Trap Crops and Insectary Plants for Pest Management in Brassicaceae family

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Trap crops

- Herbivores prefers specific plant species, variety or plant stage for either oviposition or feeding
- Relatively attractive and ability to retain the pests as determined by the plant chemistry
- Levels of glucosinolates or isothyocianates/ aggregate pheromones
- Trap cropping is a simple, reliable and economic pest management option, when it works

Border trap cropping

Trap crops

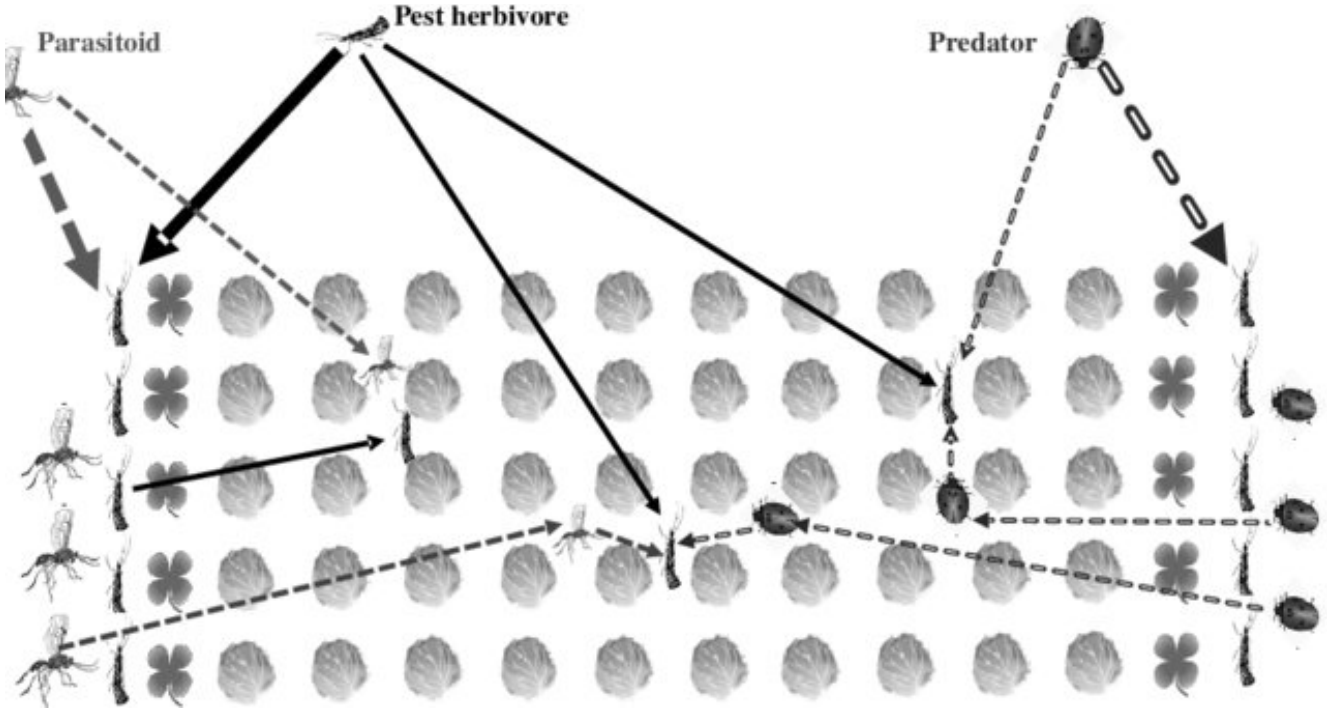
- But sometimes can be complex
  - pest retention is difficult
  - Spill over effect
  - Complex when multiple pests occur

- Pests congregated in the trap crops needed to be killed – supplementary pests management method
  - development of dead-end trap cropping
  - Trap crops supplemented with insecticide application
  - Trap crops that assist biological control of pests
  - Insectary plants

Yellow Rocket, a dead end trap crop for DBM

Trap crops + Insectary plants

- Once pests congregated on the trap crops, natural enemies get activated
- Using trap plants that supports natural enemies or integrating Insectary plants with trap crops can enhance natural enemies and kill pest insects on trap crops



Crucifer Pests

Caterpillars:

- Cabbage looper (CL), *Trichoplusia ni*
- Imported cabbageworm (ICW), *Pieris rapae*
- Diamondback moth (DBM), *Plutella xylostella*

Stink bugs:

- Harlequin Bug, *Murgantia histrionica*

Cabbage looper

Cabbage butterfly

Diamondback moth

Harlequin bug

Objectives

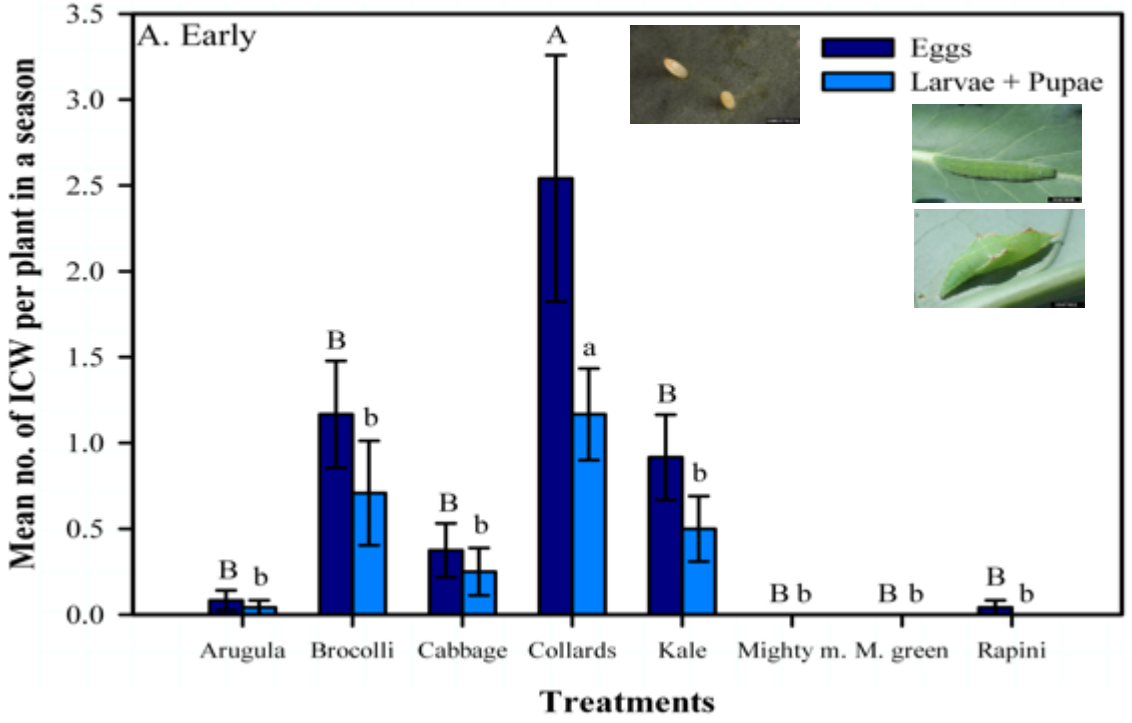
- Evaluate attractiveness of trap plant species to the key pests of Brassicas
- Develop a trap cropping system (e.g., a mixture of trap crops) that could suppress multiple pest species and minimize damage on the cabbage crop

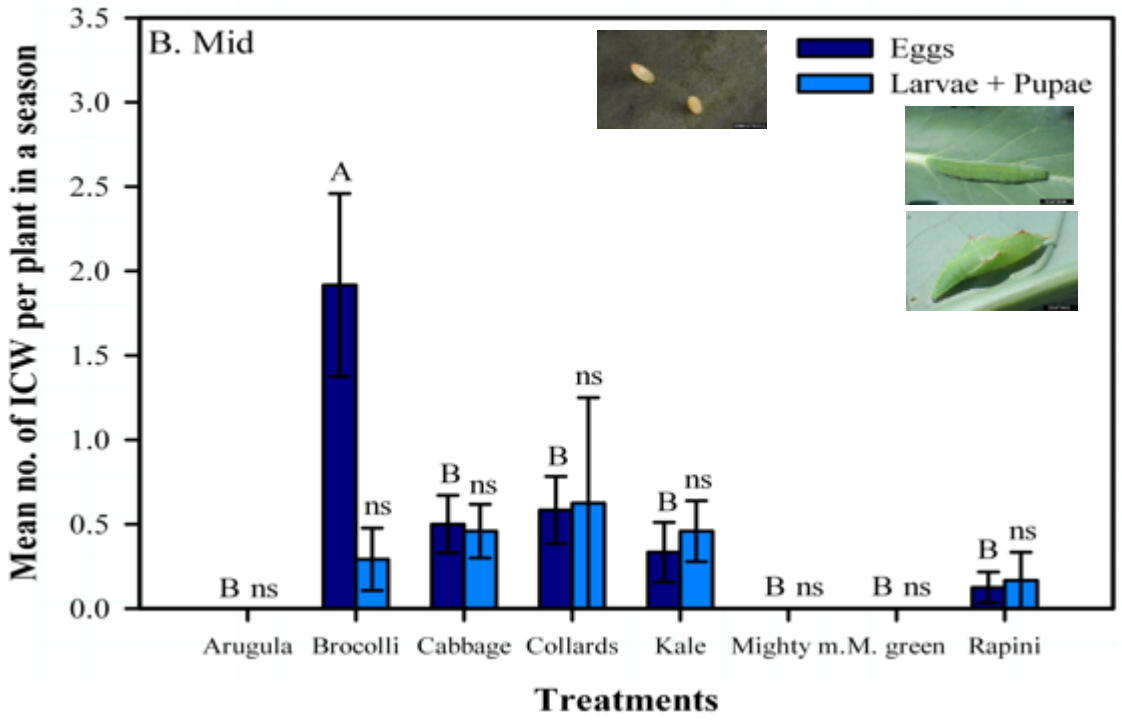
The field trials were conducted at the Lincoln University's Organic research Farm at Jefferson city (Missouri) in the year 2014 and 2015

Methods – Potted plant trials

- Attractiveness of eight brassica plants: arugula, broccoli, cabbage collards, kale,, mighty mustard, mustard greens and rapini
- Three field trials were conducted: early (April-May), mid (June-July) and late (August-Sept) field trials in the year 2014
- The potted trap plants were exposed to a natural population of insect pests
- The numbers of eggs, larvae, pupae (whenever applicable) counted weekly for ICW, CL, DBM and harlequin bug at weekly intervals

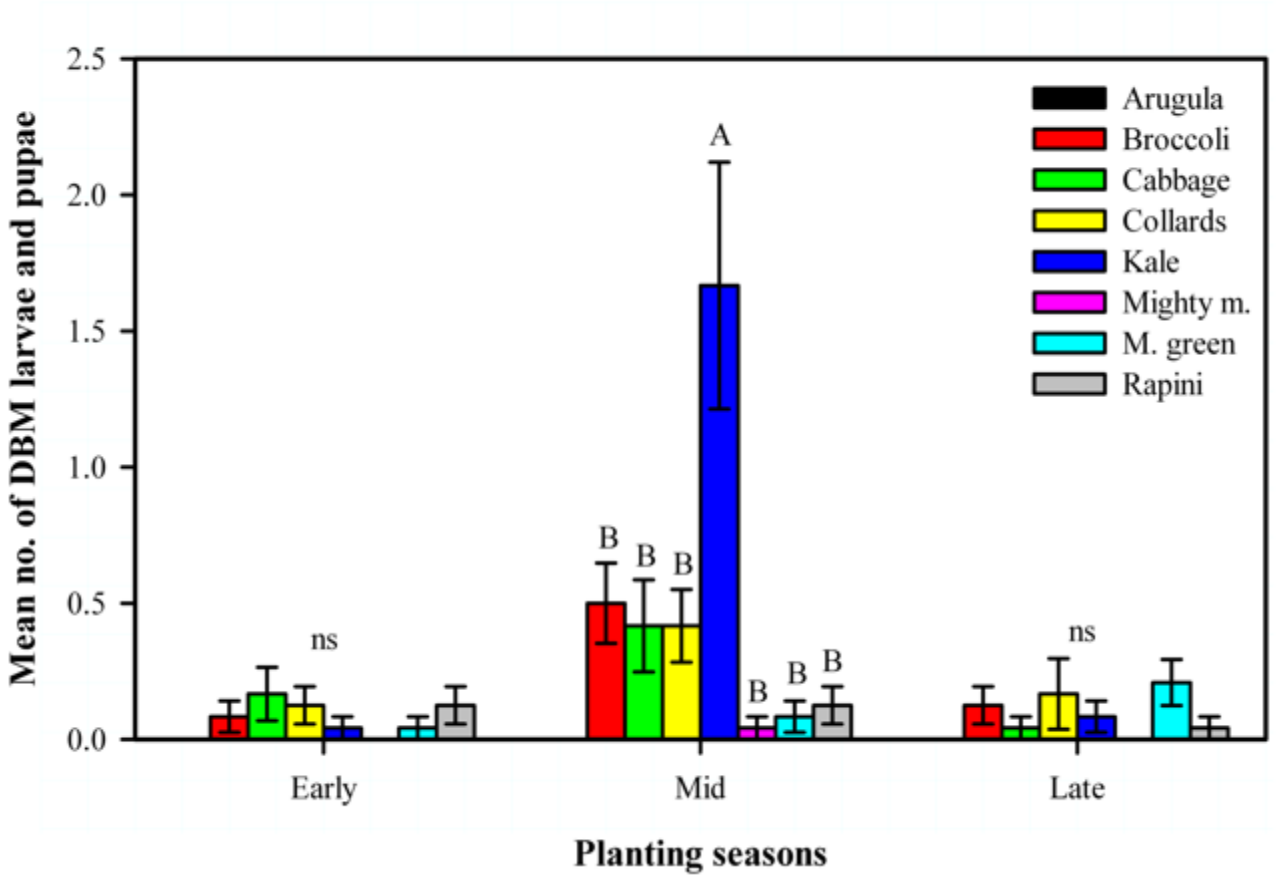
Results- Potted plant trials





- The abundance ICW eggs was significant greater on collards than other trap plants in early season

Results- Potted Plant Trials (cont.)



- The abundance of DBM immature stages was significantly greater kale than other trap plants in the mid season trial

Discussion – Potted plant trials

Collards

Kale

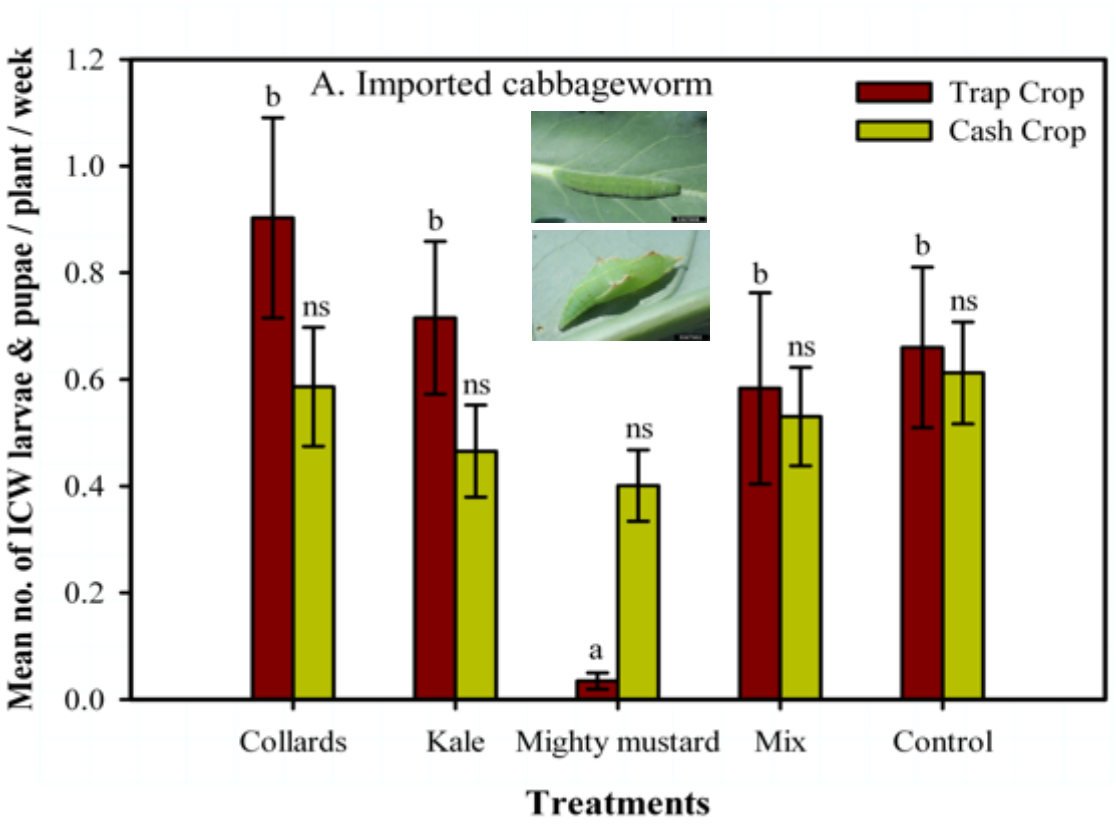
Mighty mustard

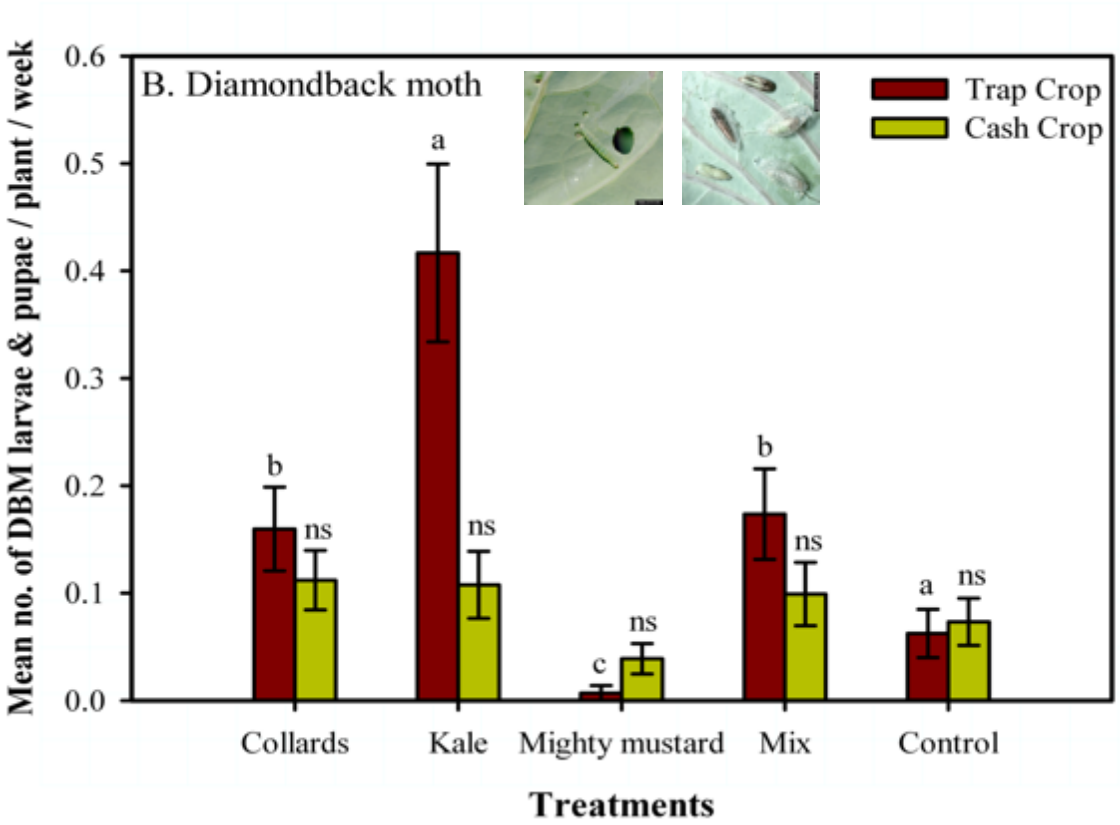
- **Collards** is attractive to ICW and CL and **Kale** is attractive to DBM
- **Mighty mustard** is attractive to harlequin bug, hosts aphid species that is generally being parasitized
- Formulate **a trap crop mixture** that could suppress multiple pest species and enhance biological control agents

Methods – A field trial

- 10% trap cropping (2 perimeter rows of trap crops + 8 rows of main crop – cabbage)
- Trap cropping treatments: (1) collard, (2) kale, (3) mighty mustard, (4) mix – a mixture of collards, kale and mighty mustard, and (5) control
- Observations for key pests pests of were taken both on trap crops and the cabbage

Results- A field trial





- Significantly more abundance of caterpillar pests on the trap crops, however pest abundance did not different on the cabbage cash crop

Discussion – A field trial

- This trial was conducted early in the season, when the population densities of insect pests were low
- Mighty mustard was not attractive to caterpillar pests, so the pooled effect of trap crop mixture was underestimated
- It is difficult to measure the effect of natural enemies on the resultant pest densities

Conclusion

- A new trap cropping system – a mixture of trap crop plants along with insectary plant can be a novel technique
- Further research is needed to document the benefits of such trap cropping system
- A pest management option for the Organic farming

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