Monitoring and Management Strategies for the Cucumber Moth *Diaphania indica* (Lepidoptera: Crambidae) in Selected Cucurbit Crops in Florida

Ihsan Nurkomar[1,2], Muhammad Haseeb[2], Jesusa C. Legaspi[3]

[1] Department of Agrotechnology, Universitas Muhammadiyah Yogyakarta. Yogyakarta, Indonesia 55183 - ihsan.nurkomar@famu.edu

[2] Center for Biological Control, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, Florida 32307, USA

[3] USDA-Agricultural Research Service-Center for Medical, Agricultural, and Veterinary Entomology, Tallahassee, Florida 32308, USA

ABSTRACT

The cucumber moth *Diaphania indica* (Lepidoptera: Crambidae) is a serious insect pest of cucurbit crops in Florida. A study to monitor infestation level and to develop an automatic monitoring systems for cucumber moth *D. indica* was carried out in the fall 2022 in Florida panhandle center. The highest infestation level was found on winter squash, and the most potential natural enemy is *Apanteles* sp. Automatic monitoring is a new monitoring strategy to detect and monitor pest attack and yield loss economically important crops accurately.

INTRODUCTION

The cucumber moth *Diaphania indica* is an occasionally serious pest of cucurbit plants **[1]**. However, this pest has so far been recognized as minor pest in Indonesia. Damage caused by this pest can reach 40-100 % **[2]**. Therefore, this pest could have economic and environmental impacts **[3]**. This pest was also reported from Florida. But its current status in different ecologies not known ?

The objective of this research was to study infestation level of *D. indica* on several cucurbit plants and associated natural enemies and to develop an automatic monitoring system for *D. indica*.

MATERIALS & METHODS

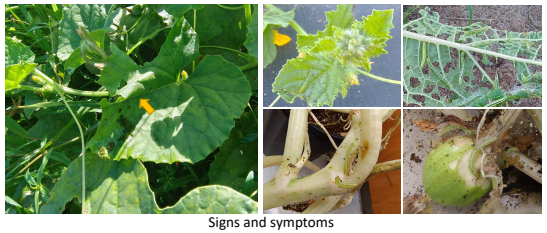
❖ Field monitoring

- Sampling Technique
  Manually
  - ✓ Direct Collection: Hand Picking (A)
  - ✓ Trap: Sticky trap (B), Delta trap + Pheromone (C)

  Automatically (D)
  - ✓ 9 traps (TrapView); 3 sites, 2 type pheromone
- Sites
  - ✓ FAMU Viticulture, IPM demo plots, ARS field site, Tallahassee, FL
  - ✓ FAMU Research and Extension Center, Quincy, FL
  - ✓ UF North Florida Research and Education Center, Quincy, FL
- Host Plant : Winter squash, cucumber, melon, and watermelon

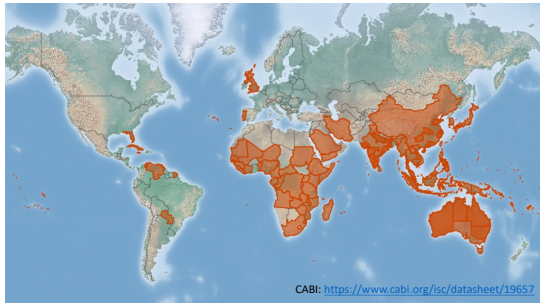
❖ Laboratory Work

- Insect rearing
  - ✓ *Diaphania indica*
  - ✓ Parasitized larva
  - ✓ Parasitoid
- Insect collection
  - ✓ Identification of parasitoid



Signs and symptoms

Life cycle of *Diapahnia indica*



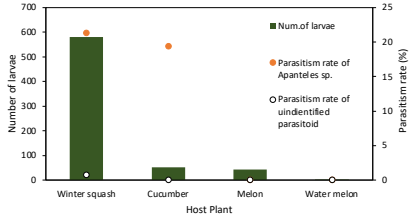
Global distribution map of *Diapahnia indica*

Sampling and monitoring technique

Insect rearing and identification

RESULTS & DISCUSSION

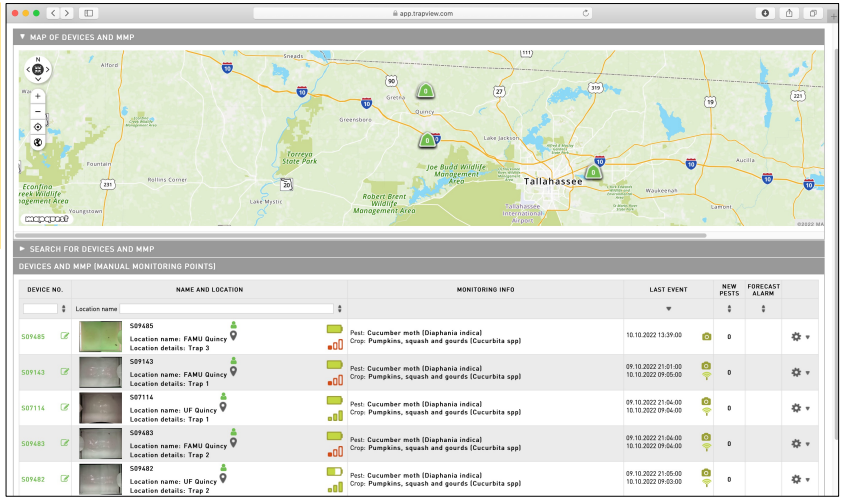
Manual Monitoring



Field data survey of *Diapahnia indica* in different host plants

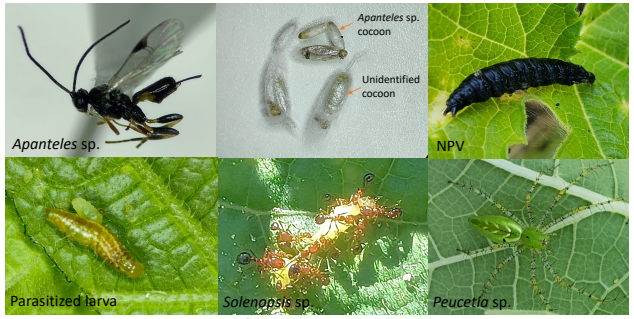
- Infestation started when the plants are 2-3 weeks old
- Parasitism rate was 20% in cucumber & winter squash

Automatic Monitoring



Automatic monitoring sites in Florida and pest information

Development of plant attacked by *Diaphania indica*



Natural enemies found associated with *Diaphania indica*

The benefit of automatic trap **[4]**:

- Real time data
- Combine with climate data
- Reduce labor cost
- Can be modified to monitor other pest species including natural enemy

Challenges

- Cost
- User friendliness
- Battery power
- Operation speed

CONCLUSION

- The highest infestation of *D. indica* found on winter squash.
- The most potential natural enemy is *Apanteles* sp. with 20% parasitism rate.
- Developing of an automatically monitoring tool is a critical to prevent pest attack and yield losses in cucurbits.

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REFERENCES

1. Pandey, P. N. (1977). Host preference and selection of *Diaphania indica* Saunders (Lep., Pyralidae). *Deutsche Entomologische Zeitschrift*, *24*(1/3), 159-173
2. Nurkomar, I., Manuwoto, S., Kainoh, Y., & Buchori, D. (2018). Multitrophic Interaction between Cucumber Moth *Diaphania indica* Saunders (Lepidoptera: Crambidae) and Its Natural Enemies. *IOP Conference Series: Earth and Environmental Science*, *197*(1), 012026.
3. Beucke, K. 2018. California Pest Rating for Cucumber Moth *Diaphania indica* (Saunders) Lepidoptera: Crambidae. Pest Rating: A. https://blogs.cdfa.ca.gov/
4. Lima, M. C. F., de Almeida Leandro, M. E. D., Valero, C., Coronel, L. C. P., & Bazzo, C. O. G. (2020). Automatic detection and monitoring of insect pests—a review. *Agriculture*, *10*(5), 161.