Effect of Cricket Frass Addition on the Growth of Canola (c.v. *Westar*)

John Steadman, Xiaopeng Gao, Roman Song

[1]Department of Soil Science, University of Manitoba, Canada

Prairie Cricket Farms, Miami, Manitoba, Canada

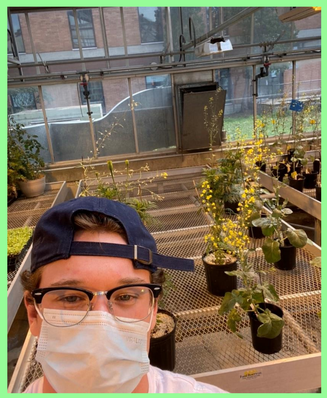
Background:

- Insects, in particular crickets (cricket meal), *Gryllodes Sigillatus*, are being hailed as the animal protein of the future due to their sustainability and environmental friendliness (livestock feed, pet feed, human protein).
- A by-product of this protein production is cricket frass (mixture of insect manure and shed exoskeletons) which has shown promising evidence of being an effective, clean fertilizer.
- A pot study was conducted to test the impact of cricket frass on soil health indicators, as well as growth and seed yield of canola grown under the controlled environmental condition.

Methods:

- Canola (c.v. *Westar*) plants were grown with 4 different rates of frass within the two soils, one with a high (R) level and one with a low (G) level of organic matter, over 82 days.
- These rates were 0% mix (control), 2.5% mix, 5% mix, and 7.5% mix (percentages based on soil volume). All treatments were arranged in a randomized complete block design (RCBD) with 4 replicates.
- Yield was measured in dry seed weight, and soil and plant material were analyzed for nutrient content.,
- All pots were watered daily to maintain soil water content at optimal level for crop growth. Pots were kept in the University of Manitoba's temperature-controlled greenhouse.

Seed yield being weighed



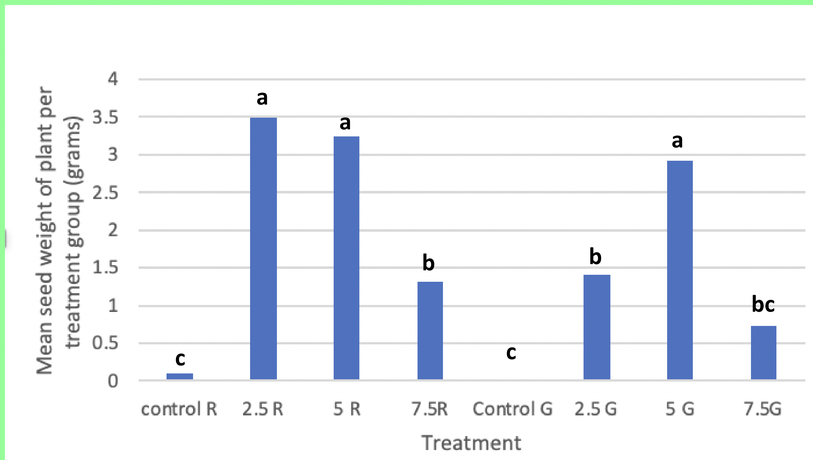
Canola being grown in GH

Raw frass before mix with soil

This project was funded by a NRC CtO (Contribution to Organizations) program. If you have questions, please contact: steadma1@myumanitoba.ca or xiaopeng.gao@umanitoba.ca

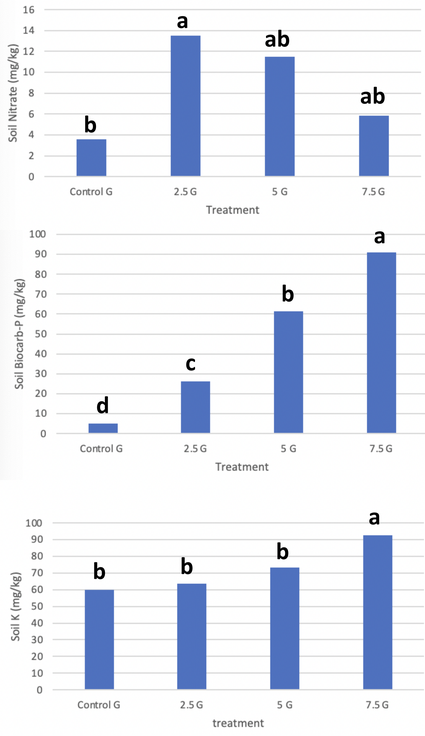
Results and Discussion:

- Canola seed yield was significantly greater in plants treated with frass, especially the 2.5% and 5% mix. Control groups showed almost no yield.
- Soil nitrate showed a significant increase at 2.5% (~2.8 times) and 5% (~2.2 times) levels, while seeing a smaller increase in the 7.5% (~55%) level, compared to control.
- Soil K displayed an increasing trend, with a gradual increase from control to 7.5% level.
- Soil Olsen-P showed an interesting consistent increase from control to 7.5 as well.
- Nutrient analysis in above ground plant tissue was recorded and found promising increases in N, P, S and Mn at 5% and 7.5% mix rates.



Nutrient analysis in above-ground plant tissue

	TKN	P	K	S	Mg	Ca	Fe	Mn	Cu	Zn	B
	----------%----------						----------ppm----------				
Soil R											
Control	0.76	0.26	1.88	0.37	0.27	1.00	143	3.0	3.6	45.6	21.4
2.5	0.78	0.25	2.15	0.68	0.32	1.30	46	4.0	2.8	49.5	27.0
5	1.40	0.37	2.43	0.81	0.36	1.07	61	10.1	4.2	52.0	25.7
7.5	2.14	0.48	2.65	0.83	0.34	0.86	57	17.7	4.0	55.9	25.5
Soil G											
Control	1.13	0.24	1.85	0.56	0.36	2.00	137	11.7	4.5	47.8	34.3
2.5	1.07	0.29	2.13	0.67	0.26	1.53	101	6.5	3.6	28.7	31.0
5	1.35	0.31	2.01	0.79	0.23	1.33	151	23.4	3.7	94.6	32.3
7.5	1.96	0.36	1.97	0.79	0.26	1.15	193	34.1	4.0	43.0	27.2
ANOVA											
Soil type (S)	0.315	0.253	**0.045**	0.640	**0.031**	**<0.001**	**<0.001**	**0.009**	0.533	0.852	**0.036**
Frass rate (F)	**<0.001**	**0.006**	0.135	**0.004**	0.890	**0.005**	0.054	**0.001**	0.425	0.363	0.885
S x F	0.207	0.374	0.219	0.581	**0.012**	**0.040**	0.055	0.510	0.663	0.396	0.603



Different letters in figures indicate significant difference at $p<0.05$.

Implications:

1) This study shows that the use of frass as a fertilizer is effective to improve soil nutrient availability and canola productivity.
2) Frass is produced in a sustainable and environmentally friendly manner, while being a chemical free, clean, organic fertilizer. There is a bright future for frass in the upcoming age of clean agriculture.