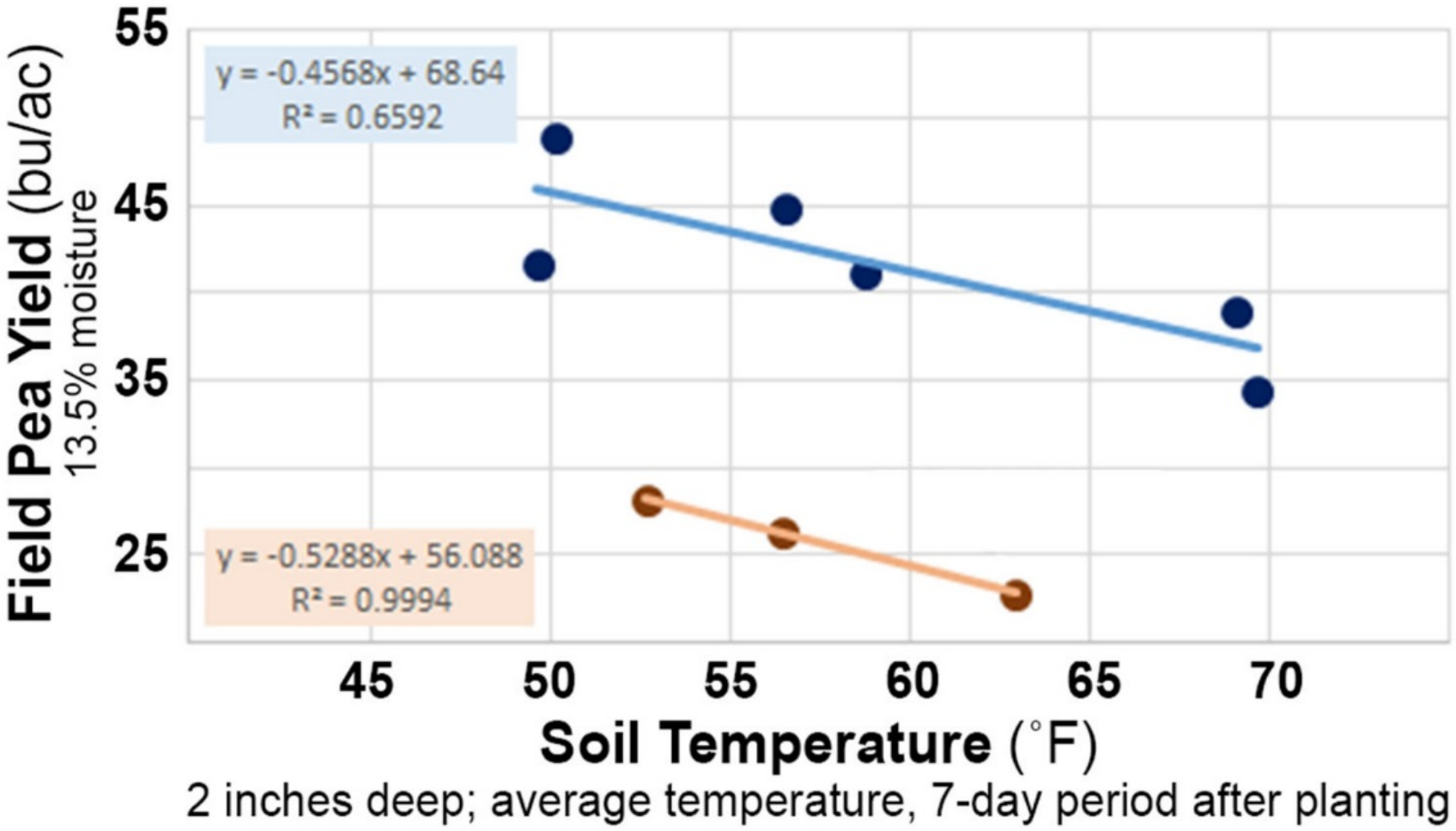
Aphanomyces root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and wilt symptom development

2018 Field peas inoculated with *Fusarium solani, F. avenaceum.* Aphanomyces pressure low to moderate. Carrington and Williston, ND. Data from no-till and conventional-till production.



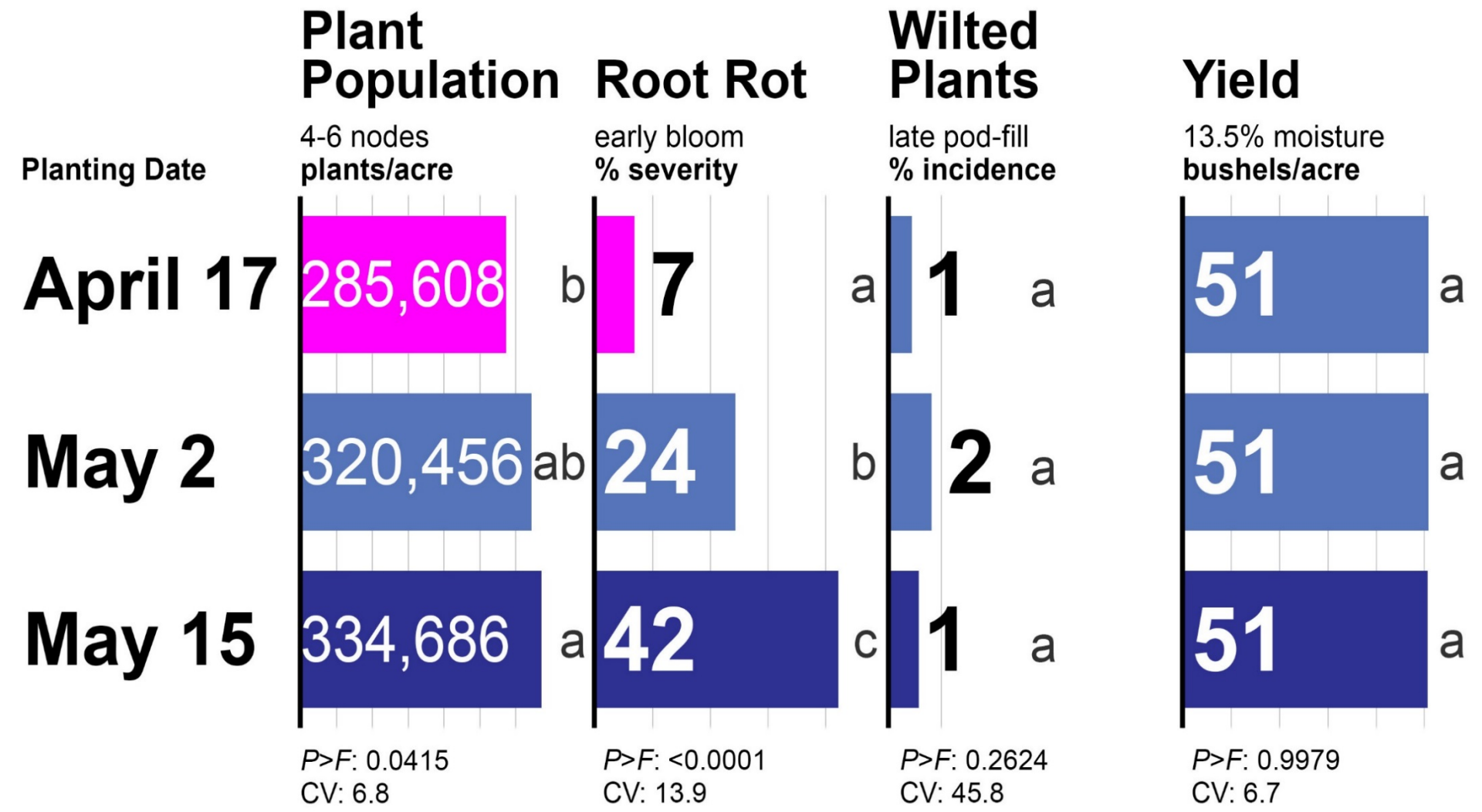
Aphanomyces root rot of field peas: Planting date studies (2018)
Relationship between soil temperature and yield

2018 Field peas inoculated with *Fusarium solani, F. avenaceum.* Aphanomyces pressure low to moderate. Carrington and Williston, ND. Data from no-till and conventional-till production.



Fusarium root rot of field peas: Impact of planting date
Direct-seeded – Carrington, ND

2017 Inoculated with *Fusarium* spp. Symptoms suggest Aphanomyces pressure was low.

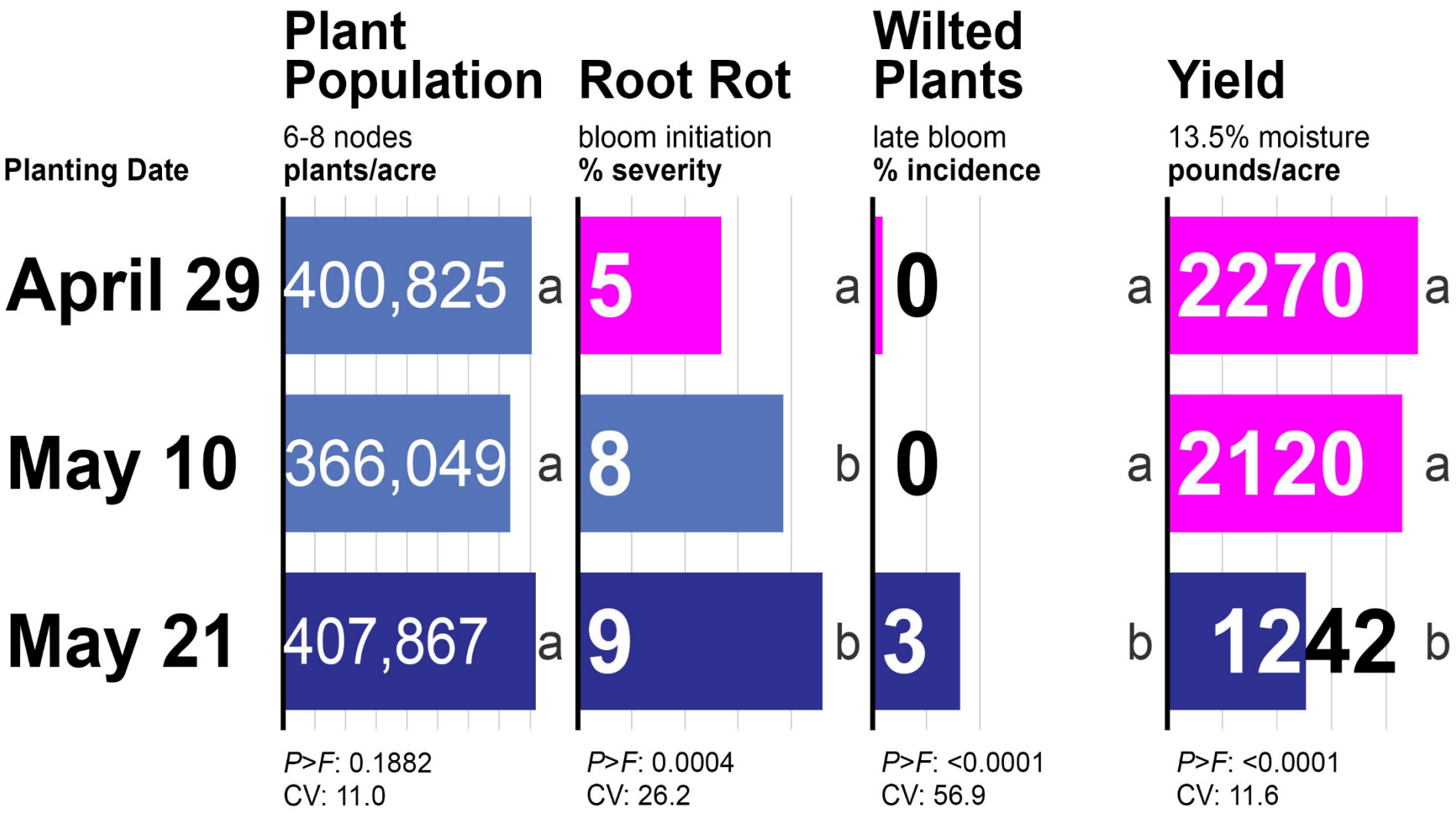


Variety: 'Abarth' (yellow-cotyledon type) **Seeding rate:** 330,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

LENTILS - Impact of planting date on Fusarium root rot
Direct-seeded – Carrington, ND

2018 Inoculated with *Fusarium* spp. Symptoms suggest Aphanomyces pressure was low.

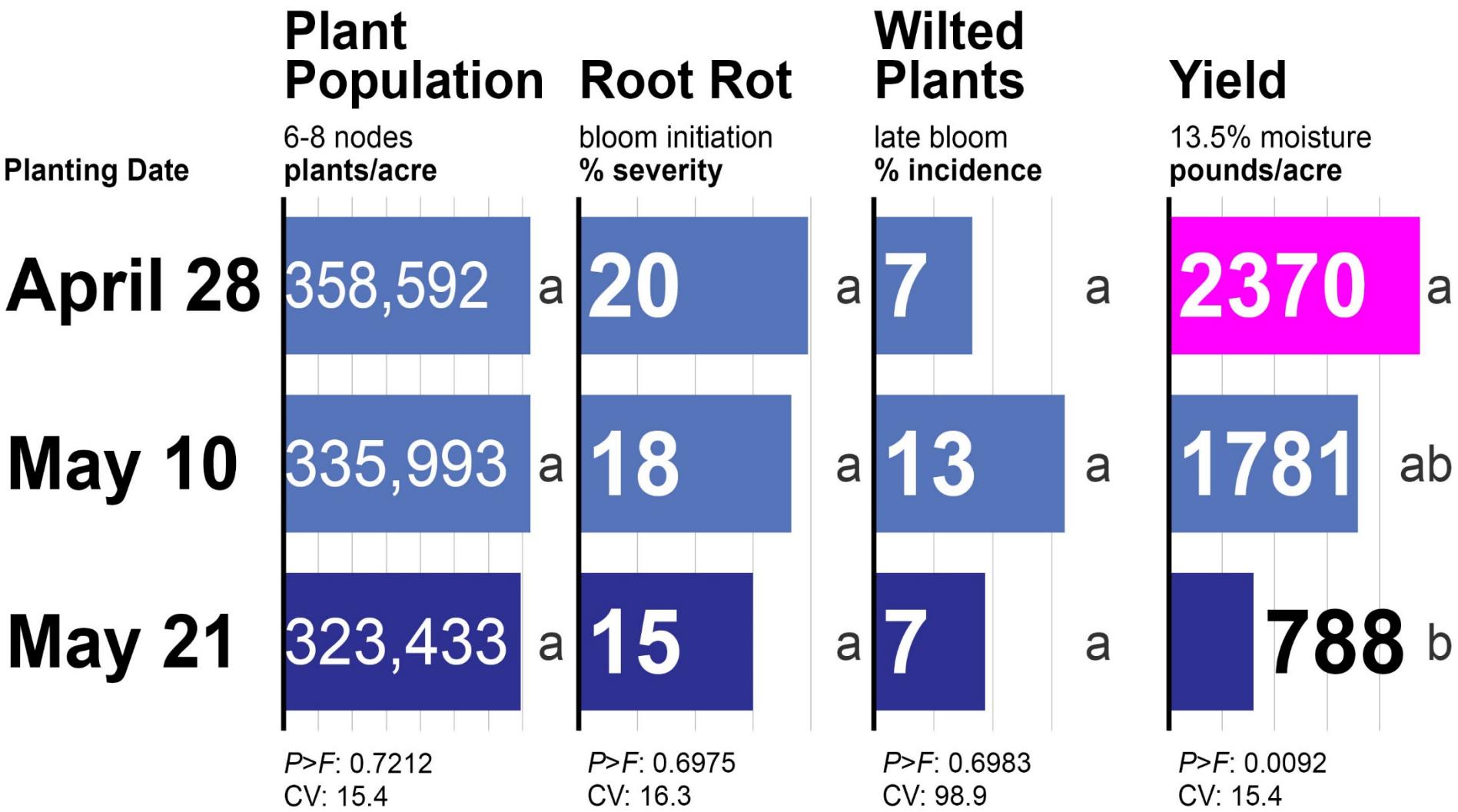


Variety: CDC 'Impress' (medium-green type) **Seeding rate:** 488,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

LENTILS: Impact of planting date on Fusarium and Aphanomyces root rots
Conventional tillage – Carrington, ND

2018 Inoculated with *Fusarium* spp. Significant Aphanomyces pressure impacted portions of the study.



Variety: CDC 'Impress' (medium-green type) **Seeding rate:** 488,000 pure live seeds/acre

Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure)

Thank you!

Research funded by:
Northern Pulse Growers Association
North Dakota Crop Protection Product Harmonization Board & Registration Board
North Dakota Department of Agriculture USDA Specialty Crop Block Grant Program