

Fighting Wireworm with Buckwheat

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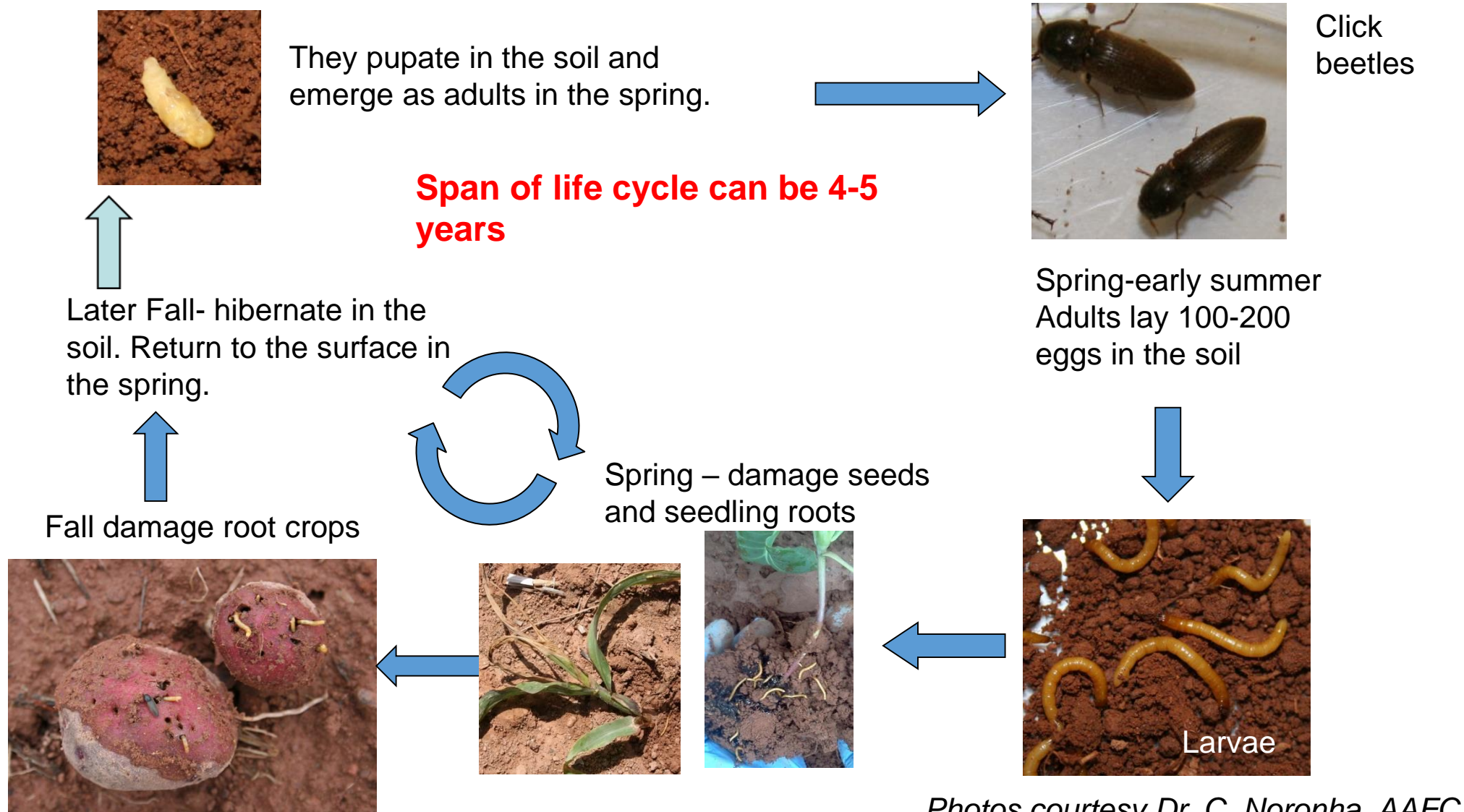


Wireworm in Prince Edward Island

- We've been battling wireworms in PEI for a while now.
- Majority of wireworms in PEI are *Agriotes sputator* (European species)
- More resistant to neonics and other insecticides than native species
- Will survive soil temps as low as -20 C, long life cycle
- Thimet used to be only real option...nasty to use, would often be less effective by Oct.
- With lack of insecticide options and high populations/damage...need to look at additional control options!



Lifecycle of Wireworms



Photos courtesy Dr. C. Noronha, AAFC

Controlling Wireworm with Rotation Crops

- Focus has largely been on two fast-establishing, short-lifecycle crops to reduce wireworm: **Brown Mustard** and **Buckwheat**
- Previous research has shown that brown mustard can reduce multiple diseases and pests through glucosinolates in roots/biomass.
- Researchers found that buckwheat was also helping to reduce damage, but were unsure how!

Controlling Wireworm with Rotation Crops

Table 1. Yield and quality variables for the processing market in a potato crop following a 2 year rotation with brown mustard, buckwheat, barley/clover or alfalfa at Hazelbrook in Prince Edward Island, Canada.

Crops	Total Market yield (t/ha)	Tubers with no Damage (t/ha)	Average Number of Holes per tuber	Tonnes/ha lost due to damage (for Processing) (t/ha)	Tonnes/ha Marketable (for Processing) (t/ha)
Brown Mustard	45.6 a ¹	16.2 a	04 a	0.5 a	45.1 a
Buckwheat	45.9 a	12.6 a	06 a	2.6 a	43.3 a
Barley	47.3 a	2.3 b	20 b	16.8 b	30.5 b

In early PEI trials, mustard and buckwheat were double cropped, with the first crop chopped and incorporated. Proved effective, but costly and lots of soil disturbance.



Controlling Wireworm with Rotation Crops

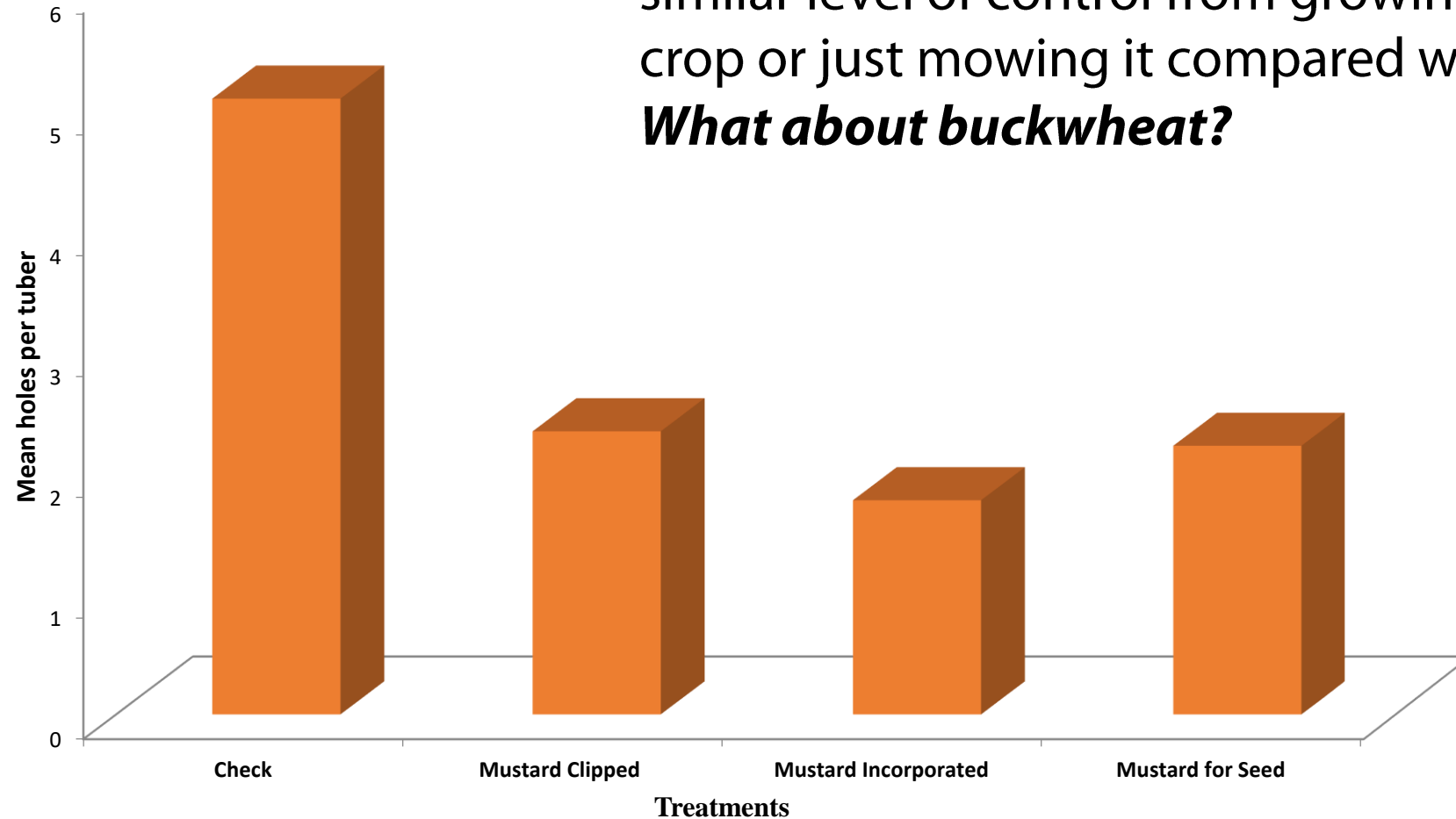
Rotation	Total Yield (cwt/ac)	Market. Yield (cwt/ac)	WW Damage (holes/tuber)
P – W Wheat – Soy	353.7	273.8	2.0
P – BW – BW	420.1	337.1	0.3
P – Mus – Mus	470.0	404.5	0.3
P – Mus – BW	450.7	409.1	0.2
P – Fallow – Fallow	371.4	271.8	0.1
P – Fallow – Mus	387.9	324.8	0.6

Russet Burbank. Graded to Canada #1. AIM Research Trial in 2018

Controlling Wireworm with Rotation Crops

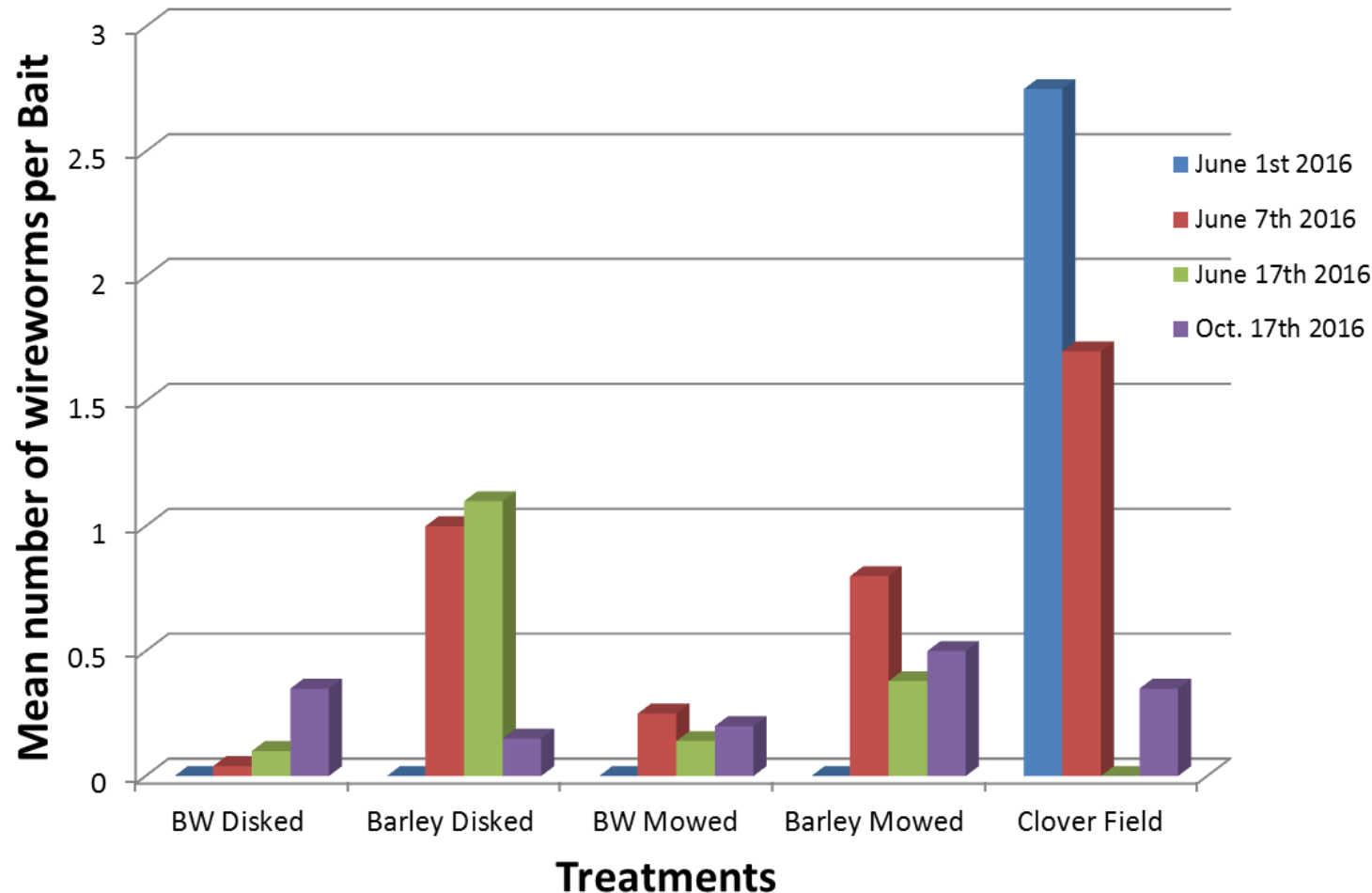
On farm trials with mustard indicated that there was a similar level of control from growing mustard as a cash crop or just mowing it compared with incorporation.

What about buckwheat?



Controlling Wireworm with Rotation Crops

Figure 2: Mean number of wireworms per bait in cabbage after two years of Buckwheat and Barley treatments



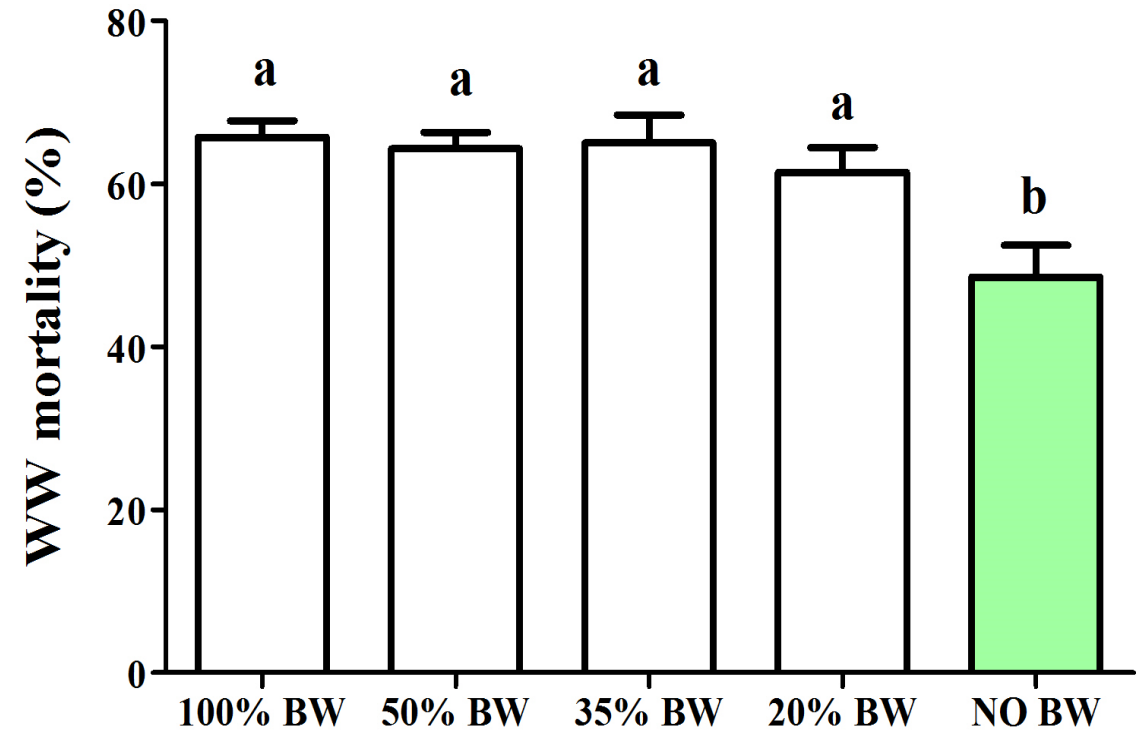
Either mowing or disking buckwheat reduced the number of wireworms found in bait traps, compared with barley or red clover.

C. Noronha, 2016

Does Buckwheat actually kill wireworms?

Treatments	T 1	T 2	T 3	T 4	T 5
Buckwheat	100%	50%	35%	20%	0
Percentage of SF, SSG, RG, and AF	0	12.50%	16.25%	20%	25%
Replicates	7	7	7	7	7
No. of WW	140	140	140	140	140

Cover crop mix: sunflower, sorghum sudangrass, ryegrass & alfalfa with buckwheat

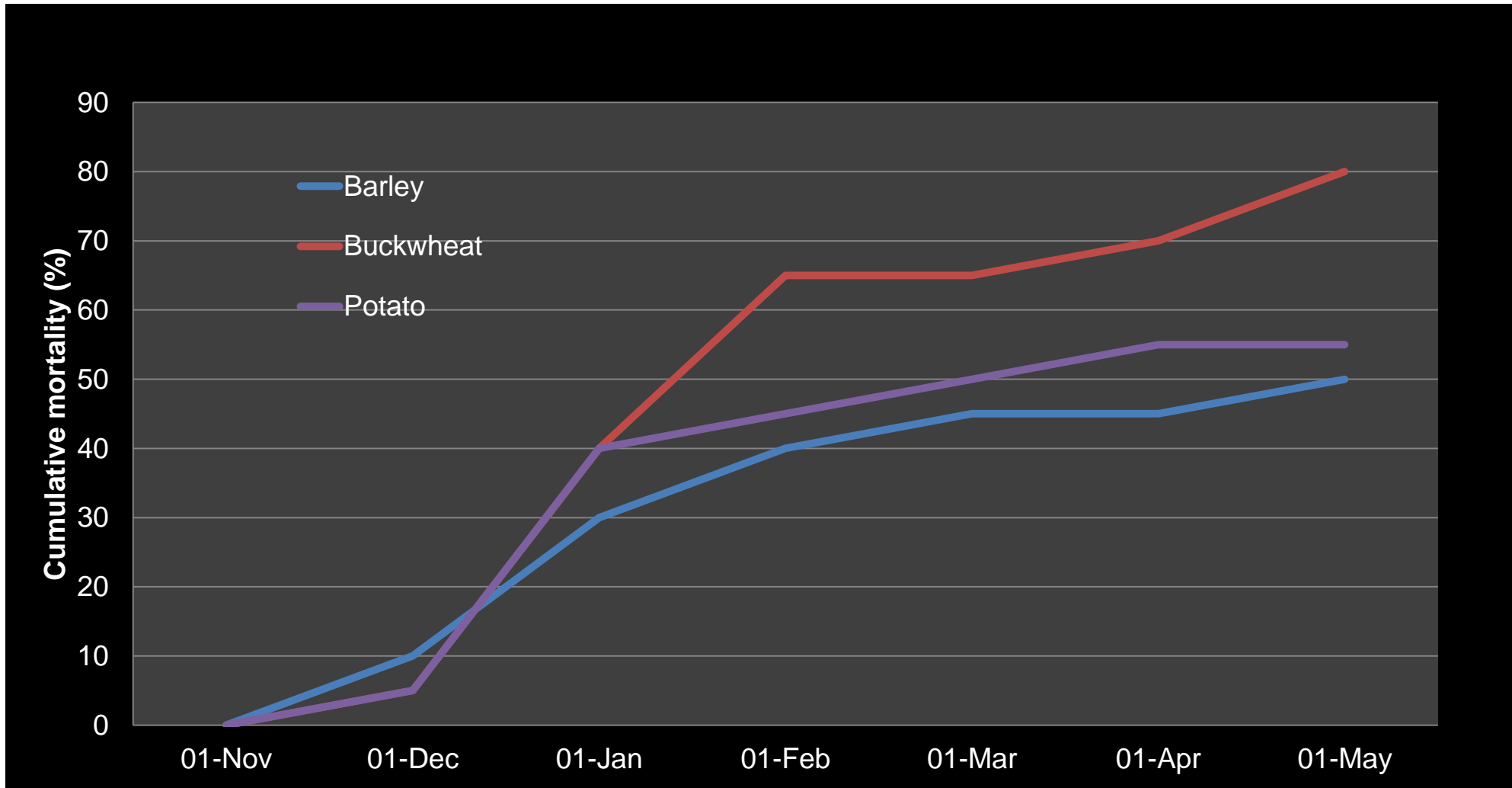


Research by S. Liu and C. Noronha was able to show that they got **similar levels of wireworm mortality with lower levels of buckwheat in a mixture**, down to 20%.

Higher levels of BW in the mix can reduce emergence of some of the other species in the mix.

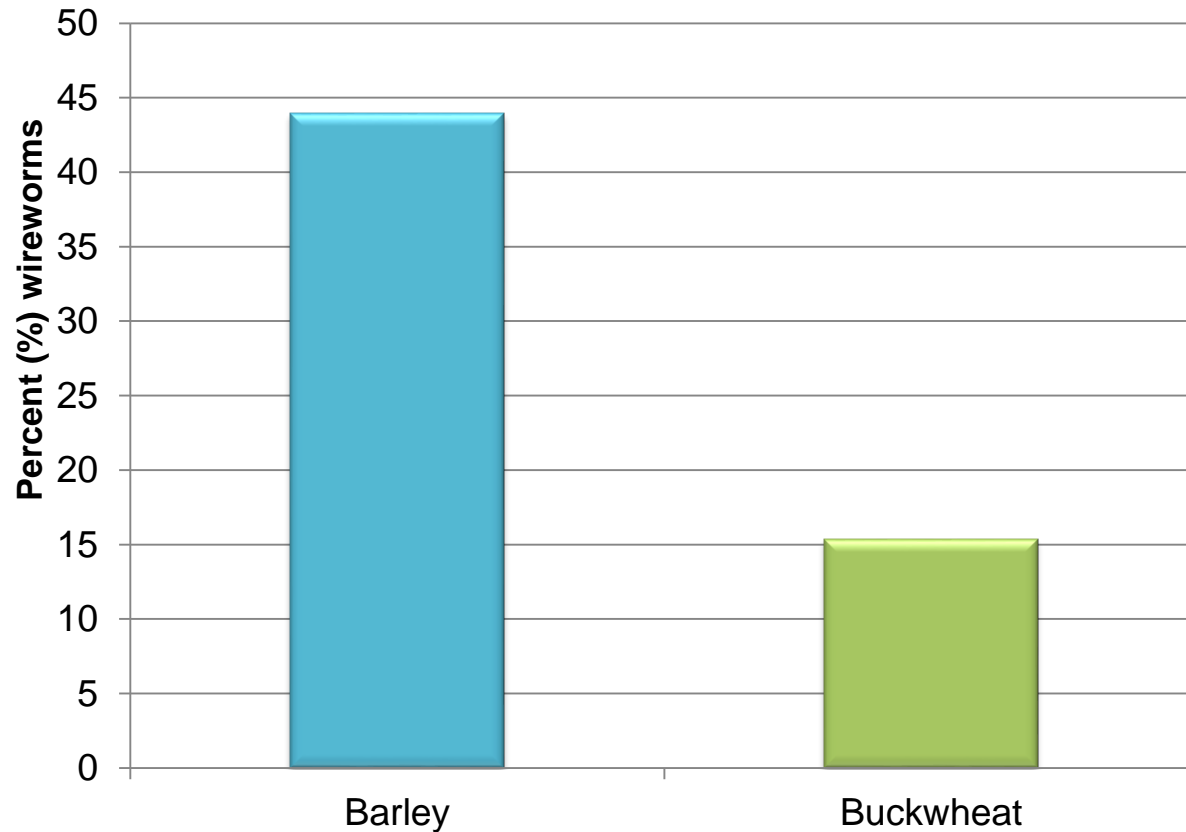
Buckwheat: Actually killing wireworms

Figure: Mortality of wireworms feeding on Barley, Buckwheat and Potatoes roots over 7 months

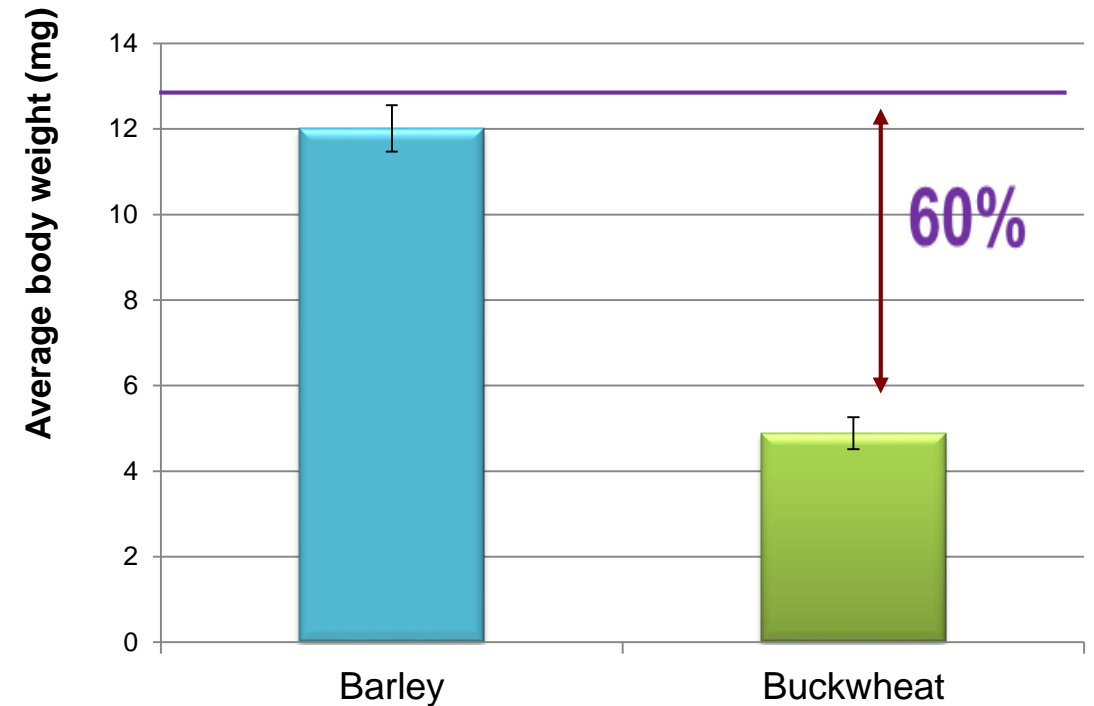


Buckwheat: Actually killing wireworms

Figure: Survival of neonate wireworms after feeding on Barley or Buckwheat roots for four months

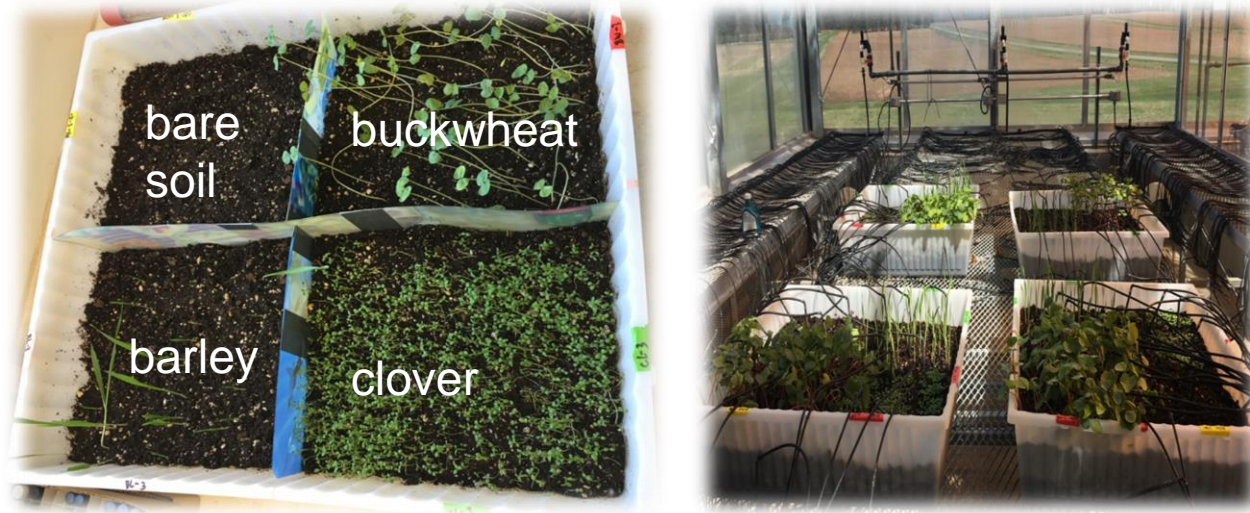


Body weight of wireworm feeding on Barley or Buckwheat roots



Data courtesy Dr. C. Noronha, AAFC

Buckwheat: attracting wireworms to feed

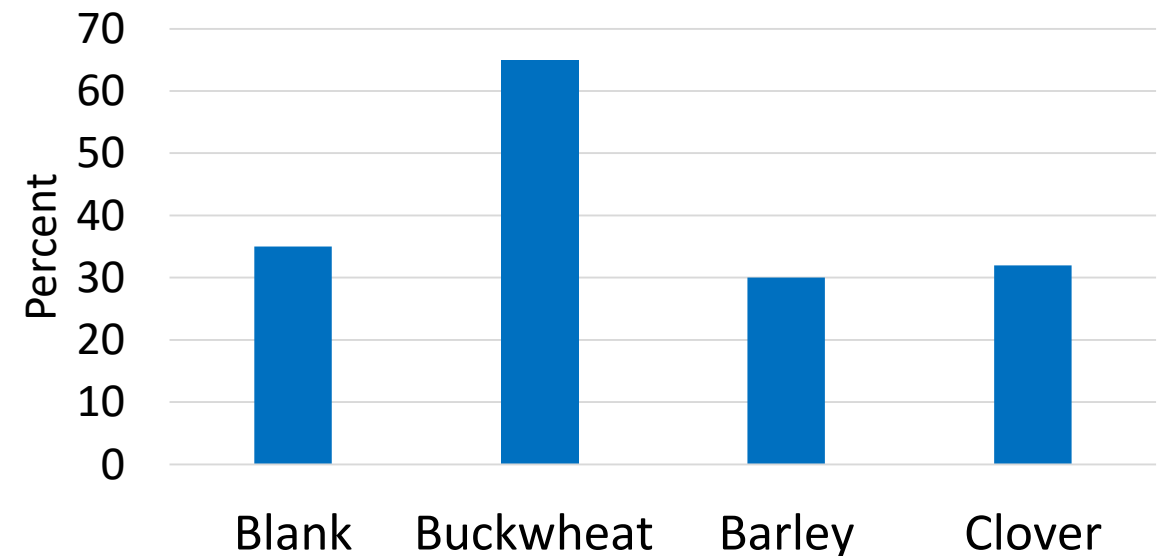


Greenhouse Trial

Plastic Boxes filled with soil were used
Four crops x Four replications. Repeated three times
N = 300 medium sized WWs in total
Soil and wireworm in each crop was collected 3-4 weeks
after wireworm were released

Data & Photos courtesy Dr. C. Noronha, AAFC

Figure: Percentage of wireworms found under each rotation crop in greenhouse trials. N=300



Buckwheat Management:

- Very susceptible to frost, so don't plant under danger of frost is reduced.
- In warm soils, will emerge in just a few days.
- Under PEI growing conditions, buckwheat produced viable seed in 45 days, full seed by 60 days.
- If you don't want volunteers, ensure mowing ahead of seed production.
- Can be grown out to harvest, but higher risk of volunteers.
- BW volunteers in potatoes are not a big yield robber, so a few escapes here and there not a big issue.



Buckwheat Management:

- If planting buckwheat in a mix with other species, try and have them compatible for seed size, maturity, etc.
- Seeding rate: 45-60 lbs/ac (50-65 kg/ha)
- Nitrogen rates are pretty low (~30 lbs/ac or 35 kg/ha) in Southern Ontario
- Has been reported to have an ability to make P more available to resulting crops in low P soils.
- Effective as a weed suppressing crop. PEI growers rave about the quality of the soil tilth following buckwheat.
- White mold susceptible

Includes recommendations from OMAFRA Field Crop Guide



Acknowledgements:

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Thank You!



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