Management of Diamondback Moth using Trap Crops and Nematode as a Biocontrol Agent

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Diamondback Moth (DBM)

- 20-40% or up to 100% yield loss
- 17-20 generations/yr in HI
- Resistant to Bt, spinosad, pyrethrin, organophosphate, carbamate, organochlorine insecticides
- Cryptic behavior during early stages unreachable by contact insecticides
Trap crop

• Crops that attract, retain, or intercept pests to reduce damage on the cash crop.

JC = ‘Joy Choi’ pak choi
KC = kai choi,
KK = head cabbage
Kale = Curly kale
MC = ‘Mei Qing’ pak choi
Entomopathogenic Nematodes (EPN)

• Insect killing nematodes
• Infect the insect host through body openings (spiracles, mouth, anus or intersegmental membranes)
• Sensitive to UV light and desiccation
• Quarantine restriction on import of commercial EPN

• An indigenous EPN isolated from Waikapu, Maui, *Steinernema feltiae* MG-14 caused 80% mortality on DBM in the laboratory.
Trap Crop & EPN on Curly Kale

2 × 2 (Trap Crop × EPN spray)
4 replications

Trap crop = Kai Choi
EPN = 53 millions IJs/ha (500/plant) + OROBOOST (Registered Material for Organic Agriculture spreader sticker)
One foliar spray/trial
Trial repeated once

Data (over 5 weeks)
DBM counts, % leaf damage
Kale yield
Trap Crop & EPN on Curly Kale

- Trap crop reduced DBM numbers and leaf damage over 5 weeks of observation in Trial I but not in Trial II.
Trap Crop & EPN on Curly Kale

- EPN only suppressed DBM in Trial II but not in Trial I (DBM pressure too high).
- Trap crop reduced kale yield in Trial I but no effect in Trial II.
Trap Crop & EPN on Head Cabbage

1000 IJs/plant (MG14, 106 mil IJs/ha)
• DBM prefers to feed on kai choi due to its higher glucosinolate content than head cabbage or kale.
• Even though DBM likes to roost on head cabbage or kale.
Take Home Message

• Planting kai choi (trap crop) in close proximity to head cabbage or kale consistently reduced DBM damage on the cash crop.
• Close planting of trap crop with cash crop would compromise crop yield.
• EPN was effective when DBM pressure was < 0.2 DBM/plant but not when DBM pressure was high.
• Future research should examine further planting distance of trap crops from the cash crop.
• EPN foliar application should be applied before DBM pressure is high.
• Collaborative farmers all agreed that their Bt and Spinosad control ICW effectively.
• Trap cropping and EPN add additional tools for farmers to manage DBM.

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