



vineland
RESEARCH & INNOVATION CENTRE



Changing production practices to increase plant health and production efficiency in floriculture crops

Rose Buitenhuis



Researchers

Sarah Jandricic,
OMAFRA



Chevonne Carlow,
OMAFRA



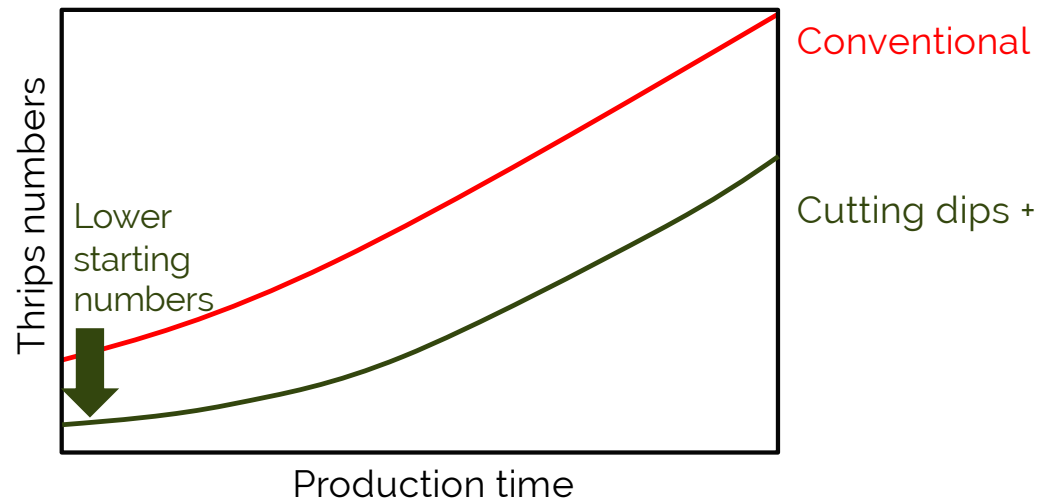
Rose Buitenhuis,
Vineland



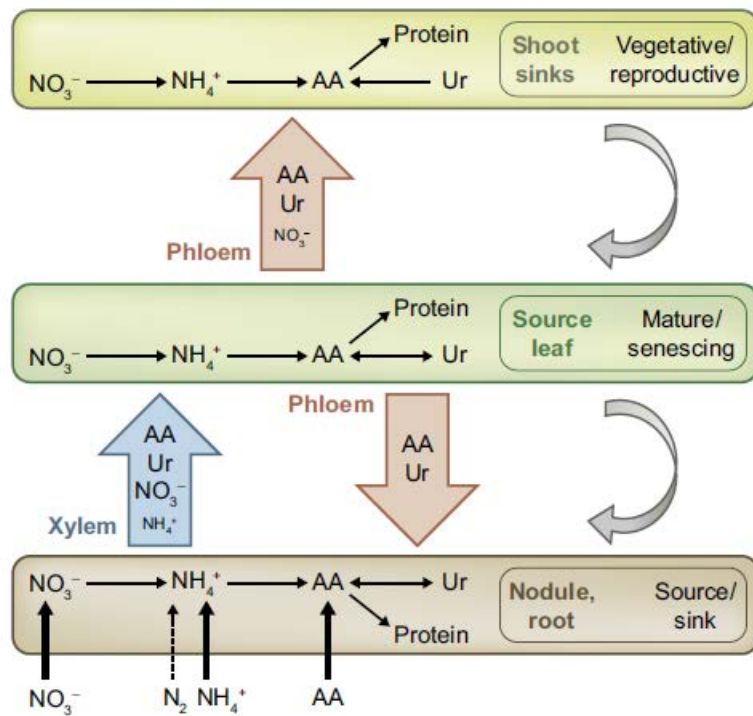
Early intervention points

Dip cuttings (objective 1)

- Knock down pest populations
- Win time for bios to start working

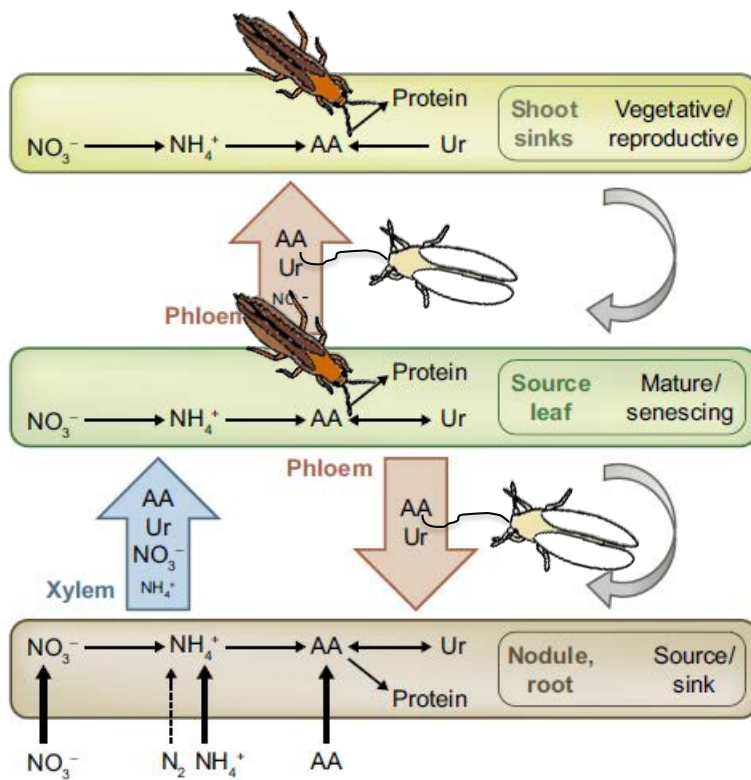


Plant nutrition and pests



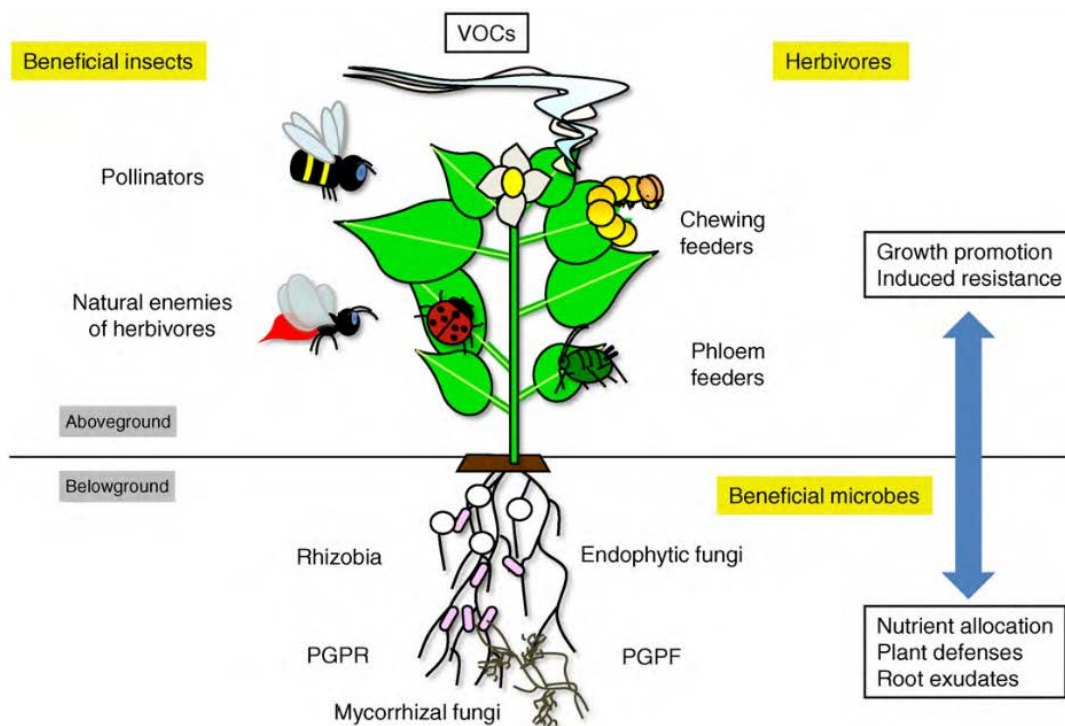
- N taken up in roots as NO_3^- and NH_4^+
- N transport mainly as amino acids
- N storage as inorganic (NO_3^- and NH_4^+) and organic (amino acids and proteins)

Plant nutrition and pests



- Nutritional value of a plant for pests in part determined by organic N
- Floriculture crops often over-fertilized
- Reduce fertilizer -> slow down pest population increase -> better biocontrol performance

Role of biostimulants



- Beneficial bacteria, fungi or extracts
- Help plants deal with reduced nutrients
- Induced plant defences against pests

Figure from: Pineda et al., 2010. Trends in Plant Science 15: 507-514

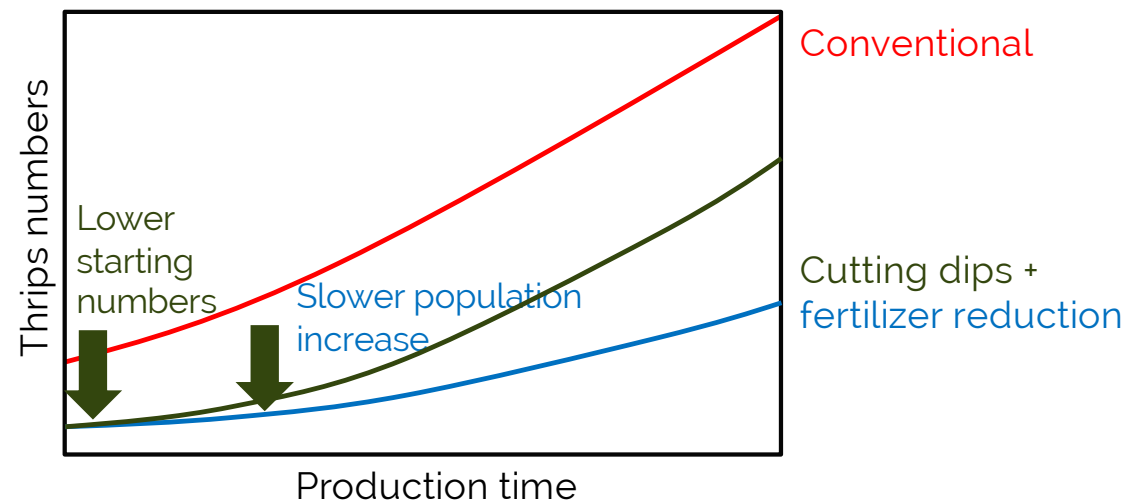
Early intervention points

Dip cuttings (objective 1)

- Knock down pest populations
- Win time for bios to start working

Optimize plant nutrition (objective 2)

- Reduce pest population growth
- Residual populations managed by bios





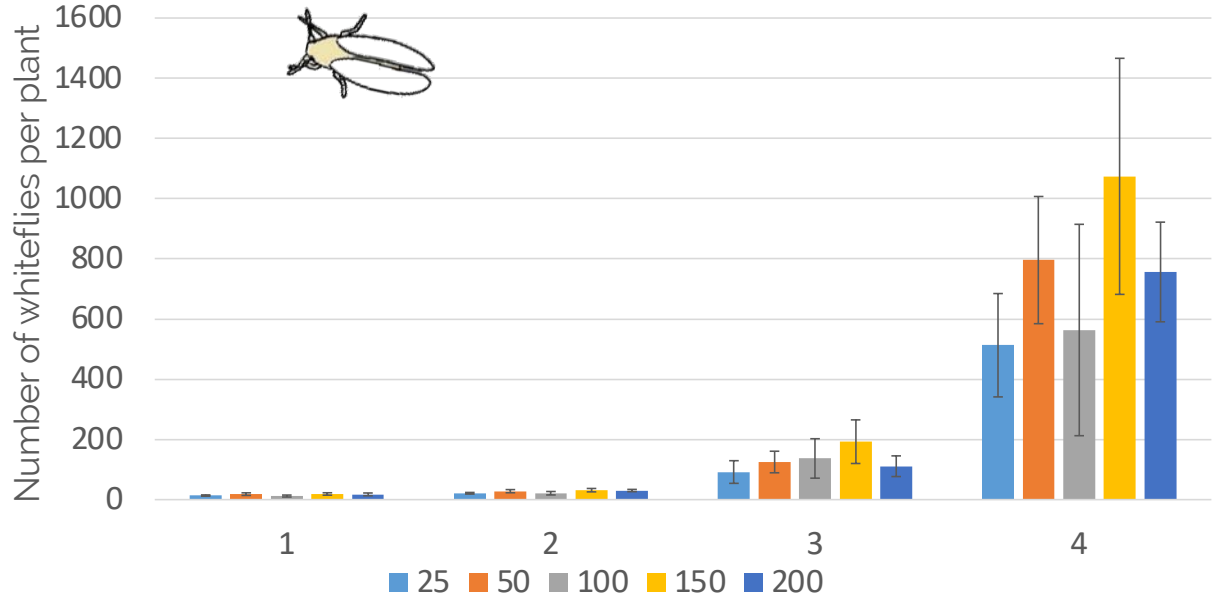
Objective 2 – Fertilizer optimization

- a. Optimize nutrient inputs and biostimulant amendments to reduce the risk of pest outbreaks while maintaining plant health and quality for two major floriculture crops (gerbera and chrysanthemum);
- b. Quantify effects of reduced nutrients and/or biostimulants on biocontrol efficiency.



Effect on whitefly populations

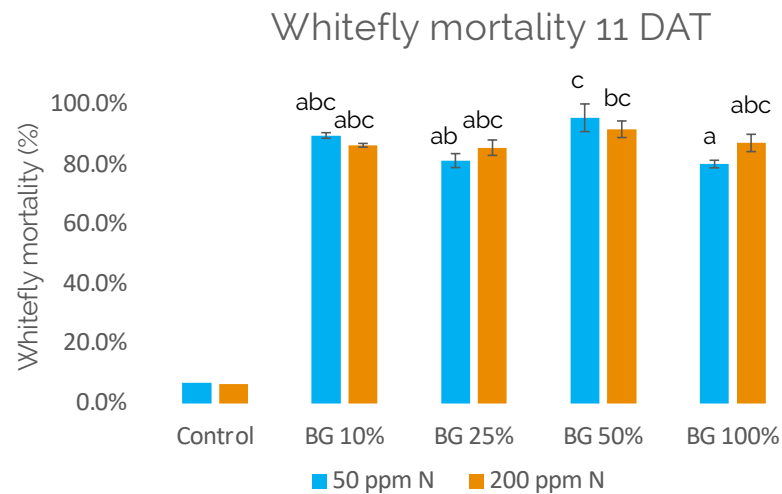
- Sap analysis confirmed increasing levels of organic N in plants
- Plant quality affected around 100 ppm
- Whitefly populations increased over time
- No significant effect of fertilizer treatment of the plants



	F-value	df	P-value
Treatment	0.99	4, 54	0.4184
Time	136.11	3, 165	<0.0001
Treatment*Time	0.63	12, 165	0.8137

Effect on whitefly biocontrol

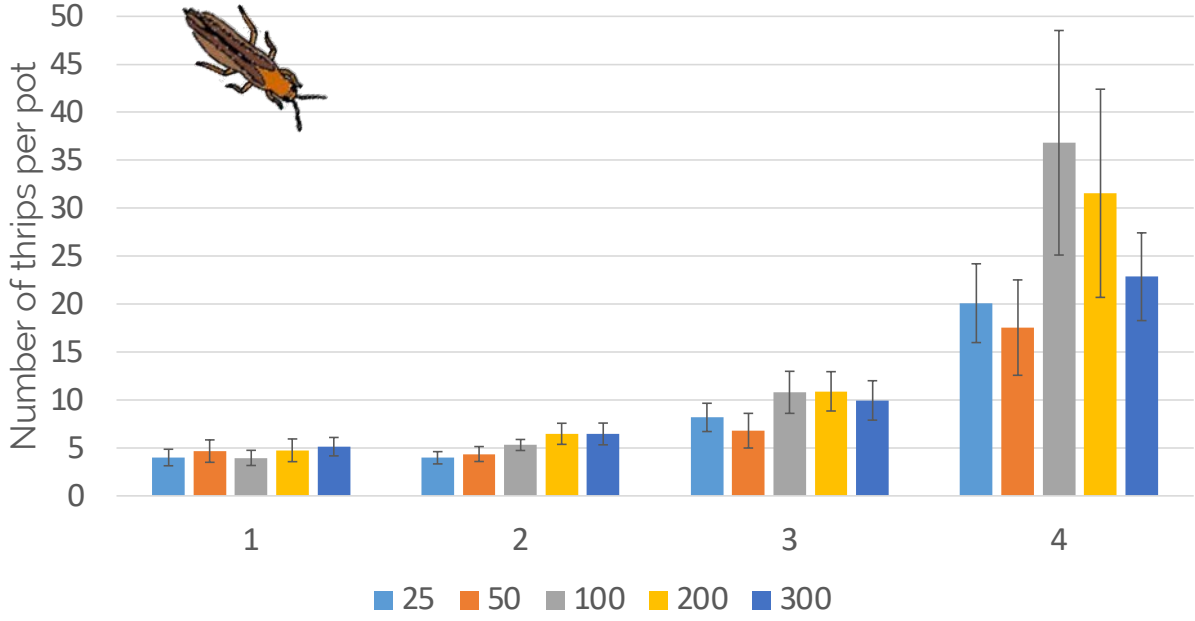
- Whitefly: 2nd to 3rd instar nymphs
- Fertilizer: 50 ppm vs 200 ppm of N
- Biocontrol: BotaniGard WP at 100%, 50%, 25% and 10% of recommended rate
- No effect of reduced N on whitefly susceptibility to entomopathogenic fungi





Effect on thrips populations

- Sap analysis confirmed increasing levels of organic N in plants
- Plant quality affected around 100 ppm
- Thrips populations increased over time
- Marginal (?) effect of fertilizer treatment of the plants



	F-value	df	P-value
Treatment	2.10	4, 81	0.0889
Time	103.06	3, 179	<0.0001
Treatment*Time	0.43	12, 179	0.9508

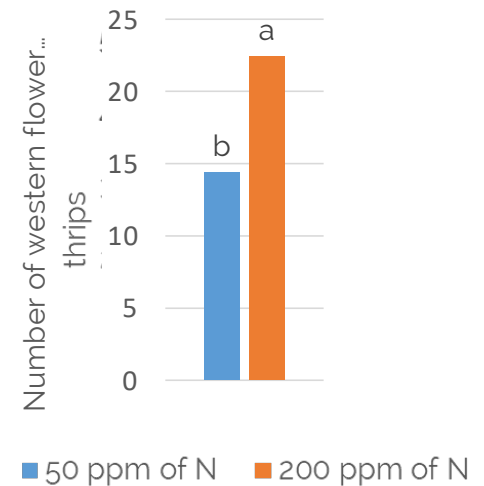
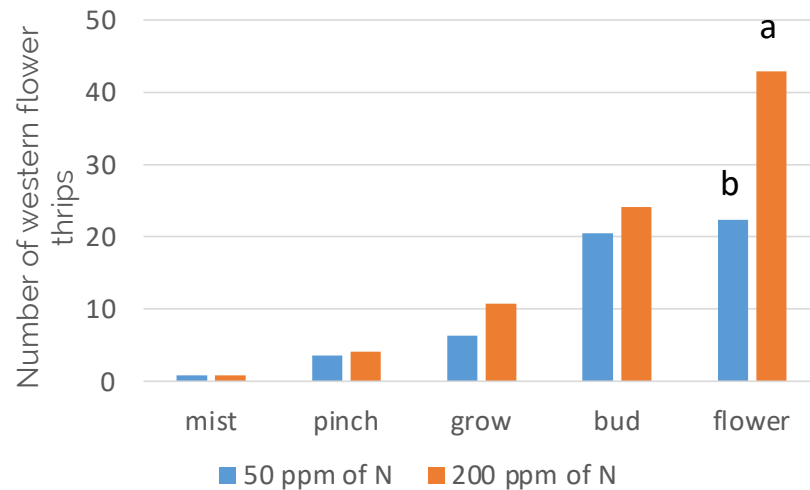
Biostimulants – plant quality

- Confirmed colonization of plant roots
- Some effect of biostimulant on root length
- Selected biostimulants did not compensate for low fertilizer treatment.
- Effects on plant quality only due to high and low fertilizer
 - High fertilizer (200 ppm of N) – more dense foliage, higher foliage mass, more flowers
 - Low fertilizer (50 ppm of N) – increased root length and root mass



Biostimulants – thrips populations


- No effect of biostimulants at low or high fertilizer
- Some effect of low vs high fertilizer on thrips populations





Conclusions

- Whiteflies on potted gerbera
 - No effect on whitefly population within the time frame of a crop cycle
 - No effect on whitefly susceptibility to biopesticide
- Thrips on potted chrysanthemum
 - Possible effect (TREND ONLY) of plant nutrition on thrips populations (up to 50%)
 - Combined effect of reduced plant nutrition and biocontrol?
- Next step: lab studies to measure life history parameters in a more controlled environment, on different cultivars
- Unknown what is happening in the plant (metabolites)
- This study varies complete fertilizer rate. Different results when changing individual nutrients?



Objective 3 – Validation

Validate the effectiveness of the systems approach by growing two crops from start to finish in commercial greenhouses in ON and QC, incorporating best practices from objectives 1 and 2.

- Compare to conventional growing practices
- Assess shelf life
- Cost-benefit analysis



Objective 4 - KTT

2020-2021

Presentations

- Buitenhuis, R. and Summerfield A., 2020. Greenhouse IPM research update. Green Industry Show, webinar.
- Buitenhuis, R., 2020. The opportunity for use of biological controls. VIII International Symposium on Floriculture (SIFLOR), Colombia, webinar (repeated for American Floral Endowment webinar series).
- Buitenhuis, R. and Jandricic, S., 2020. The biology and management of western flower thrips. Webinar for CropTalk Media.

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- Vineland greenhouse staff



Thank you



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