Damage potential of *Pratylenchus penetrans* on soybean

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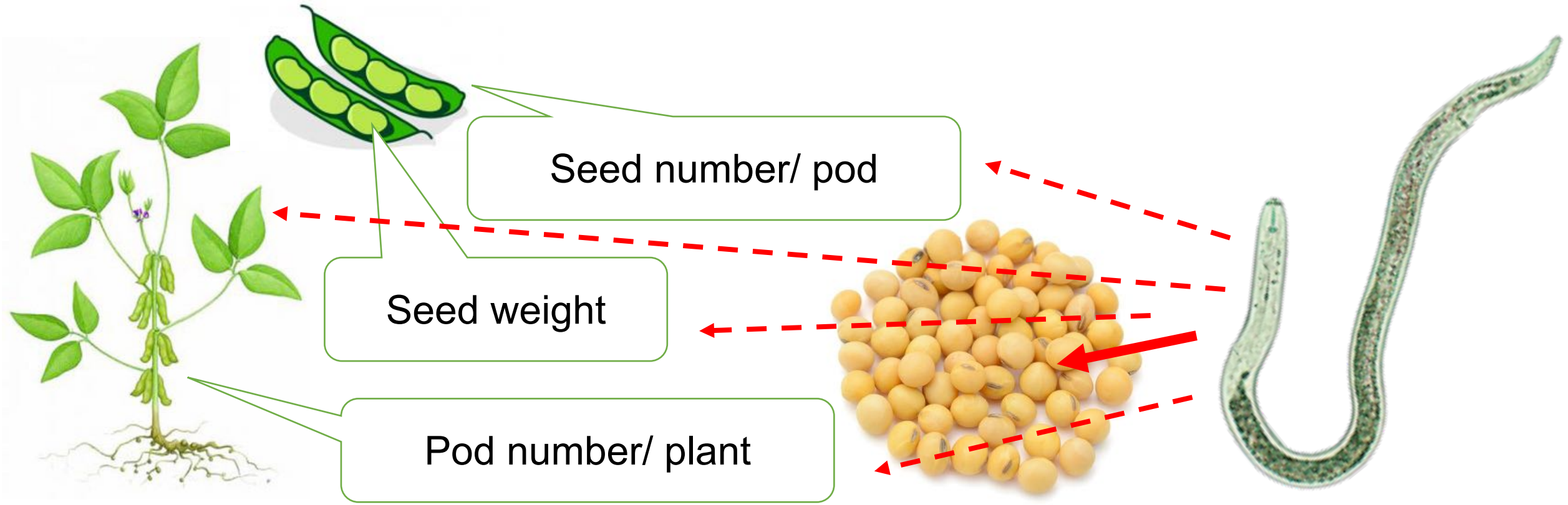
Plant Pathology
at the University of Wisconsin-Madison

Introduction



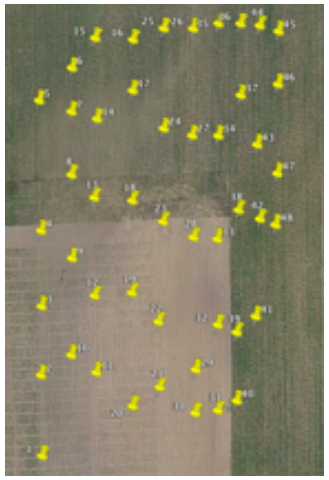
Our objective was to describe
the effect of *P. penetrans* on plant growth and soybean yield
under field and green house conditions.

Field study - Materials and Methods

Conducted at Hancock Agricultural Research Station in 2017 & 2018 (n=201).
Irrigated Plainfield loamy sand, sized 4.2 acres in 2017 and 2.8 acres in 2018

Emergence stage

- Two-meter plots were established.
- Soil samples (Pi)



Second Trifoliate Stage (V2)

- 2 plant samples
  Root weight
  Shoot weight
  Shoot : root

Final maturity

- Harvest plots
  Yield
  Pod number/ plant
  Seed number/ pod
  100-seed weight

Field study - Modeling

Linear Mixed Model by the MIXED procedure in SAS

V2 stage

Y: Shoot weight
Root weight
Shoot : Root

X: Number of *P. penetrans* /100 cm^3 soil at VE (Pi)

Random: Year

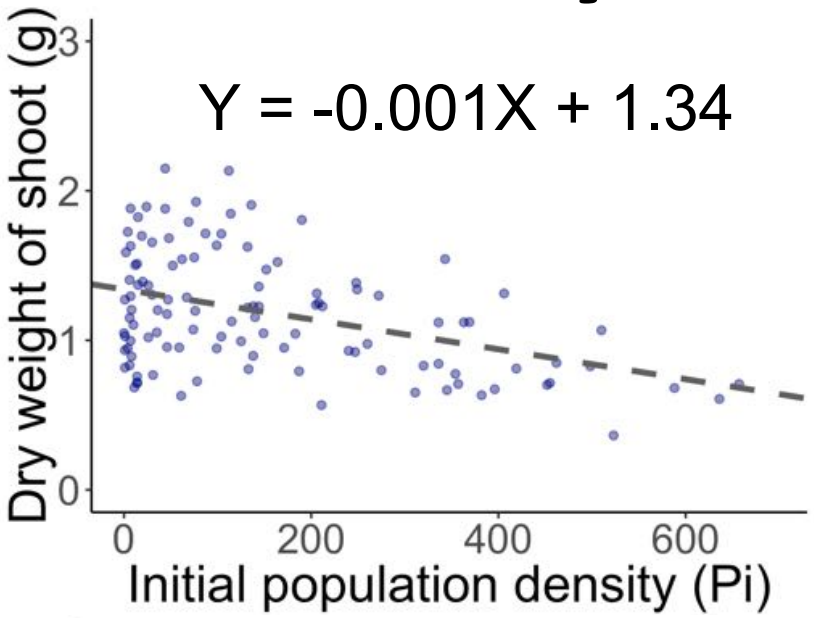
Final maturity

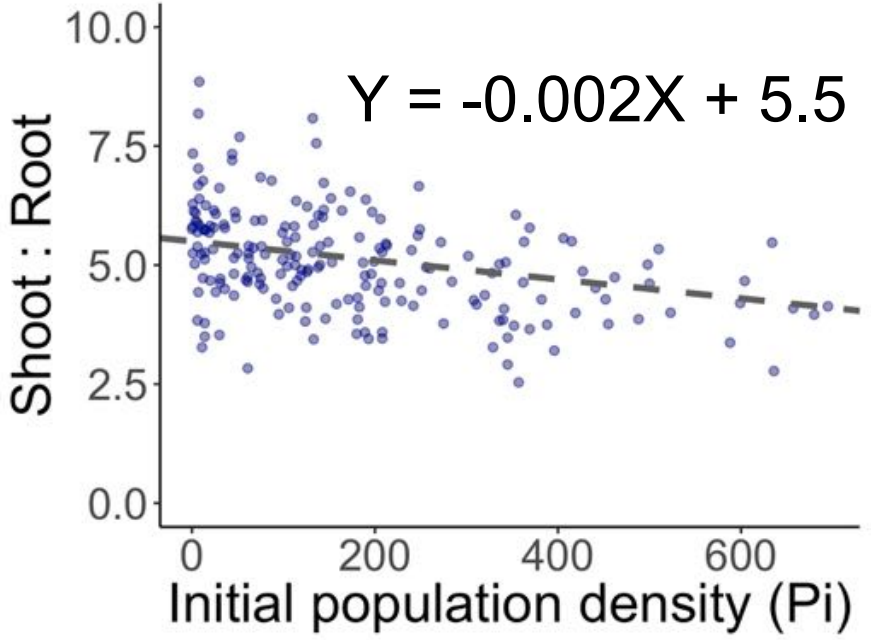
Y: Yield (bu/A)
Pod number/ plant
Seed number/ pod
100-seed weight

X: Number of *P. penetrans* /100 cm^3 soil at VE (Pi)

Random: Year

Field study – Results at Vegetative stage

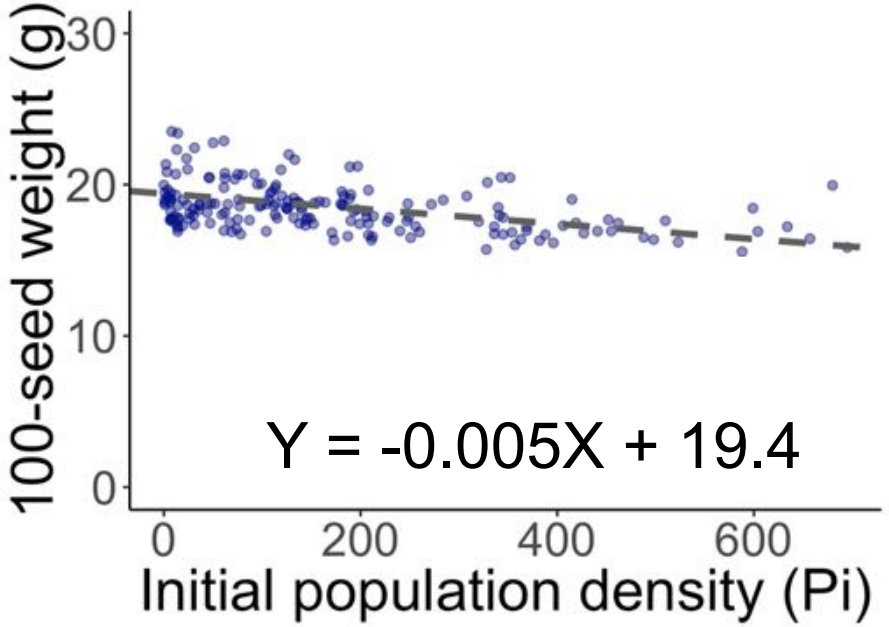


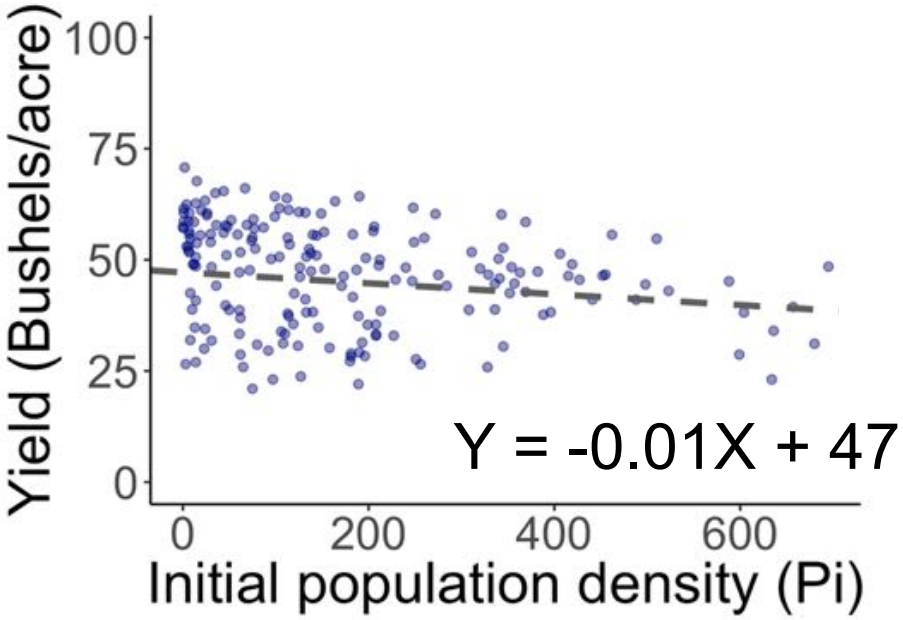


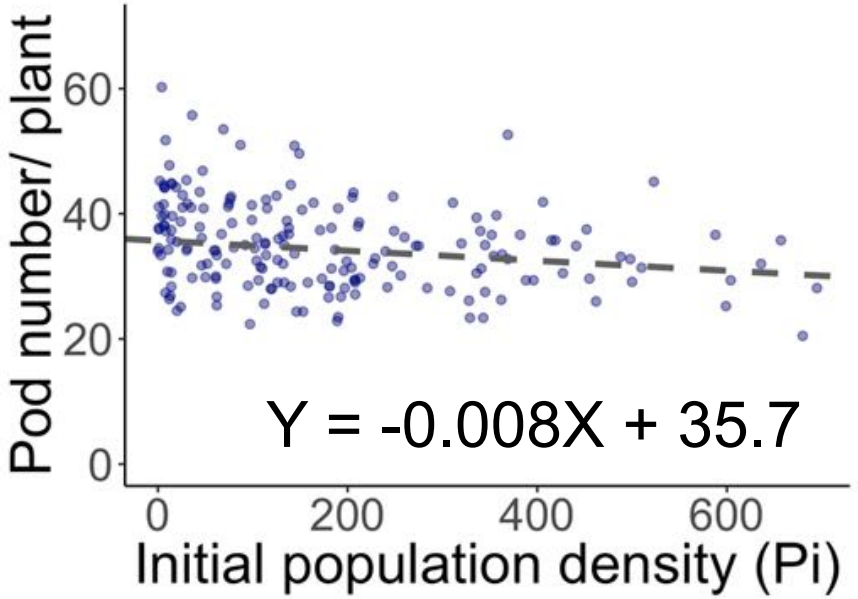
Pi = 201 (3-695) in 2017
Pi = 165 (0-1313) in 2018

Plant Parameter	Estimate	*P*- value
Root weight (g)	-0.00003	NS
Shoot weight (g)	-0.001	< 0.0001
Shoot : Root	-0.002	< 0.0001

Field study – Results at Final maturity



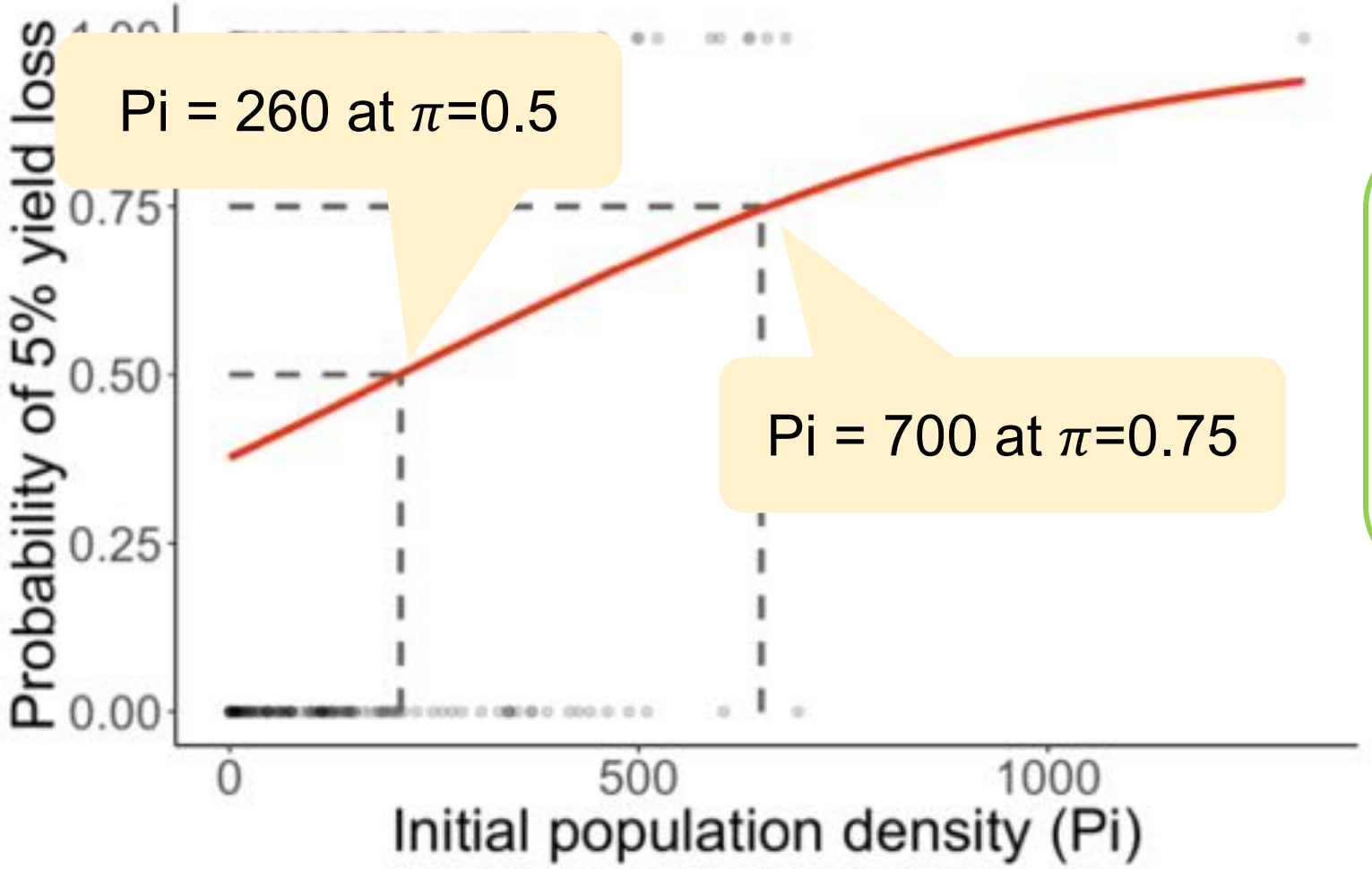




Plant Parameter	Estimate	*P*- value
Yield (bu/A)	-0.011	0.002
Pod number/ plant	-0.008	0.0008
Seed number/ pod	0.00006	0.002
100-seed weight	-0.005	< 0.0001

Field study – Probability of 5% yield loss

Should growers implement nematode management?
What is the probability that the cost of the application is covered?



Logistic regression
Where Y = 1
when yield loss is ≥5%,
otherwise Y = 0

Green house study - Materials and Methods

Inoculum level:
0 , 2000, 4000, 8000, 12000, 16000, 20000
with 8 replications

Cultivar:
Corsoy and P24T05R (Pioneer)

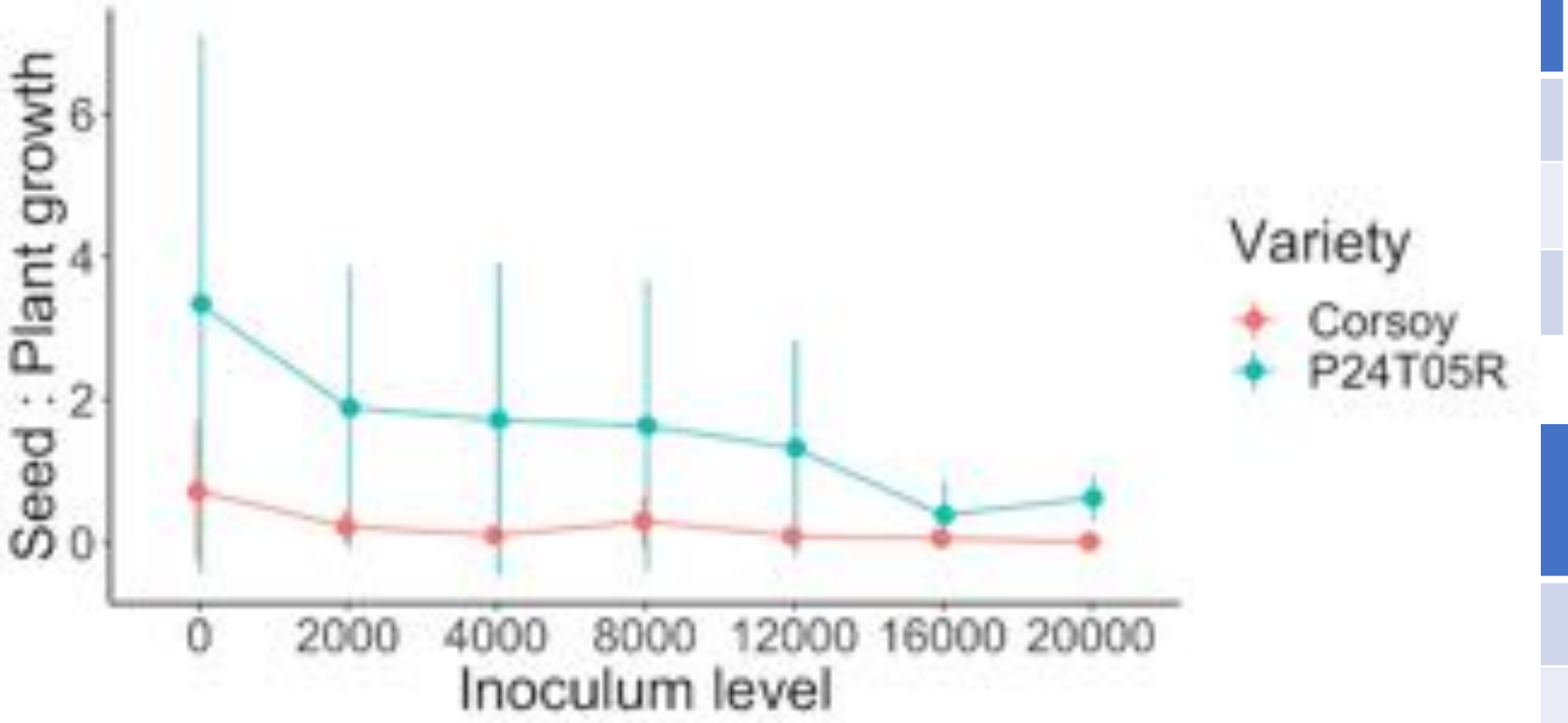
Data:
Weights of shoots and roots at V2 (3 reps)
Weights of shoots and roots at final maturity (5 reps)
Yield and yield components (5 reps)

Data analysis:
Generalized Linear Mixed Model (GLIMMIX procedure in SAS)
Fixed effect – Inoculum level, soybean cultivar, Inoculum level x cultivar
Random effect – Trial, Replication(Trial)

Green house study – Results*

Vegetative stage

Fixed effect	Root	Shoot	Shoot:



Final

	Seed: Plant growth**
Inocu	0.03
Cultiv	< 0.0001
Inoculum level x Cultivar	NS

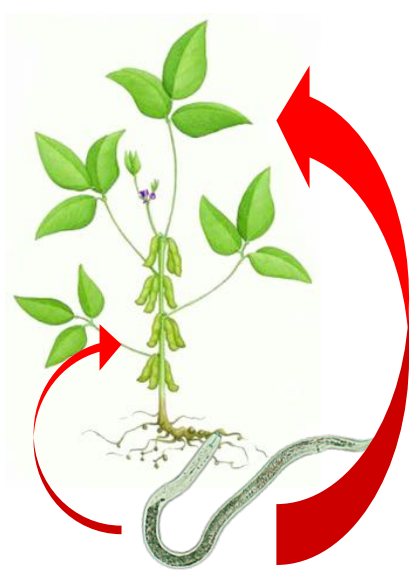
NS	NS	NS	NS

*P-value of F test statistics

**Seed = weight of seeds,
Plant growth = weights of shoots and roots at final maturity

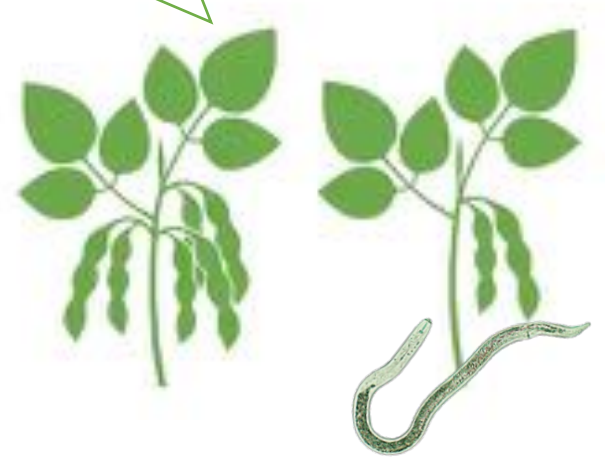
Conclusions

Reduced shoot weight, but maintained root weight.



Manipulated the energy partitioning of plants toward plant growth over reproduction

Reduced pod number



Yield loss

Thank you

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