COMBATING COLE CROP CRITTERS

Riley Harding and Brian Nault
Cornell AgriTech, Geneva, NY

Growing Produce

Cornell AgriTech
New York State Agricultural Experiment Station

OUTLINE

- Define cole crops
- Common pests of cole crops
- Identification of pests
- Management of pests

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WHAT IS A COLE CROP?

- A lot of variation in what is considered cole crop:
  - kale, collards, kohlrabi, cabbage, Brussels sprouts, broccoli, cauliflower, Chinese broccoli, Chinese cabbage, Chinese mustard, oriental, radish, mustard, and turnips

WHAT IS A COLE CROP?

- A lot of variation in what is considered cole crop:
  - **kale, collards, kohlrabi, cabbage, Brussels sprouts, broccoli, cauliflower**, Chinese broccoli, Chinese cabbage, Chinese mustard, oriental, radish, mustard, and turnips
- All members of cole crop family are usually of the same species:
  - *Brassica oleracea*

NEW YORK STATE CABBAGE STATISTICS, 2019

- 11,700 acres harvested
- $82 million

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COMMON PESTS OF COLE CROPS

- **Cabbage maggot** (*Delia radicum*)

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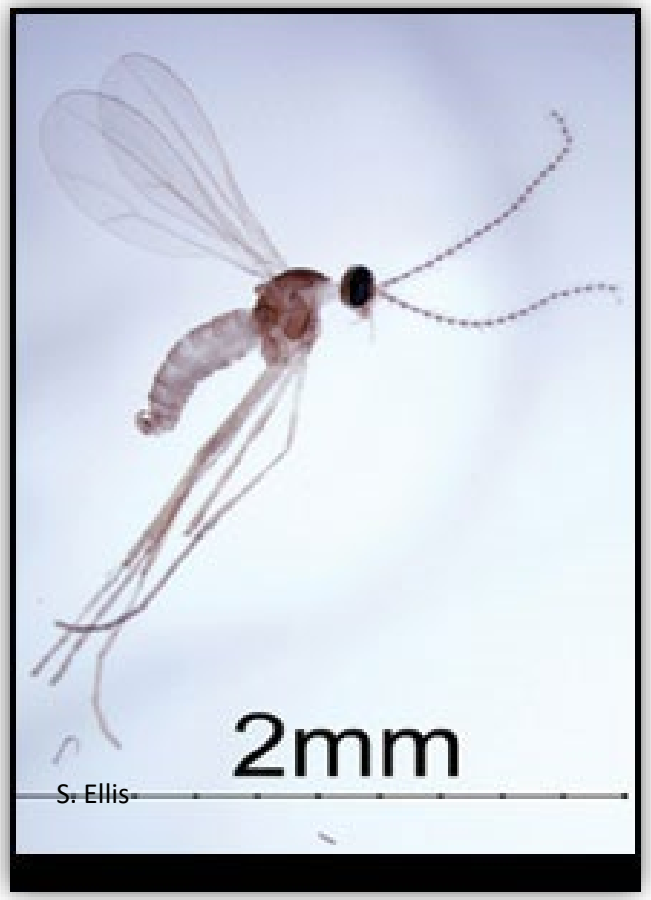
  - **Time of concern**: at planting (May-June)

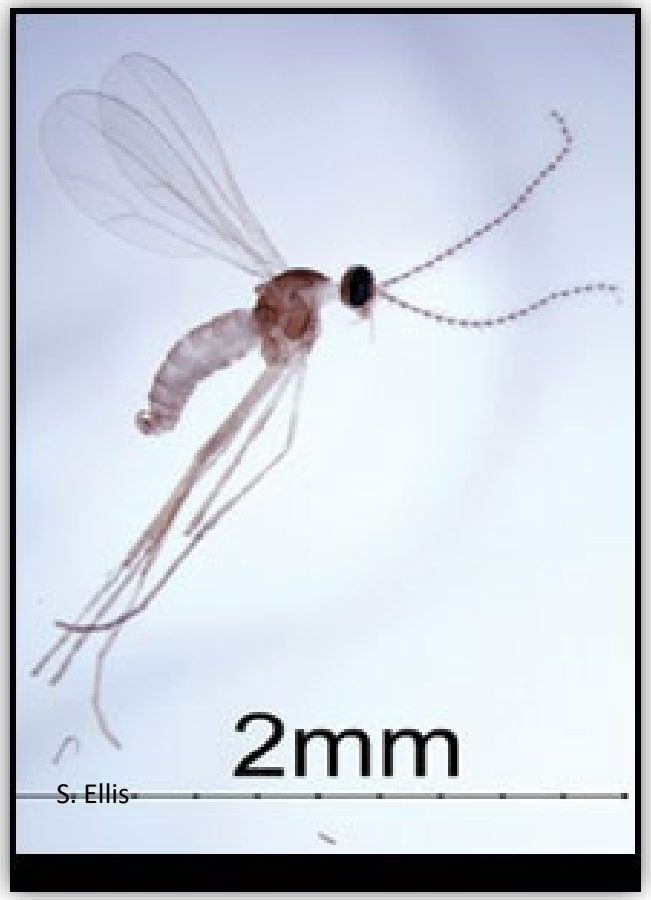
COMMON PESTS OF COLE CROPS

- Cabbage maggot
- **Swede midge**
  (*Contarinia nasturtii)*



COMMON PESTS OF COLE CROPS

- Cabbage maggot
- **Swede midge** (*Contarinia nasturtii)*
  - **Time of concern**: few weeks after planting (June-September)



COMMON PESTS OF COLE CROPS

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- Swede midge
- **Onion thrips (*Thrips tabaci)***

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- Swede midge
- **Onion thrips (*Thrips tabaci)***
  - **Time of concern**: head formation through harvest (August-September)

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  (*Pieris rapae*)

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      June through August

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  - **Cabbage looper (CL)** (*Trichoplusia ni*)

COMMON PESTS OF COLE CROPS

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  - Imported cabbage worm (ICW)
  - **Cabbage looper (CL)** (*Trichoplusia ni*)
    - **Time of concern**: migrate from south, August-September

COMMON PESTS OF COLE CROPS

- Worm pests:
  - Imported cabbage worm (ICW)
  - Cabbage looper (CL)
  - **Diamondback moth (DBM)** *(Plutella xylostella)*

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    - **Time for concern:** May-September

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IDENTIFICATION: CABBAGE MAGGOT

- **Pupae**: overwinters in soil

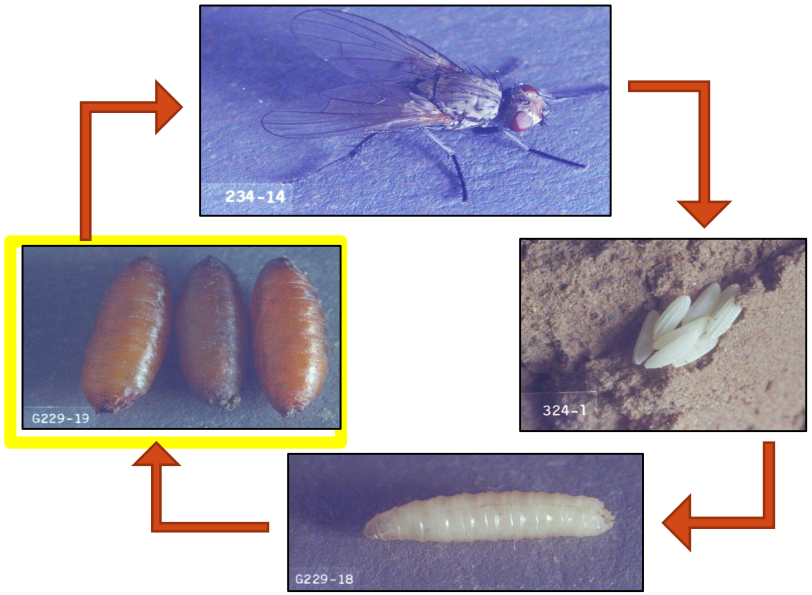
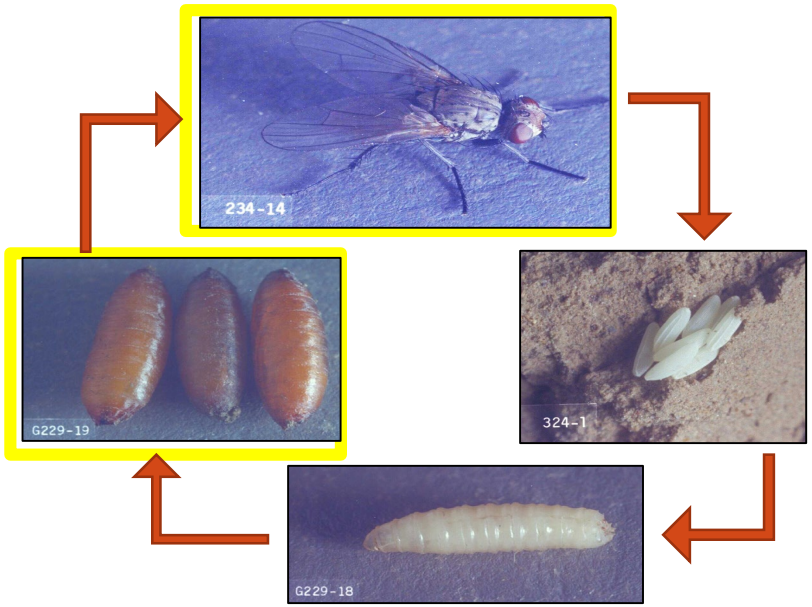


Photo credits: Ken Gray

IDENTIFICATION:
CABBAGE MAGGOT

- **Pupae**: overwinters in soil
- **Adults**: emerge in spring



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IDENTIFICATION:
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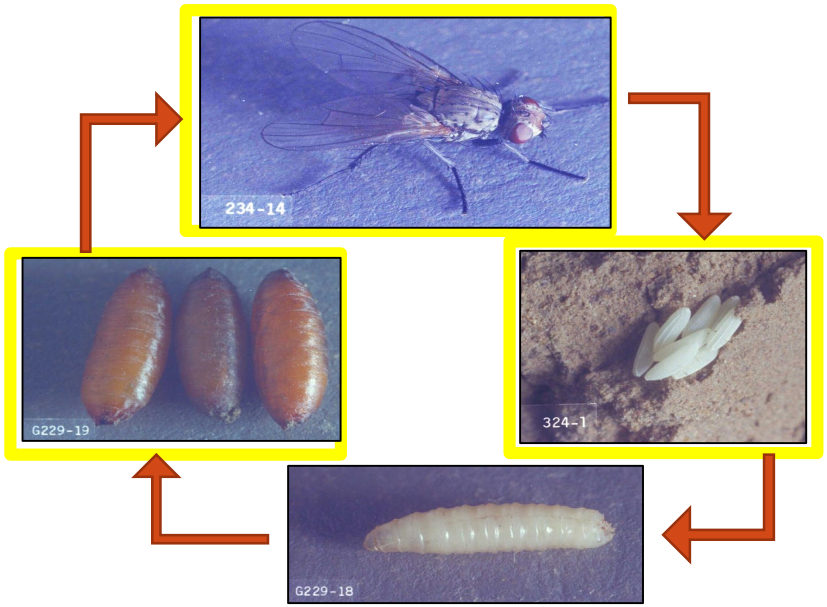
- **Pupae**: overwinters in soil
- **Adults**: emerge in spring
- **Eggs**: laid at base of cole crop plants



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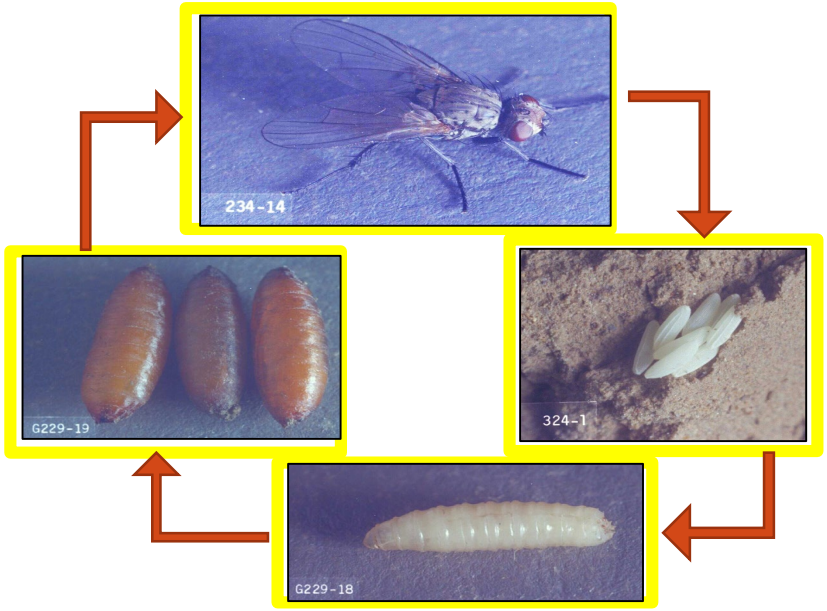

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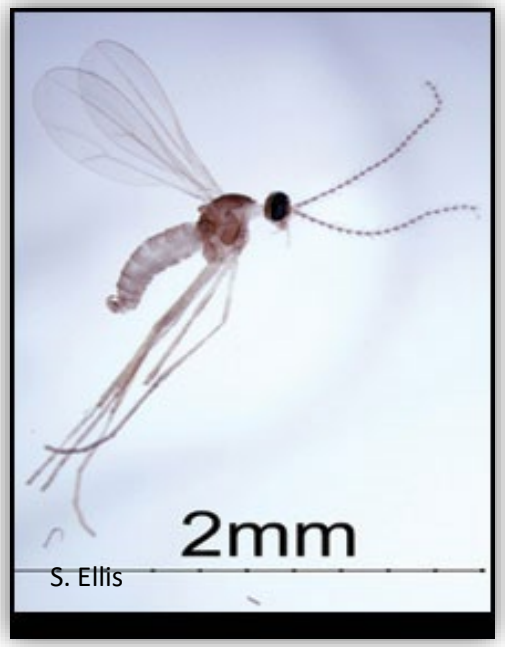
CABBAGE MAGGOT

- **Pupae**: overwinters in soil
- **Adults**: emerge in spring
- **Eggs**: laid at base of cole crop plants
- **Larvae**: develop on or near base of plant
- **Damage**: Wilting and reduced vigor

IDENTIFICATION: SWEDE MIDGE

- **Adults**: tiny light brown flies, midge-like



IDENTIFICATION: SWEDE MIDGE

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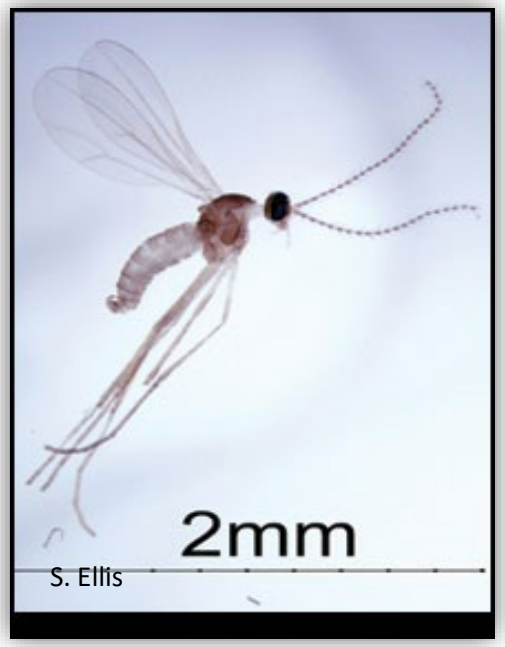

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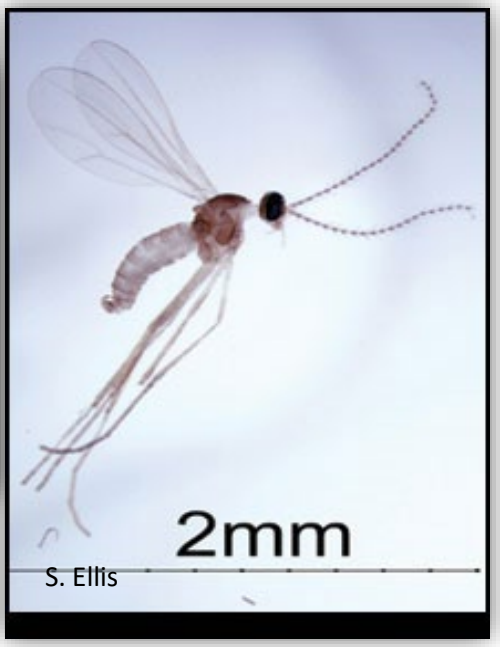

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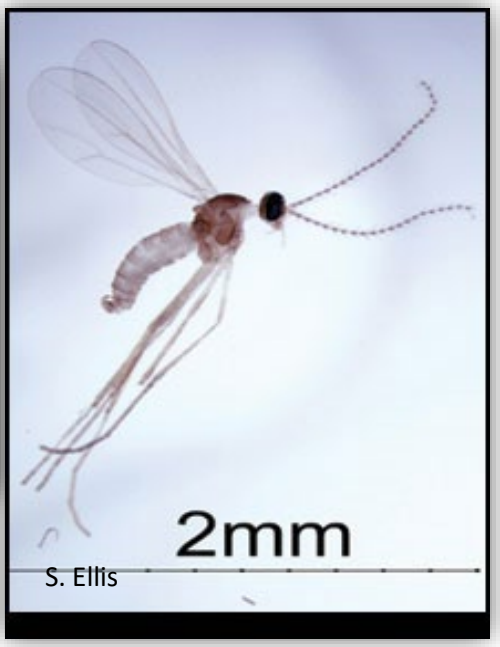

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- **Damage**: leaf galling and distortion

IDENTIFICATION: ONION THRIPS

- **Adult**: tan-brown, fast


I. Yannuzzi


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- **Adult**: tan-brown, fast
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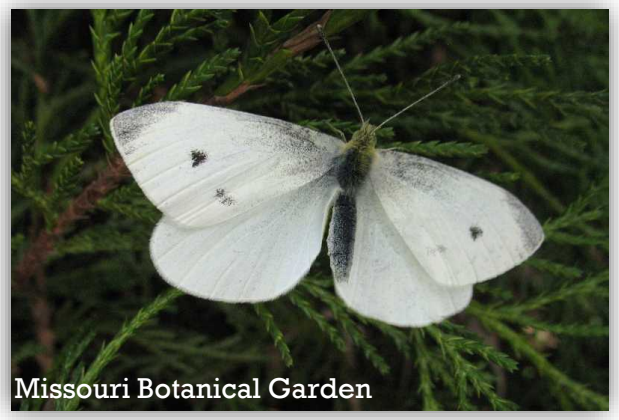
- **Damage**: bronzing on leaves

IDENTIFICATION: IMPORTED CABBAGE WORM

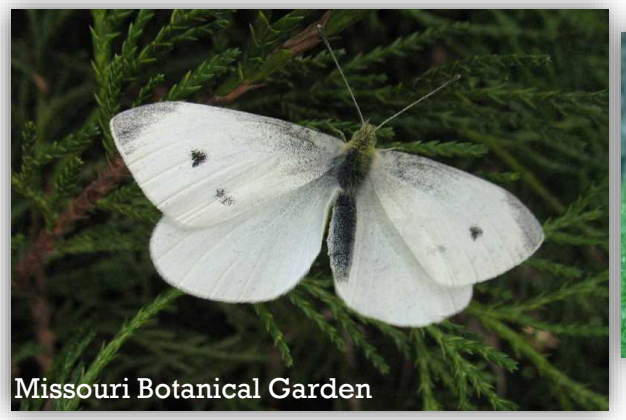

Missouri Botanical Garden

- **Adults**: white butterfly


Missouri Botanical Garden

IDENTIFICATION:
IMPORTED CABBAGE WORM

- **Adults**: white butterfly
- **Eggs**: bullet-shaped, 0.5 mm



IDENTIFICATION:
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- **Adults**: white butterfly
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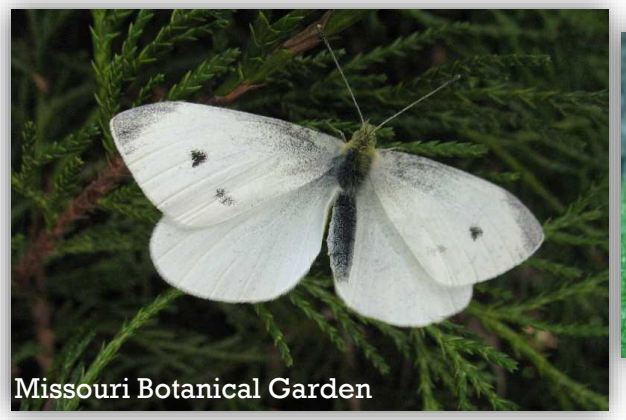

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- **Damage**: complete defoliation leaving stems and veins

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CABBAGE LOOPER

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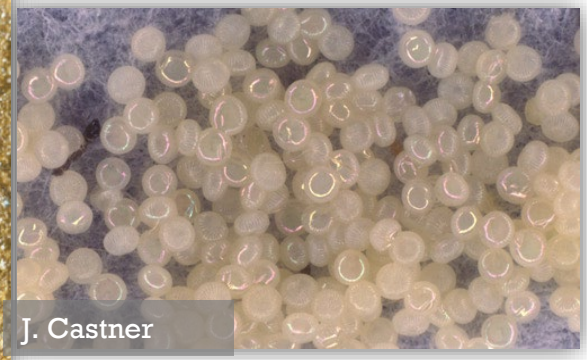
J. Castner

IDENTIFICATION:
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- **Adults**: brown moth with silver figure 8 in middle of wing
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- **Larvae**: make loop when prodded


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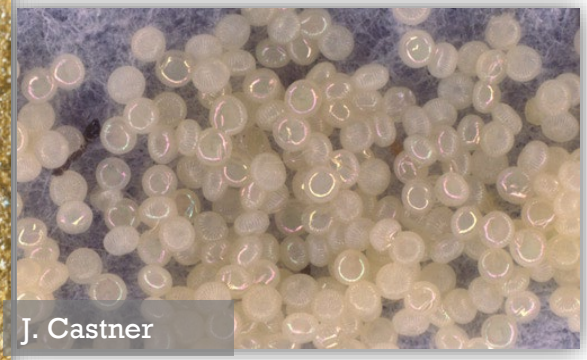
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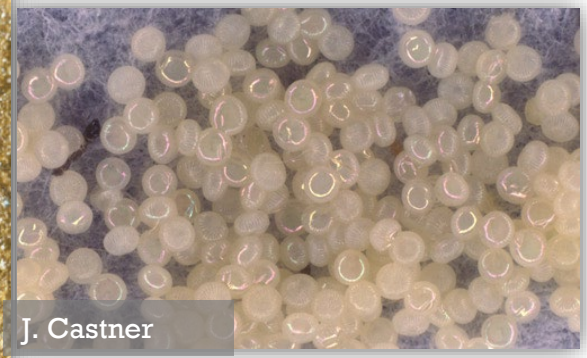
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- **Eggs**: hemispherical, 0.6 mm
- **Larvae**: make loop when prodded
- **Pupae**: loose silk cocoon, dark brown larva
- **Damage**: not as destructive, wrapper leaves and head


L. Buss


Missouri Botanical Garden

IDENTIFICATION: DIAMONDBACK MOTH

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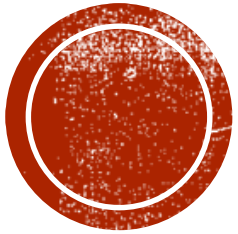
- **Larvae**: wriggle rapidly, suspend from silks, smallest
- **Pupae**: encased in loose silk cocoon, yellowish larva
- **Damage**: window-paning



ACTIVE LEARNING

IDENTIFICATION OF THE VARIOUS PESTS:

1. 

2. 

3. 

4. 

IDENTIFICATION OF THE VARIOUS PESTS: ANSWERS

1. 

2. 

3. 

4. 

IDENTIFICATION OF THE VARIOUS PESTS: ANSWERS

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Cabbage looper

2. 

3. 

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IDENTIFICATION OF THE VARIOUS PESTS: ANSWERS

1. 

Cabbage looper

2. 

Imported cabbage worm

3. 

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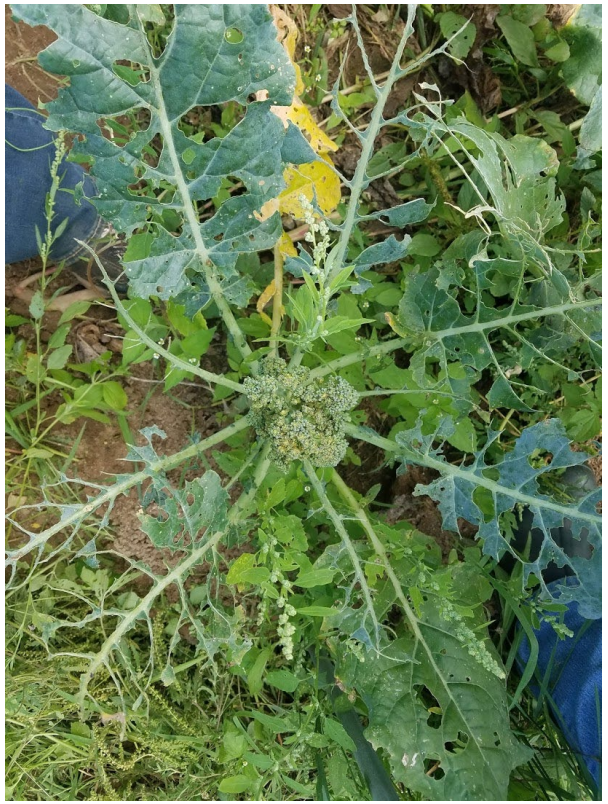
4. 

Diamondback moth

IDENTIFICATION OF WORMS BY DAMAGE

1.

2.

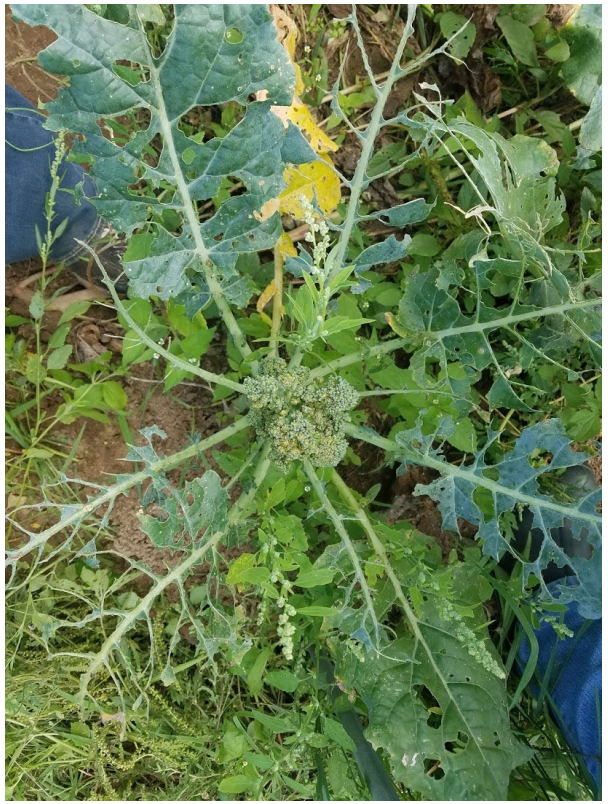


3.

IDENTIFICATION OF WORMS BY DAMAGE: ANSWERS

1.

2.



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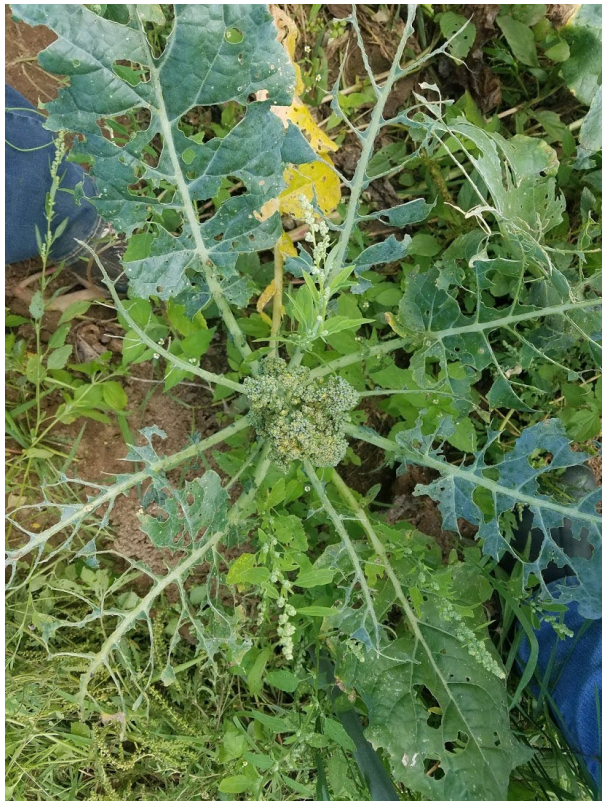

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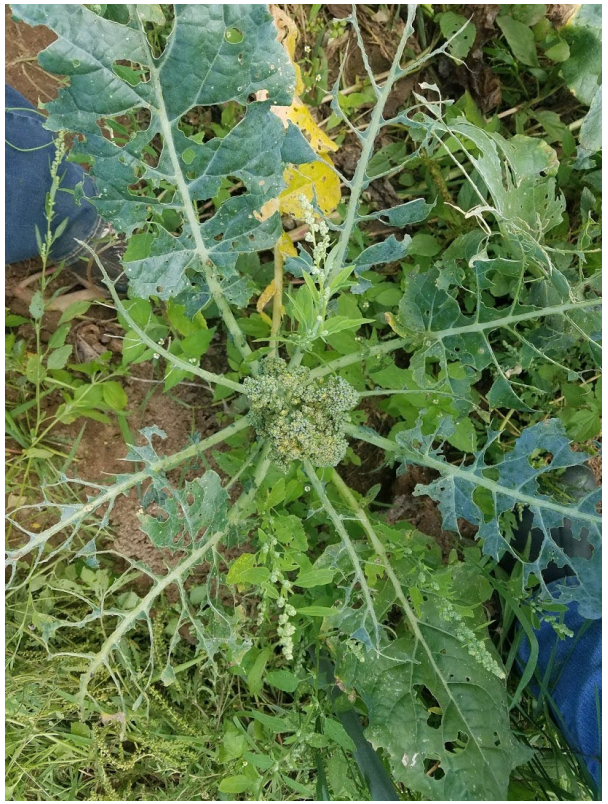

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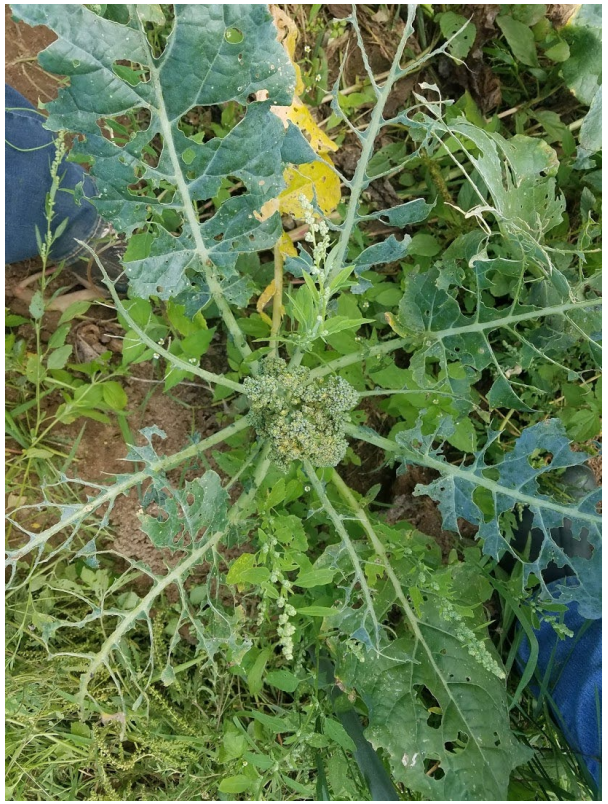

Imported cabbage worm

3.

SLUGS!!

OUTLINE

- Define cole crops
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- Identification of pests
- Management of pests

MANAGEMENT: CABBAGE MAGGOT

Product	Active Ingedient	IRAC group
Diazinon AG500	Diazinon	1B-organophosphate
Capture LFR	Bifenthrin	3A-pyrethroid
Verimark	cyantraniliprole	28-diamide
Coragen SC	chlorantraniliprole	28-diamide
Entrust SC	spinosad	5-spinosyn
Radiant	spinetoram	5-spinosyn

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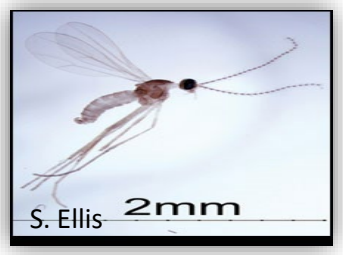
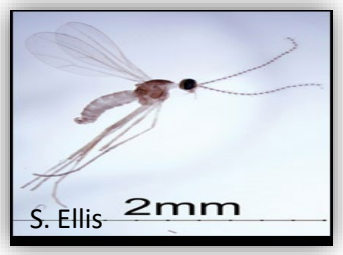
- Other tactics:
  - Avoid animal and green manure
  - Crop rotation
  - Row cover

MANAGEMENT: SWEDE MIDGE



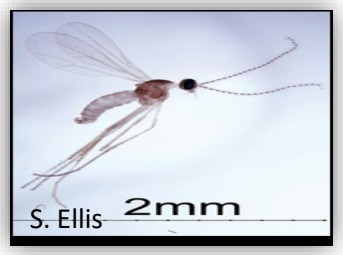
Product	Active Ingredient	IRAC Group
Assail 30SG	acetamiprid	4A-neonicotinoid
Admire Pro	imidacloprid	4A-neonicotinoid
Warrior II w/ Zeon Tech	lambda-cyhalothrin	3A-pyrethroid
Movento	spirotetramat	23-tetronic and tetramic acid deriv.

MANAGEMENT: SWEDE MIDGE



- Prevent population build-up

MANAGEMENT: SWEDE MIDGE



- Prevent population build-up
  - Transplants SM free
  - Pheromone traps, monitor SM populations
  - Exclusion netting
  - Post-harvest culling
  - Crop rotation

MANAGEMENT: ONION THRIPS


I. Yannuzzi

Product	Active Ingredient	IRAC Group
Asana XL	esfenvalerate	3A-pyrethroid
Baythroid XL	beta-cyfluthrin	3A-pyrethroid
Hero	bifenthrin + zeta-cypermethrin	3A-pyrethroid
Mustang MAXX	zeta-cypermethrin	3A-pyrethroid
Warrior II w/ Zeon Tech	lambda-cyhalothrin	3A-pyrethroid
Admire Pro	imidacloprid	4A-neonicotinoid
Assail 30 SG	acetamiprid	4A-neonicotinoid
Platinum 75 SG	thiamethoxam	4A-neonicotinoid
Endigo ZC	lambda-cyhalothrin + thiamethoxam	3A-pyrethroid 4A-neonicotinoid
Leverage 2.7	imidacloprid+cyfluthrin	4A-neonicotinoid 3A-pyrethroid
Entrust SC	spinosad	5- spinosyn
Radiant SC	spinetoram	5 - spinosyn
Movento	spirotetramat	23-tetronic and tetramic acid deriv.
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Platinum 75 SG	thiamethoxam	4A-neonicotinoid
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Endigo ZC	lambda-cyhalothrin + thiamethoxam	3A-pyrethroid 4A-neonicotinoid
Leverage 2.7	imidacloprid+cyfluthrin	4A-neonicotinoid 3A-pyrethroid
Entrust SC	spinosad	5- spinosyn
Radiant SC	spinetoram	5 - spinosyn
Movento	spirotetramat	23-tetronic and tetramic acid deriv.
Exirel	cyantraniliprole	28- diamide


I. Yannuzzi

- Other options:
  - Tolerant varieties
  - Natural enemies
  - Aware of nearby alternate host crops

INTEGRATED PEST MANAGEMENT: WORM COMPLEX

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INTEGRATED PEST MANAGEMENT: WORM COMPLEX

IPM

CHEMICAL

CULTURAL CONTROL

HOST PLANT RESISTANCE

INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

CHEMICAL

IPM

CULTURAL CONTROL

HOST PLANT RESISTANCE

CHEMICAL MANAGEMENT: CORNELL GUIDELINES

Product	Active Ingredient	IRAC Group
Lannate LV	methomyl	**1A** – carbamate
Baythroid XL	beta-cyfluthrin	**3A**-pyrethroid
Hero	bifenthrin + zeta-cypermethrin	**3A**-pyrethroid
Mustang MAXX	zeta-cypermethrin	**3A**-pyrethroid
Perm-Up	permethrin	**3A**-pyrethroid
Warrior II Zeon Technology	lambda-cyhalothrin	**3A** - pyrethroid
Endigo ZC	lambda-cyhalothrin + thiamethoxam	**3A**-pyrethroid **4A**-neonicotinoid
Besiege	chlorantraniliprole + lambda-cyhalothrin	**28** - diamide **3A** - pyrethroid
Entrust SC	spinosad	**5**- spinosyn
Radiant SC	spinetoram	**5** - spinosyn
Proclaim	emamectin benzoate	**6** - avermectin
Biobit HP/ Dipel DF/ Javelin	*Bacillus thuringinesis var. kurstaki*	**11A**-Bt proteins
XenTari/ Agree WG	*Bacillus thuringinesis var. aizawai*	**11A**-Bt proteins
Avaunt	indoxacarb	**22A** - oxadiazin
Coragen	chlorantraniliprole	**28** - diamide
Exirel	cyantraniliprole	**28**- diamide

INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

CHEMICAL

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INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

IPM

CHEMICAL

CULTURAL CONTROL

HOST PLANT RESISTANCE

Cornell AgriTech

New York State Agricultural Experiment Station

HOST PLANT RESISTANCE

- Glossy wax genotypes resistant

Low epicuticular waxes

Resistance

High epicuticular waxes

HOST PLANT RESISTANCE

- Glossy wax genotypes resistant
  - Low epicuticular waxes
  - Low larval survival

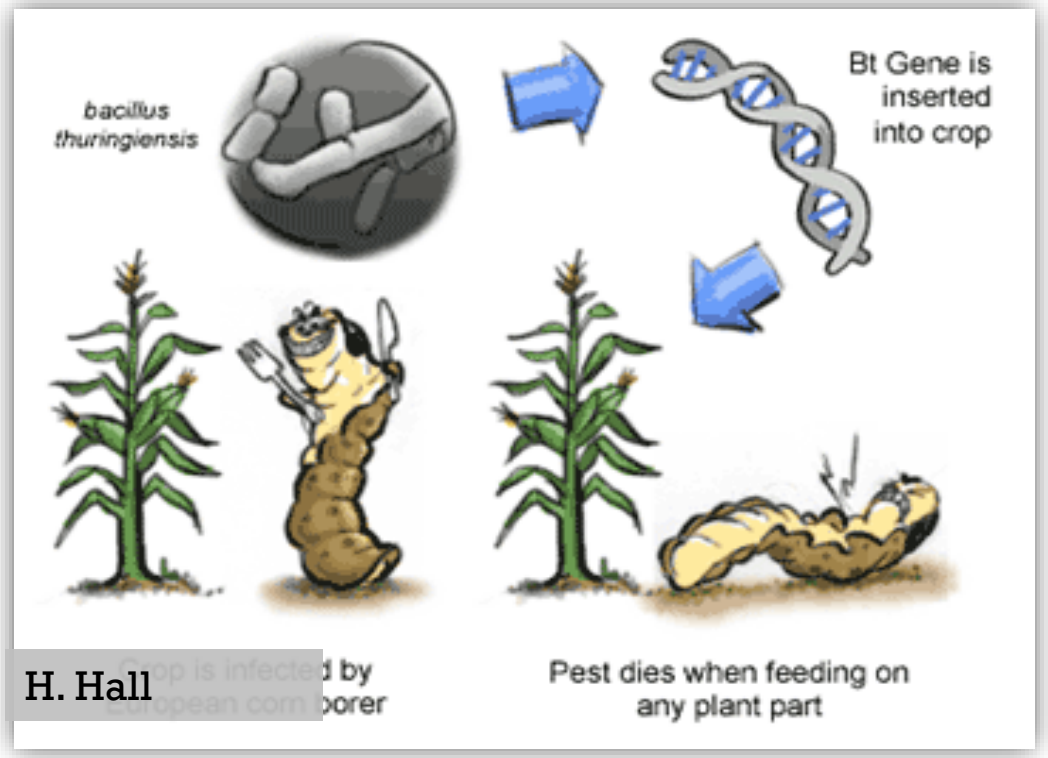
Low epicuticular waxes

Resistance

High epicuticular waxes

GENETICALLY MODIFIED ORGANISM (GMO)

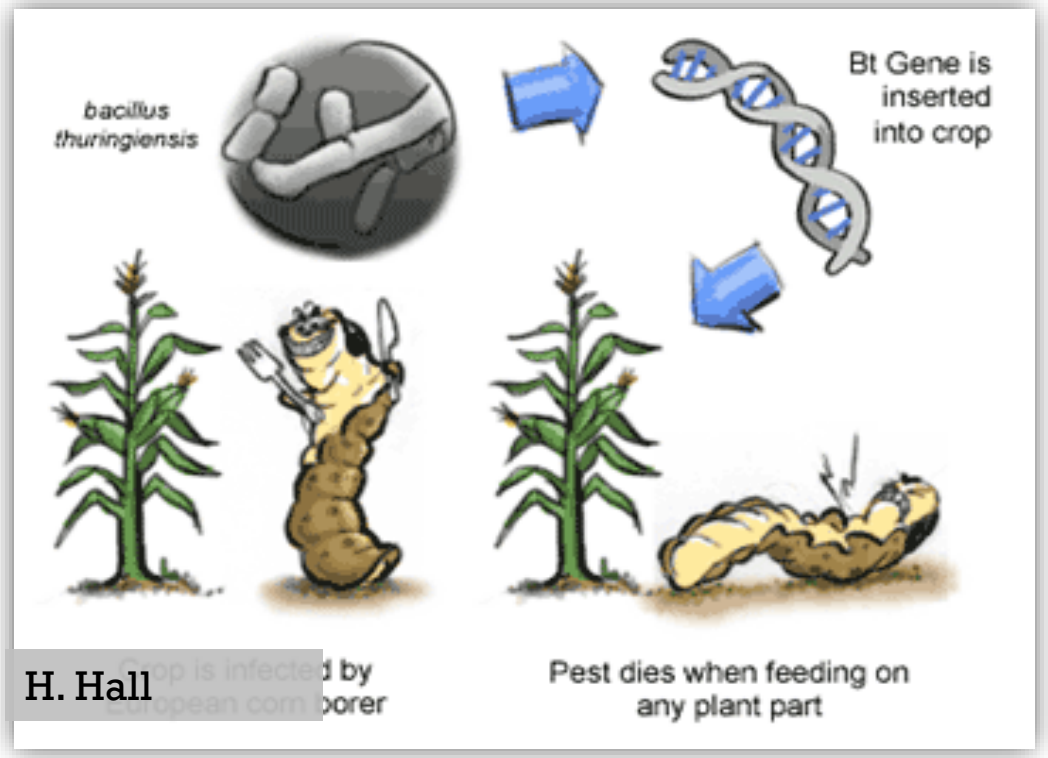
1. Insertion of gene into host plant that encodes for protein



H. Hall

GENETICALLY MODIFIED ORGANISM (GMO)

1. Insertion of gene into host plant that encodes for protein
2. Protein product *Bacillus thuringiensis (Bt)*



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GENETICALLY MODIFIED ORGANISM (GMO)

1. Insertion of gene into host plant that encodes for protein
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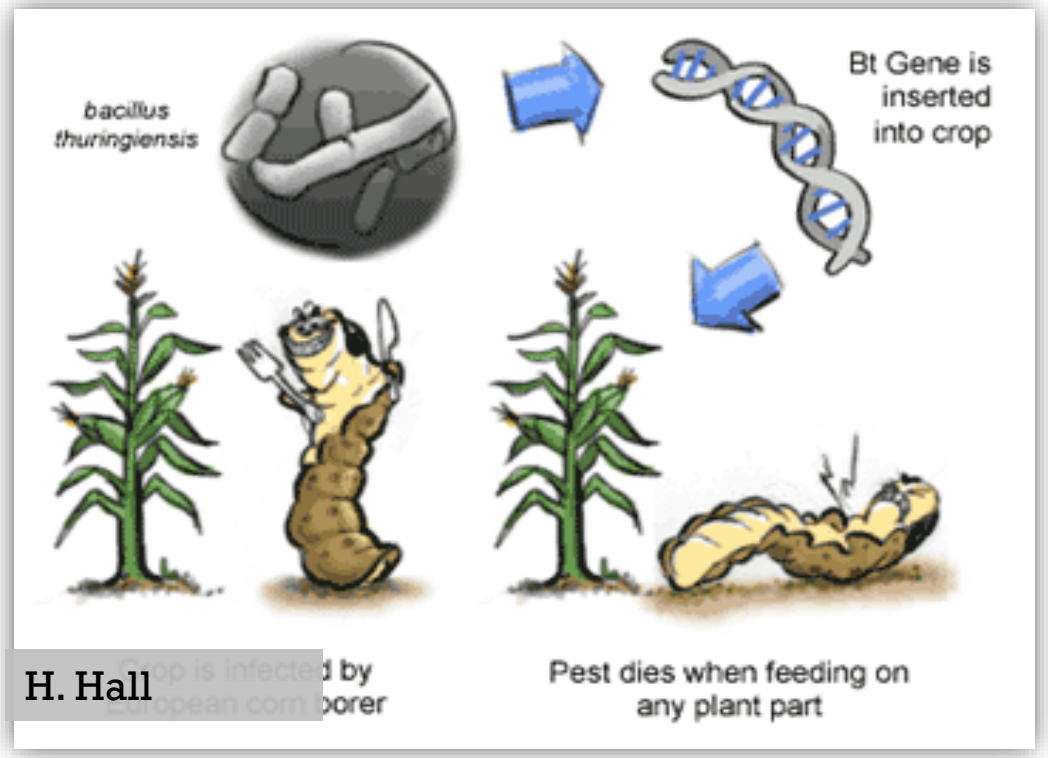

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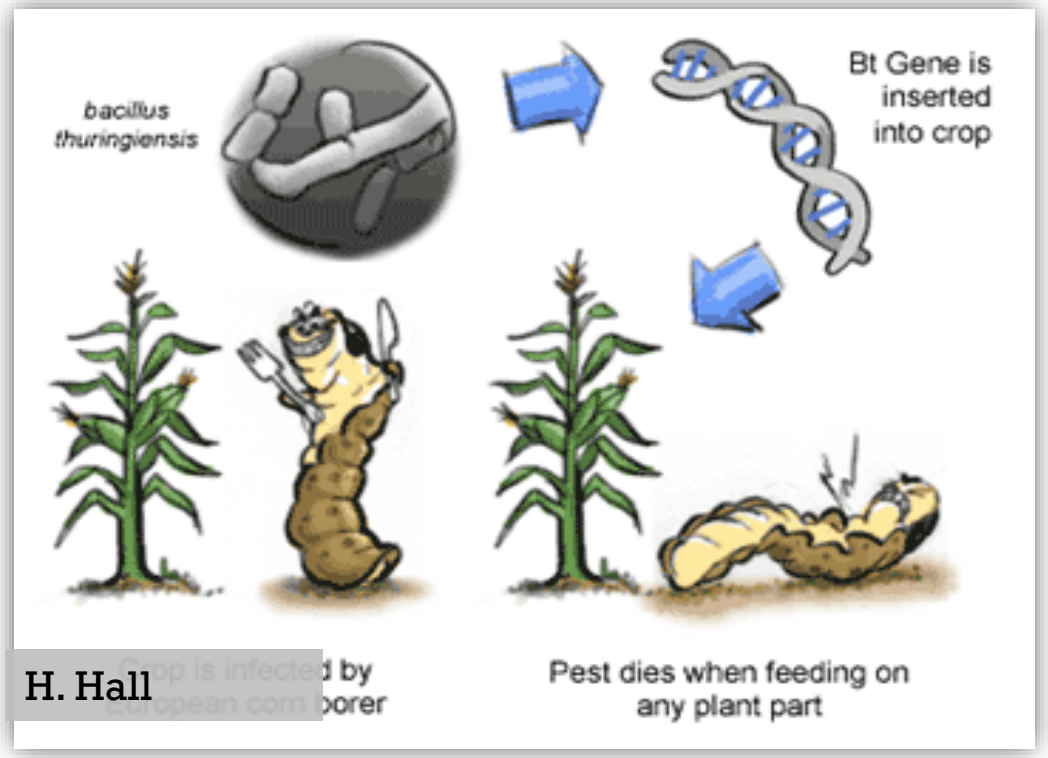

H. Hall

GENETICALLY MODIFIED ORGANISM (GMO)

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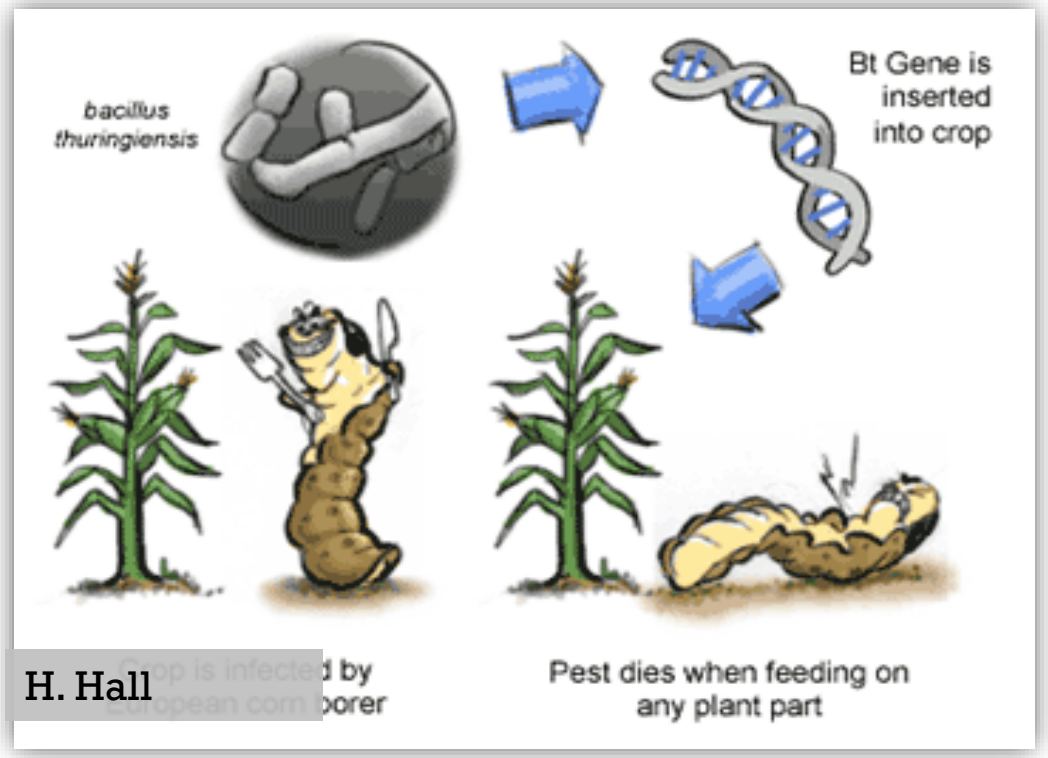

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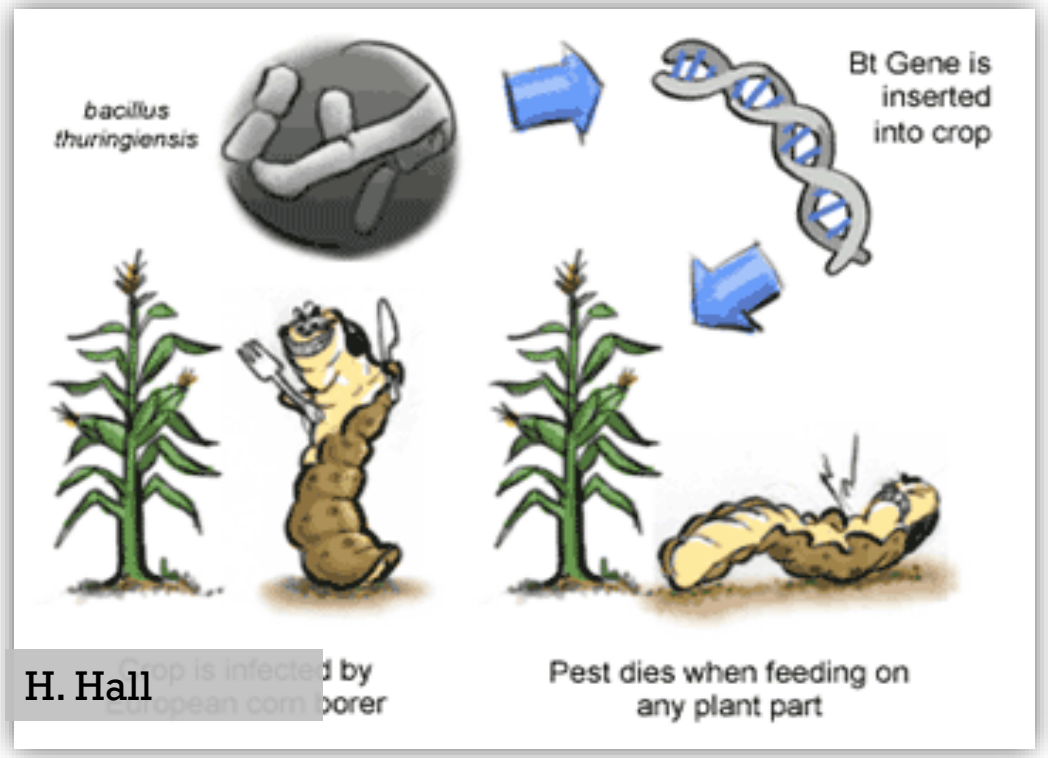
2. Protein product *Bacillus thuringiensis (Bt)*
3. Selectively toxic to lepidopterans
4. Kills larvae when it feeds on plant
5. Not registered in US, high potential
   - Control Bt eggplants in Bangladesh



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INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

CULTURAL CONTROL

IPM

CHEMICAL

HOST PLANT RESISTANCE

INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

CHEMICAL

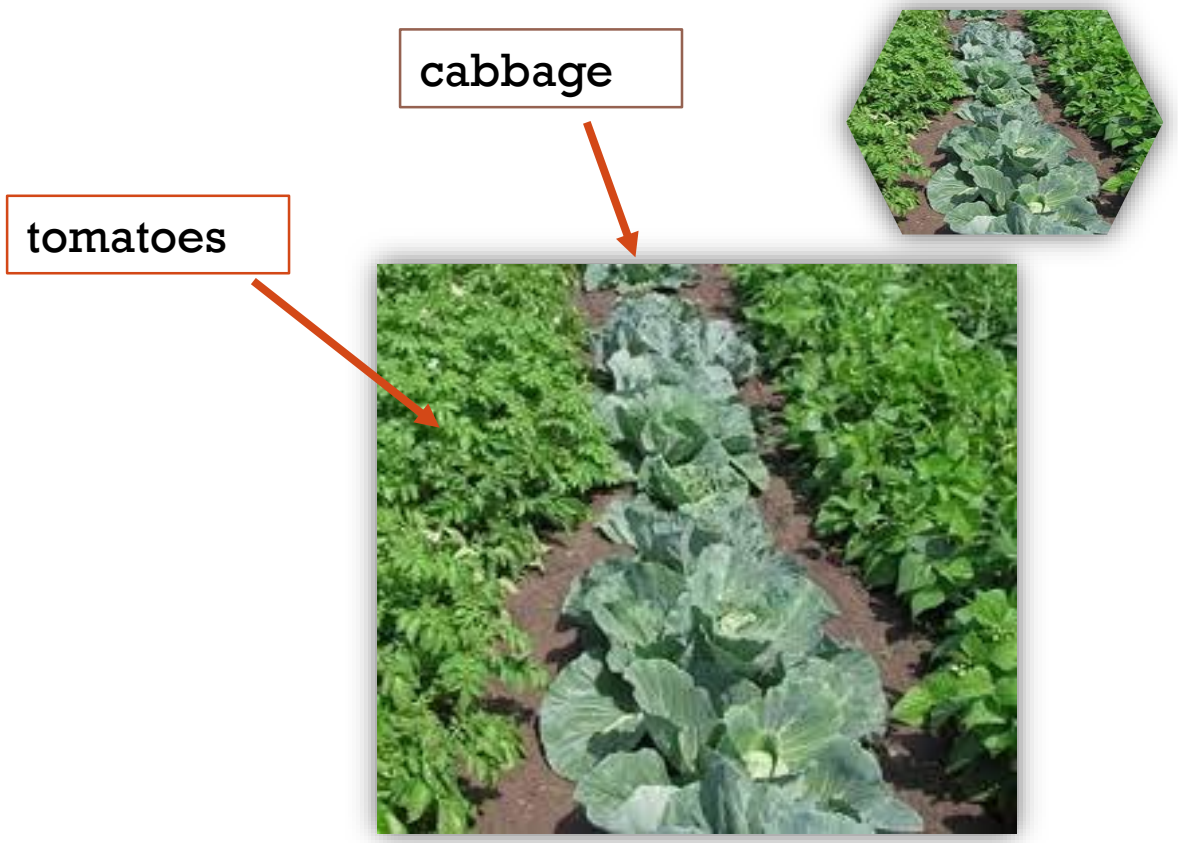
IPM

CULTURAL CONTROL

HOST PLANT RESISTANCE

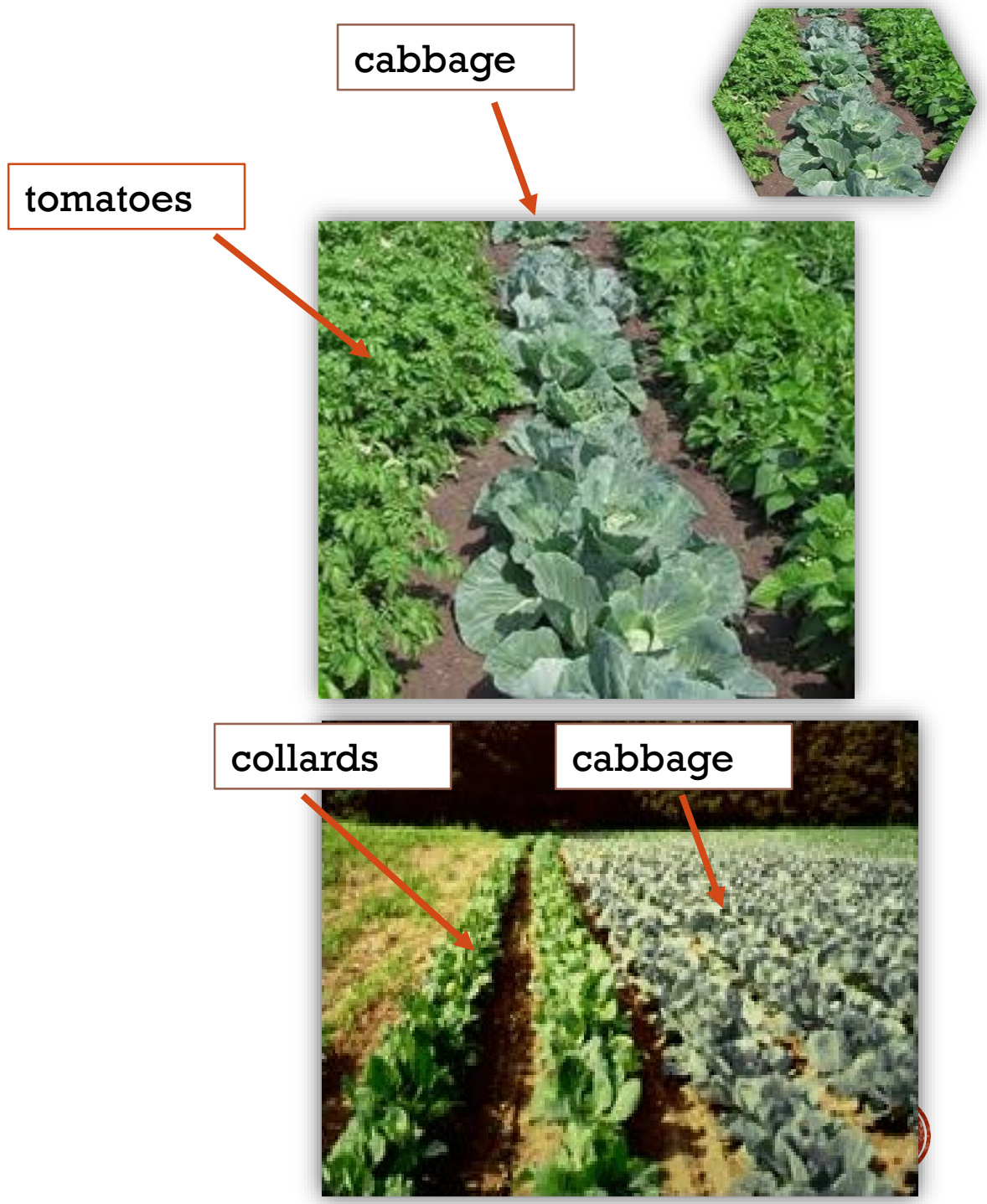
CULTURAL CONTROL

- Intercropping



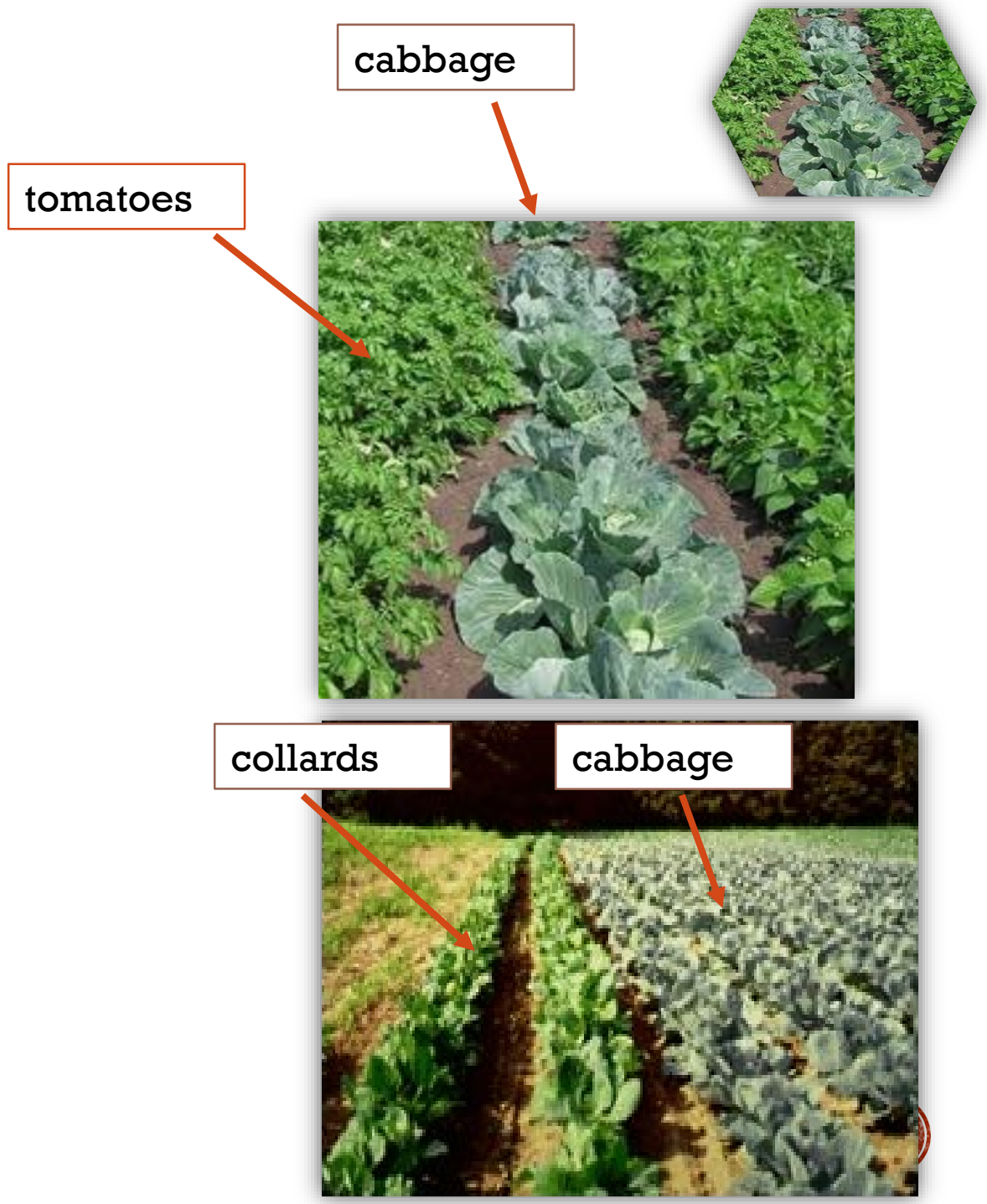
CULTURAL CONTROL

- Intercropping
- Trap cropping



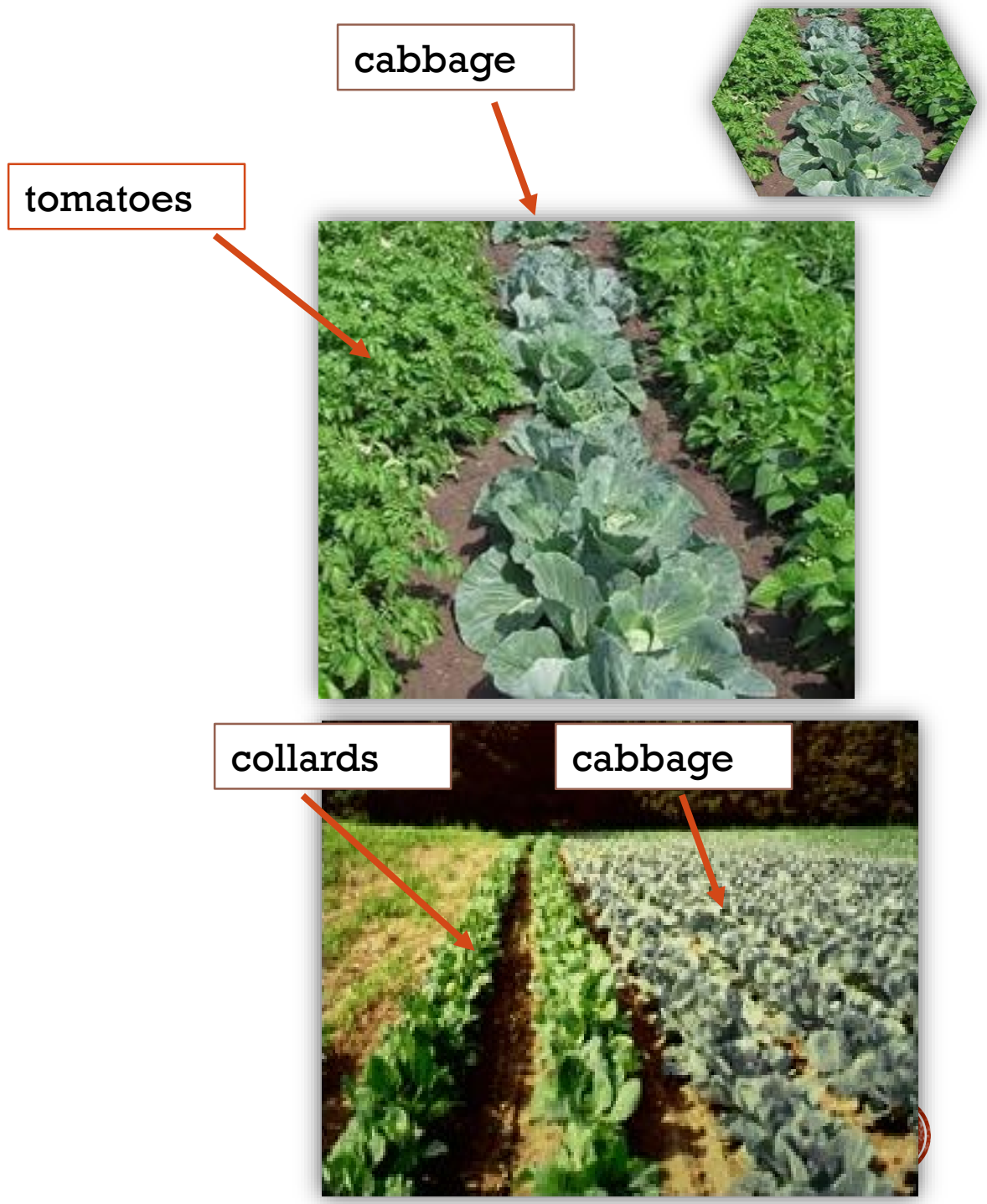
CULTURAL CONTROL

- Intercropping
- Trap cropping
- Limitations:



CULTURAL CONTROL

- Intercropping
- Trap cropping
- Limitations:
  - Only small diversified
  - timing



INTEGRATED PEST MANAGEMENT: WORM COMPLEX

INTEGRATED PEST MANAGEMENT: WORM COMPLEX

BIOLOGICAL CONTROL

IPM

CHEMICAL

CULTURAL CONTROL

HOST PLANT RESISTANCE

Cornell AgriTech

New York State Agricultural Experiment Station

BIOLOGICAL CONTROL

- Natural enemy conservation

BIOLOGICAL CONTROL

- Natural enemy conservation
  - Avoid use broad spectrum insecticides

BIOLOGICAL CONTROL

- Natural enemy conservation
  - Avoid use broad spectrum insecticides
- Parasitic wasps

BIOLOGICAL CONTROL

- Natural enemy conservation
  - Avoid use broad spectrum insecticides
- Parasitic wasps
- Vespid wasps

BIOLOGICAL CONTROL

- Natural enemy conservation
  - Avoid use broad spectrum insecticides
- Parasitic wasps
- Vespid wasps
- Ground beetles

SUMMARY OF LEPIDOPTERAN MANAGEMENT

- ICW and CL are generally more susceptible to insecticides

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- DBM is the hardest to control

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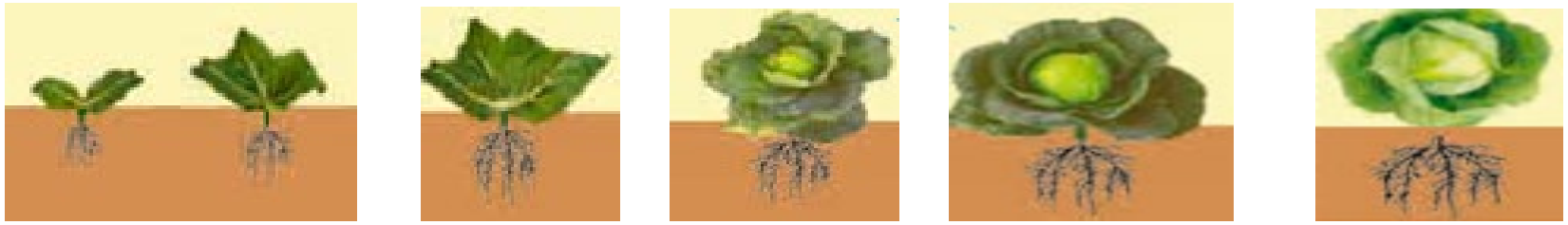
- ICW and CL are generally more susceptible to insecticides
- DBM is the hardest to control
  - Resistant to numerous classes insecticides

SUMMARY OF LEPIDOPTERAN MANAGEMENT

- ICW and CL are generally more susceptible to insecticides
- DBM is the hardest to control
  - Resistant to numerous classes insecticides
  - Multiple generations

IPM PROGRAM FOR COLE CROP CRITTERS

Typical growing season



Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM		Generation 1				Generation 2				Generation 3							

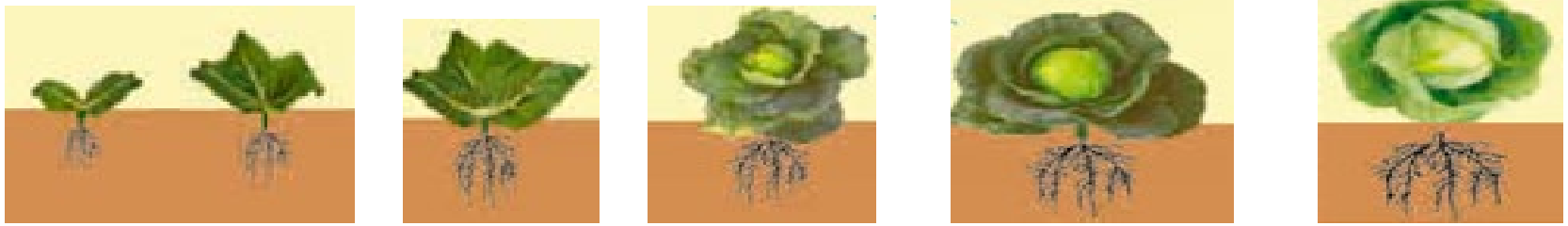
IPM PROGRAM FOR COLE CROP CRITTERS

Typical growing season

Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1					Generation 2				Generation 3							
MOA	MOA 1																
Insecticide App		Spray 1		Spray 2													
IRAC	28	11A		11A													
Trade name	Verimark	Agree, Xentari, Dipel		Agree, Xentari, Dipel													
Pests	CM, DBM	ICW, smCL		ICW, smCL													

IPM PROGRAM FOR COLE CROP CRITTERS

Typical growing season



Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1					Generation 2											
MOA	MOA 1					MOA 2											
Insecticide App		Spray 1		Spray 2		Spray 3		Spray 4									
IRAC	28	11A		11A		5		5									
Trade name	Verimark	Agree, Xentari, Dipel		Agree, Xentari, Dipel		Radiant		Radiant									
Other Control	CM, DBM	ICW, smCL		ICW, smCL		ICW, CL, thrips		ICW, CL, thrips									

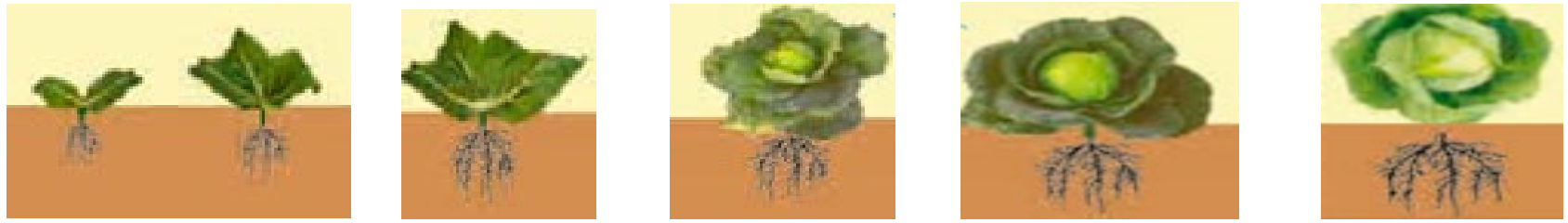
IPM PROGRAM FOR COLE CROP CRITTERS

Typical growing season

Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1					Generation 2				Generation 3							
MOA	MOA 1					MOA 2				MOA 3							
Insecticide App		Spray 1		Spray 2		Spray 3		Spray 4		Spray 5				Spray 6			
IRAC	28	11A		11A		5		5		6				6			
Trade name	Verimark	Agree, Xentari, Dipel		Agree, Xentari, Dipel		Radiant		Radiant		Proclaim				Proclaim			
Other Control	CM, DBM	ICW, smCL		ICW, smCL		ICW, CL, thrips		ICW, CL, thrips		ICW, CL				ICW, CL			

IPM PROGRAM FOR COLE CROP CRITTERS

Difficult growing season



Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1					Generation 2				Generation 3							

IPM PROGRAM FOR COLE CROP CRITTERS

Difficult growing season

Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1																
MOA	MOA 1				MOA 2												
Insecticide App		Spray 1		Spray 2	Spray 3	Spray 4											
IRAC	28	11A		11A	5	5											
Trade name	Verimark	Agree, Xentari, Dipel		Agree, Xentari, Dipel	Radiant	Radiant											
Other Control	CM, DBM	ICW, smCL		ICW, smCL	ICW, CL, OT	ICW, CL, OT											

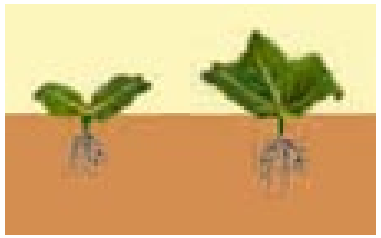
IPM PROGRAM FOR COLE CROP CRITTERS

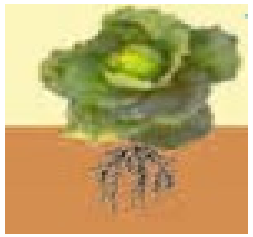
Difficult growing season

Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM	Generation 1					Generation 2 & 3?											
MOA	MOA 1			MOA 2		MOA 3		MOA 4									
Insecticide App		Spray 1	Spray 2	Spray 3	Spray 4	Spray 5	Spray 6	Spray 7	Spray 8								
IRAC	28	11A	11A	5	5	6	6	28	28								
Trade name	Verimark	Agree, Xentari, Dipel	Agree, Xentari, Dipel	Radiant	Radiant	Proclaim	Proclaim	Coragen Beseige (+3A) Exirel	Coragen Beseige (+3A) Exirel								
Other Control	CM, DBM	ICW, smCL	ICW, smCL	ICW, CL, OT	ICW, CL, OT	ICW, CL	ICW, CL	ICW, CL, OT, FB	ICW, CL, OT, FB								

IPM PROGRAM FOR COLE CROP CRITTERS

Difficult growing season





Month	At Planting	July				August				September				October			
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DBM		Generation 1				Generation 2 & 3?				Generation 3 & 4?							
MOA		MOA 1			MOA 2	MOA 3		MOA 4		MOA 5				MOA 6			
Insecticide App		Spray 1	Spray 2	Spray 3	Spray 4	Spray 5	Spray 6	Spray 7	Spray 8	Spray 9	Spray 10			Spray 11			
IRAC	28	11A	11A	5	5	6	6	28	28	22A	22A			3A			
Trade name	Verimark	Agree, Xentari, Dipel	Agree, Xentari, Dipel	Radiant	Radiant	Proclaim	Proclaim	Coragen Besiege (+3A) Exirel	Coragen Besiege (+3A) Exirel	Avaunt	Avaunt			Warrior, etc.			
Other Control	CM, DBM	ICW, smCL	ICW, smCL	ICW, CL, OT	ICW, CL, OT	ICW, CL	ICW, CL	ICW, CL, OT, FB	ICW, CL, OT, FB	ICW, CL	ICW, CL			ICW, smCL, OT, FB			

For More Information

Christy Hoepting
cah59@cornell.edu
585-721-6953

Elisabeth Hodgdon
eh528@cornell.edu
518-650-5323

New Factsheet Available

Cornell Cooperative Extension

VEGETABLE FACT SHEET

Integrated Pest Management

May 2020

NEW Crop Rotation Recommendations for Swede Midge

Christy Hoepting and Sarah Vande Brake, CCE Cornell Vegetable Program

A spatiotemporal rotation of 500 feet for 2.5 to 3 months can be highly effective for managing swede midge

INTRODUCTION

Swede midge is difficult to control on small farms

Swede midge (*Contarinia nasturtii*) is an invasive insect that can seriously damage plants in the family Brassicaceae, which includes broccoli, cauliflower, cabbage, kohlrabi, and kale. Larval feeding on brassica crops results in distorted plant growth, corky scarring, and/or blind heads, which can reduce marketable yield and quality (Fig. 1). Swede midge control is challenging on small-scale and organic farms, where season-long production of brassica crops in close proximity is common. This continuous supply of host plants allows swede midge populations to explode. Research shows that economic damage to crops can be avoided by "crashing" the swede midge population. New crop rotation recommendations provide a feasible population management strategy for some small farms.

Life cycle

In New York, swede midge has 4-5 overlapping generations that are active from mid-May to late-October. Each spring, the tiny (2 mm) gnat-like adult flies emerge from overwintered pupae in the soil. Females have 3 days to find a mate and then a suitable host on which to lay their microscopic eggs. Eggs hatch within 2-8 days and then the larvae (2-3 mm) feed deep within the growing tips of brassica plants for 7-26 days before dropping to the soil, where they pupate for 7-49 days or overwinter. About 2% of overwintering pupae remain in the soil for at least 2 years.

Figure 1. Damage caused by swede midge larval feeding: leaf puckering and brown scarring along leaf margins in broccoli (left), and brown corky scarring deeming kohlrabi head unmarketable (right). Photos: C. Hoepting, CCE Cornell Vegetable Program

FAR AND LONG CROP ROTATION OPTIONS

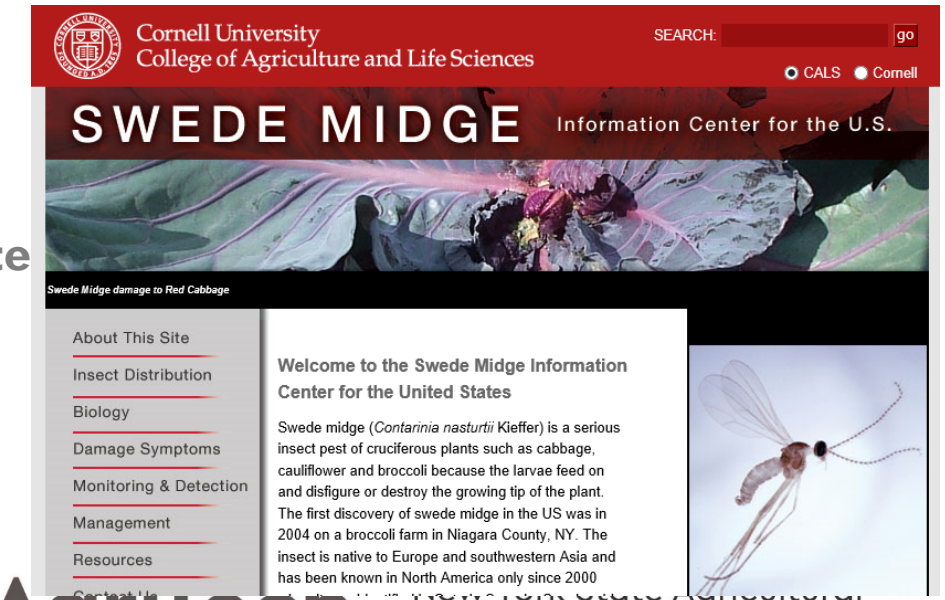
Preliminary crop rotation recommendations

Preliminary crop rotation recommendations advised growers to rotate away from brassica crops by **at least 3,000 feet for a minimum of 3 years**. This was a conservative recommendation based on the knowledge that swede midge are weak fliers and can persist in soil for at least 2 years. Implementing such far and long spatiotemporal rotations is impractical for most small farms.

To examine whether a reduced spatiotemporal rotation scheme could effectively mitigate swede midge damage, Cornell Vegetable Program researchers conducted an extensive project, which monitored swede midge populations and crop damage on seven small-scale organic farms in New York from 2015 to 2017. **This work resulted in new, less restrictive crop rotation recommendations** that center on reducing economic damage by depriving adult swede midge of susceptible host plants during peak periods of activity.

NEW Crop Rotation Recommendations for Swede Midge | 1

Website



Cornell University
College of Agriculture and Life Sciences

SEARCH: go

CALS Cornell

SWEDE MIDGE Information Center for the U.S.

Swede Midge damage to Red Cabbage

About This Site
Insect Distribution
Biology
Damage Symptoms
Monitoring & Detection
Management
Resources

Welcome to the Swede Midge Information Center for the United States

Swede midge (*Contarinia nasturtii* Kieffer) is a serious insect pest of cruciferous plants such as cabbage, cauliflower and broccoli because the larvae feed on and disfigure or destroy the growing tip of the plant. The first discovery of swede midge in the US was in 2004 on a broccoli farm in Niagara County, NY. The insect is native to Europe and southwestern Asia and has been known in North America only since 2000

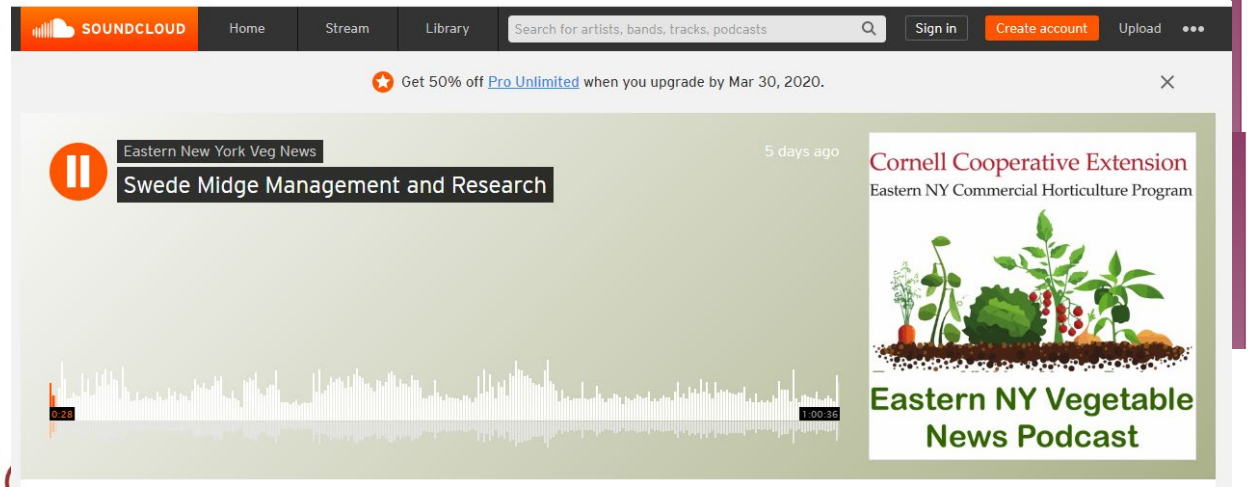
Cornell AgriTech

New York State Agricultural Experiment Station

For More Information

Diagnostic video

Podcast - March 24, 2020



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Final report for ONE15-237

Optimizing management of a new invasive species, swede midge, on small-scale organic farms

Final report for ONE16-262

Optimizing management of a new invasive species, swede midge, on small-scale organic farms: Part II

Cornell AgriTech Experiment Station

THANK YOU

Cornell AgriTech

New York State Agricultural Experiment Station

http://nault.entomology.cornell.edu/

LOOK AT YOUR WORKSHEET...

What's in your toolbox?

Whether you've been using integrated pest management practices for years, or are just getting started, you're probably already implementing some IPM strategies. But there's always room for more IPM! What are you doing? What do you want to add?

	Specific IPM practices	
General areas for IPM	**What I'm already doing**	**What I'd like to add**
What you plant, where, and how		

Based on this presentation, write down some IPM practices you'd like to add in 2021

(continued on next page)

WORKS CITED:

- https://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/insects/caterpillars/imported-cabbageworm.aspx
- https://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/cole-crop-confusion.html
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