

***Leaf Volatile Ecology:
Multitrophic interaction networks
mediated by leaf volatiles***

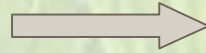
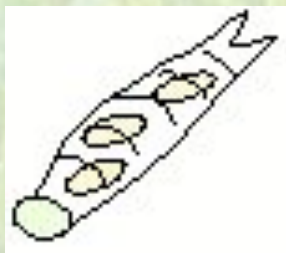
**Junji Takabayashi
Center for Ecological Research
Kyoto University**



Parasitic wasps



Parasitic wasps



Pupa



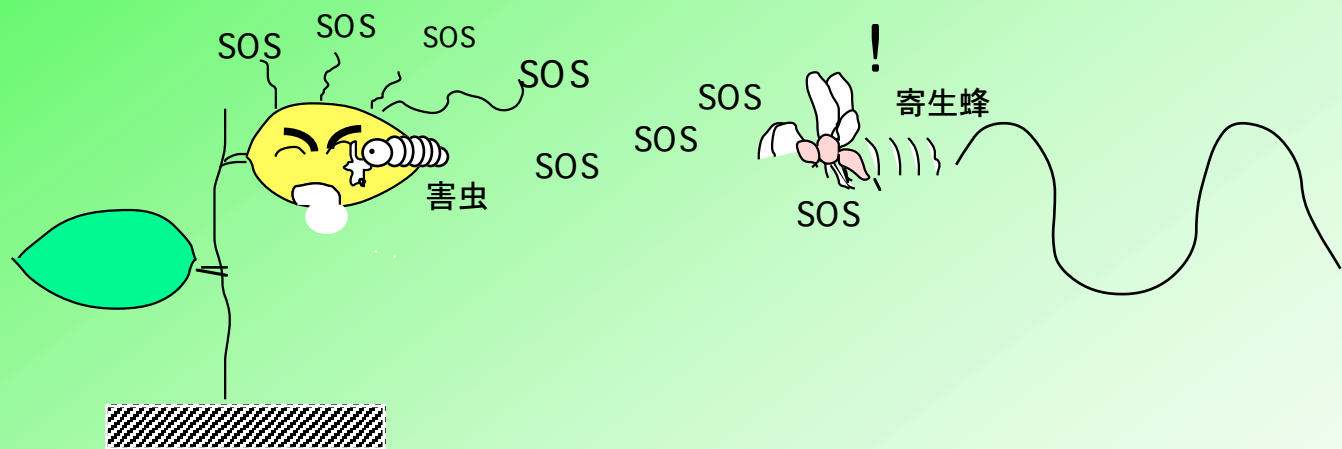
Parasitic wasps





A cocoon of *C. vestalis* on a Yellow cress plant.





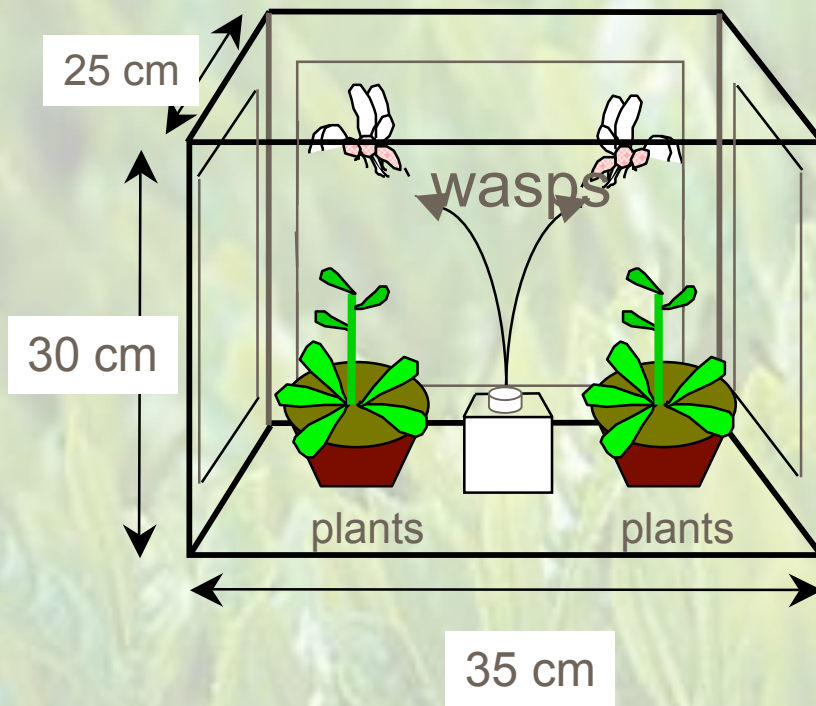


1. Field study

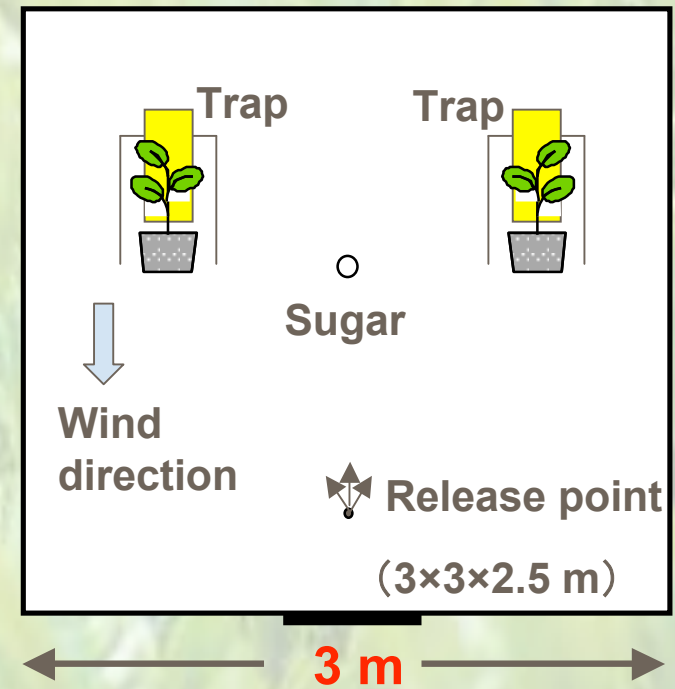
2. From single tritrophic system to plural ones

3. Plant-plant interaction: key compound and sensitivity

Choice Chamber



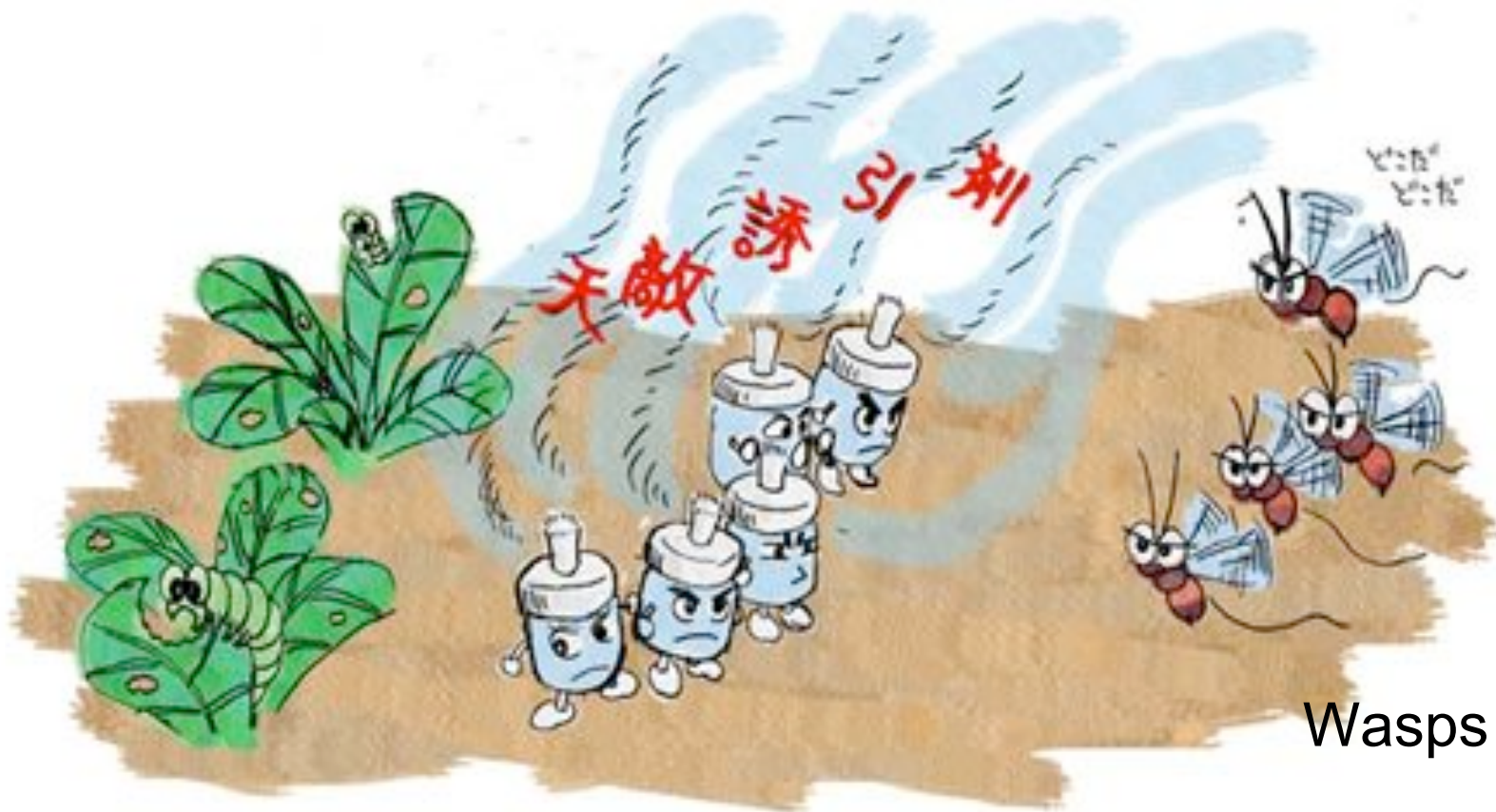
Climate controlled room



DBM



Cotesia vestalis



Attractants

Wasps



1. Field study
2. From single tritrophic system to plural ones
3. Plant-plant interaction: key compound and sensitivity

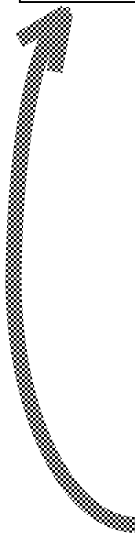


Cotesia vestalis

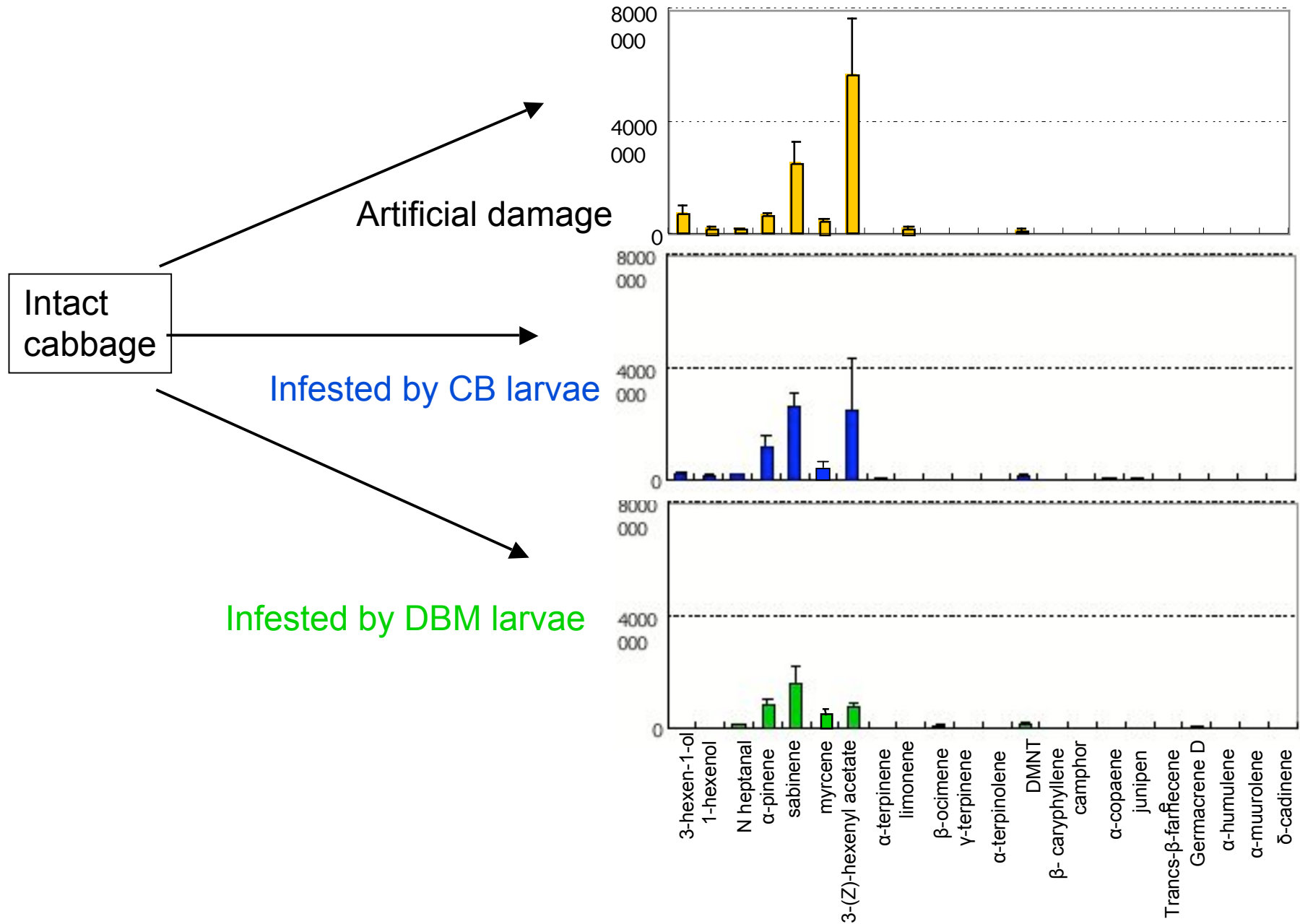


DBM

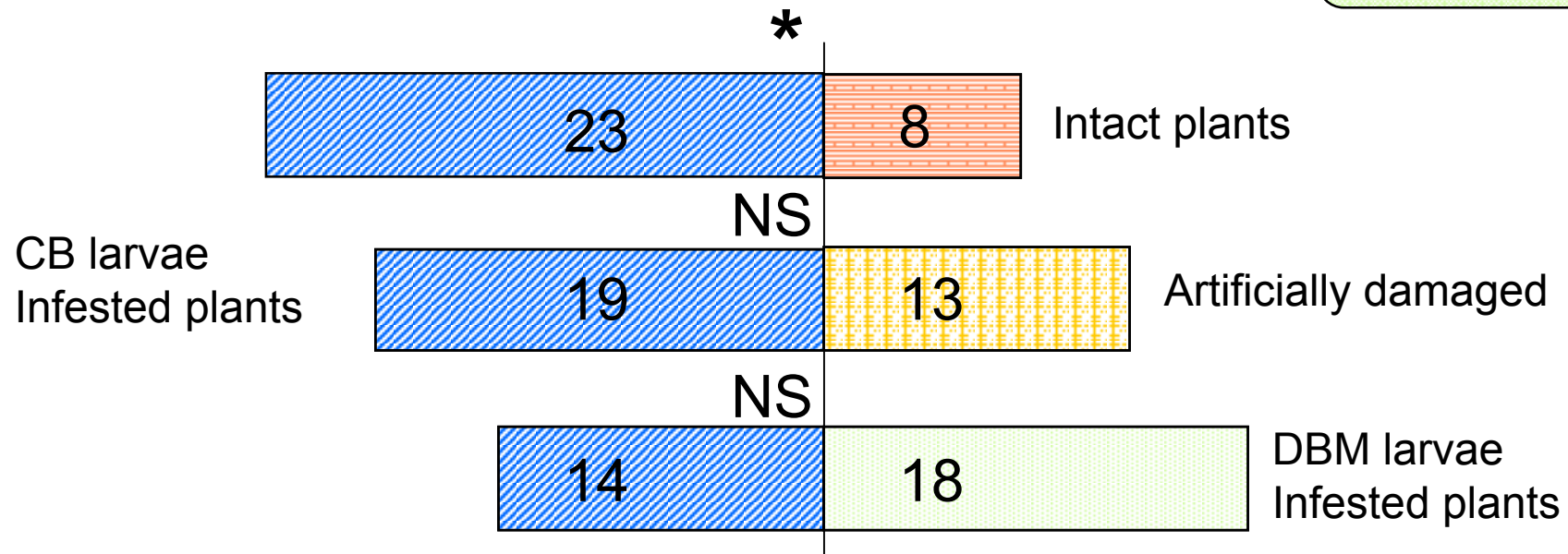
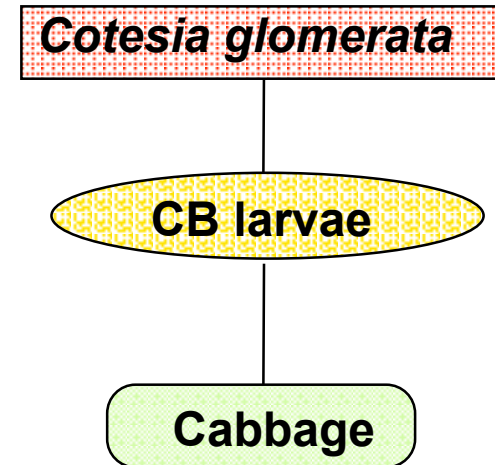
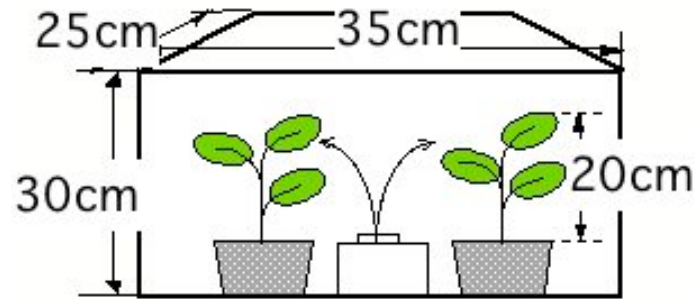
Cabbage



Plants emit herbivore-species specific blend of volatiles.

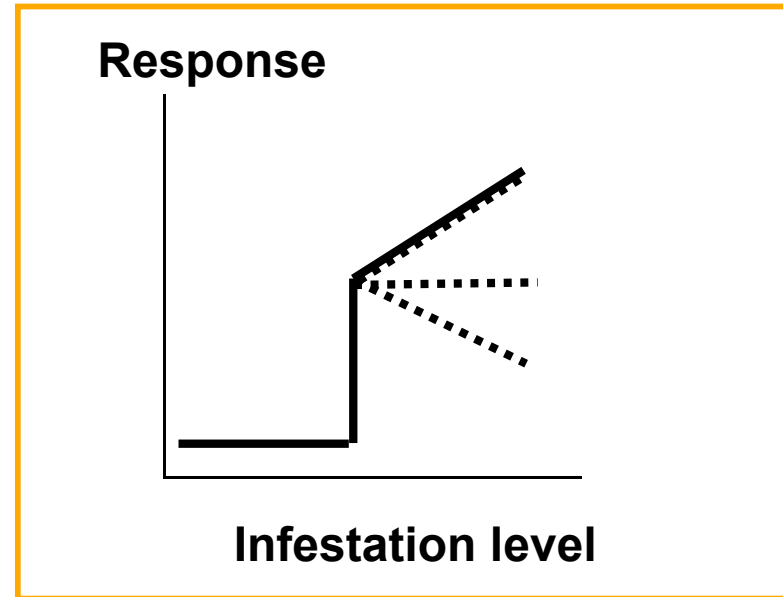
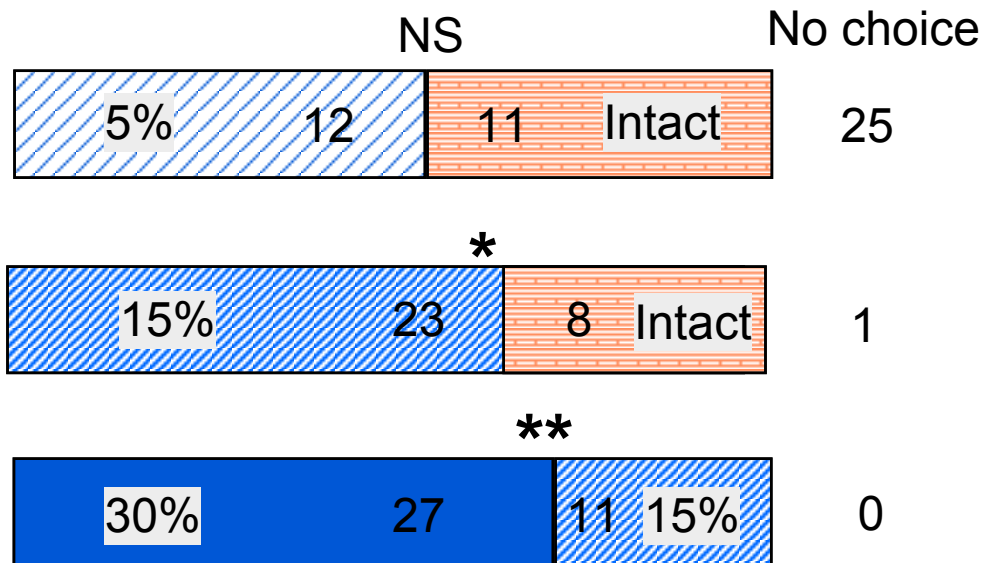
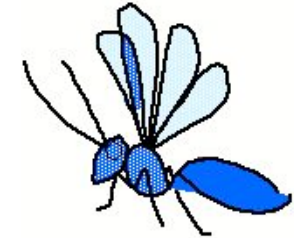


Response of *C. glomerata* to host-infested plants.

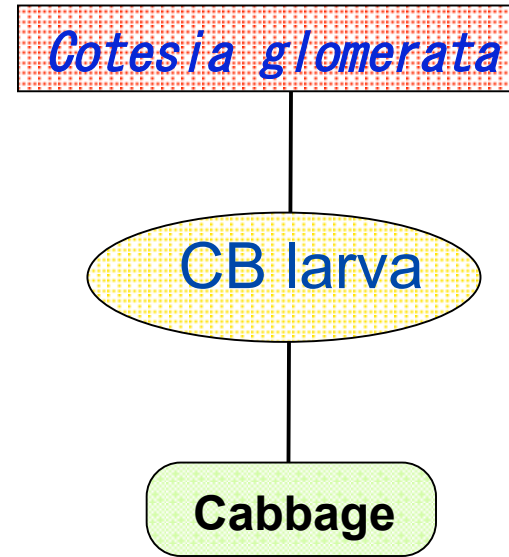
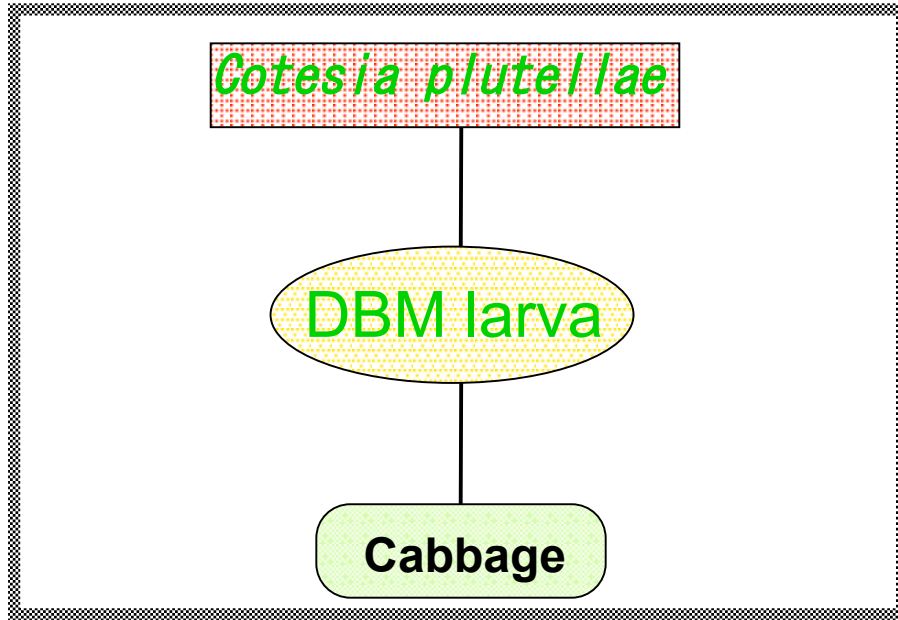


The wasps respond to cabbage plants with any wounding.

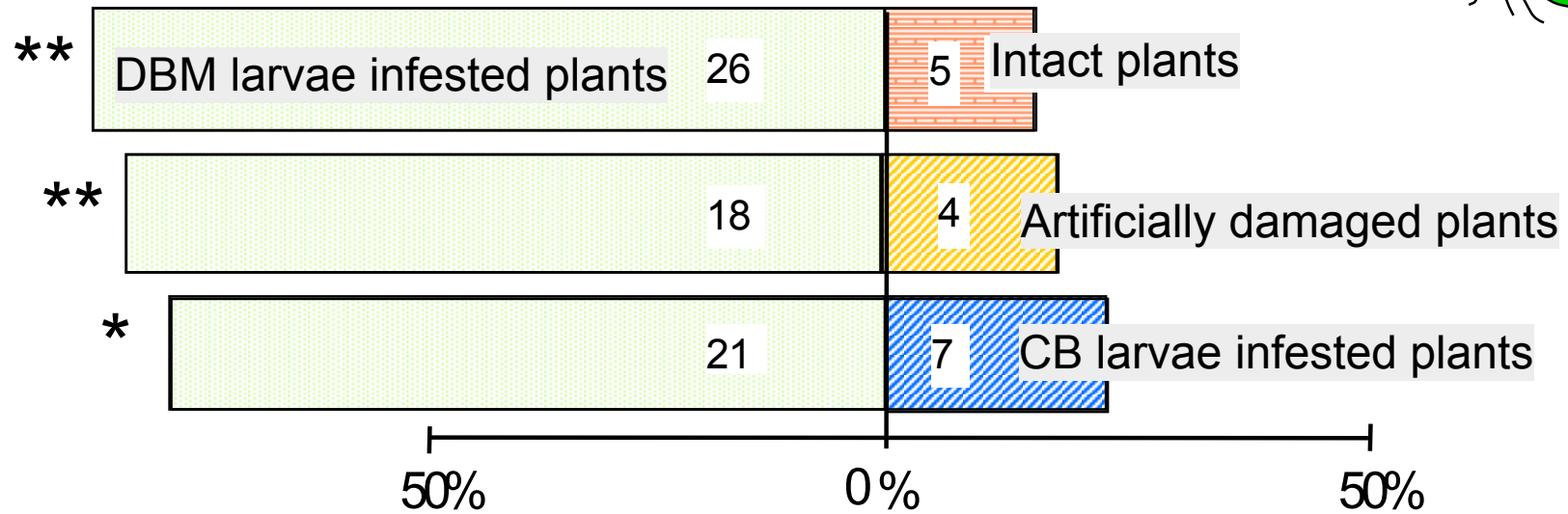
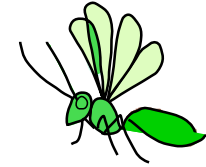
C. glomerata: does the wasps respond differently to plants with different infestation levels?



1. Presence of the threshold.
2. After the threshold, the wasps preferred plants with more damage.

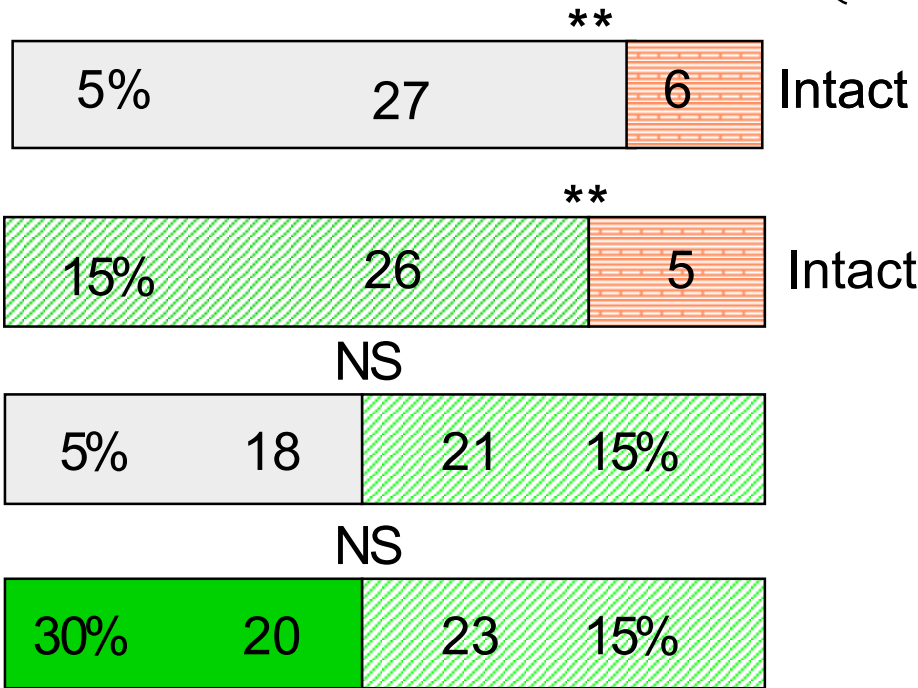
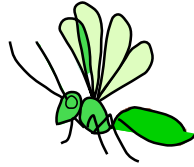


Response of *C. plutellae* to host-infested plants

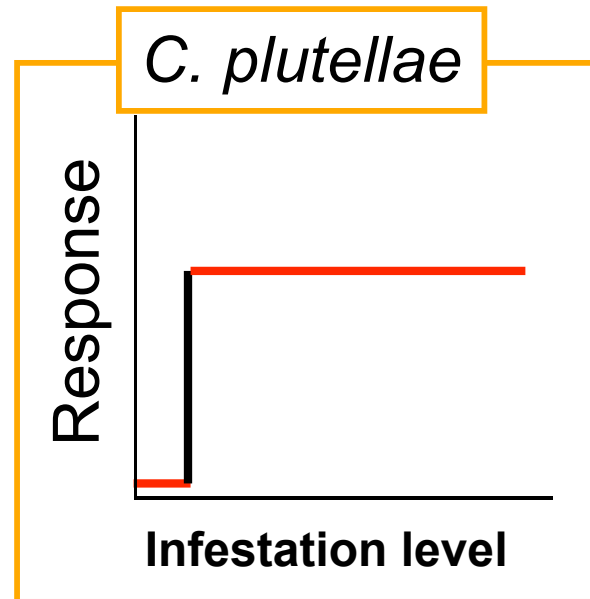
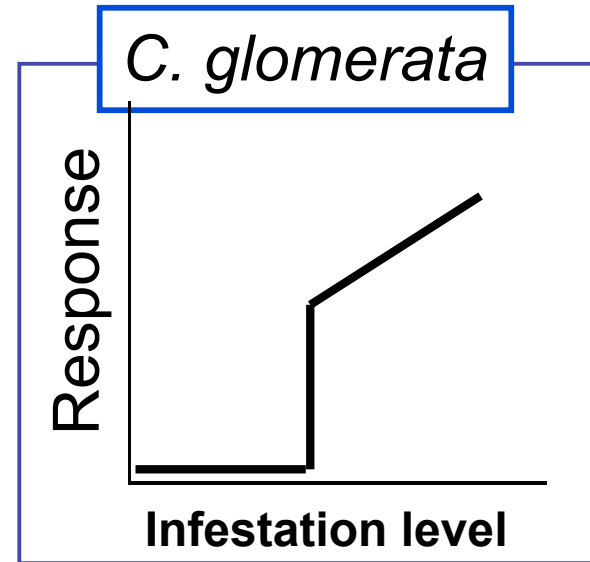


Specific response to host-infested plant volatiles

Response of *C. plutellae*:
 How does the wasps detect
 infestation levels?



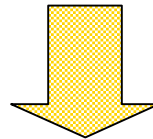
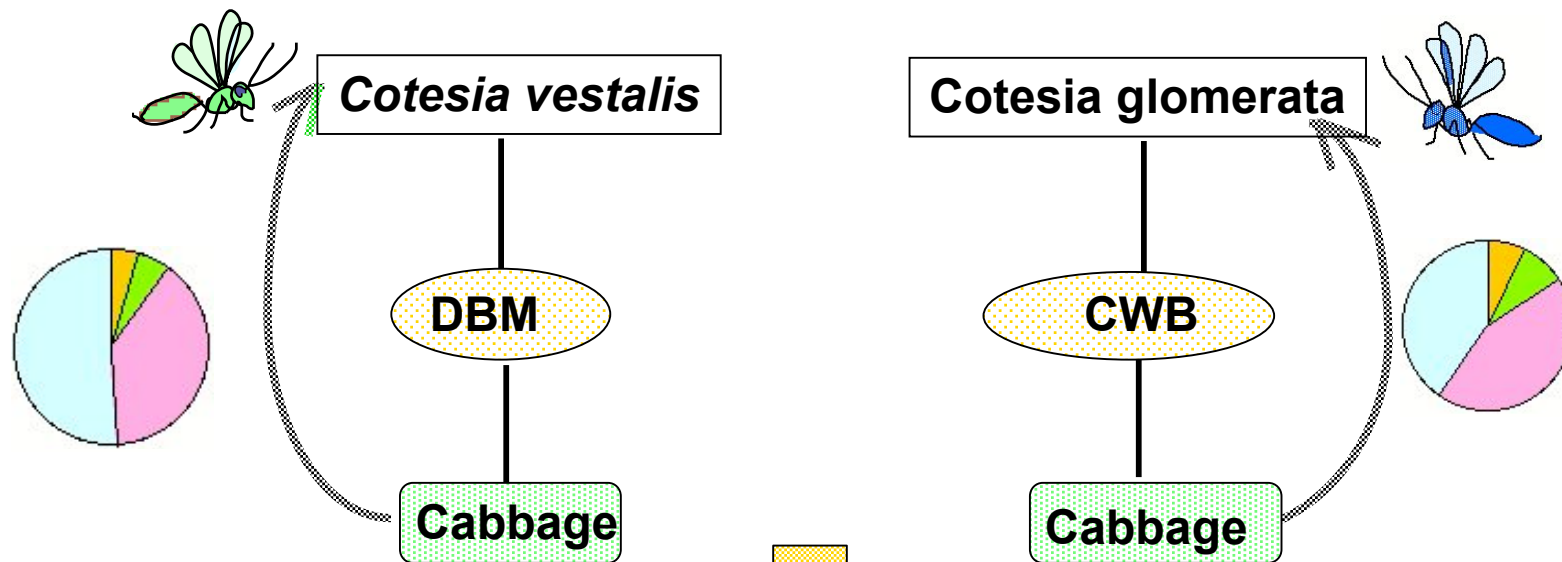
Low threshold.
 Response did not increase after
 the threshold.



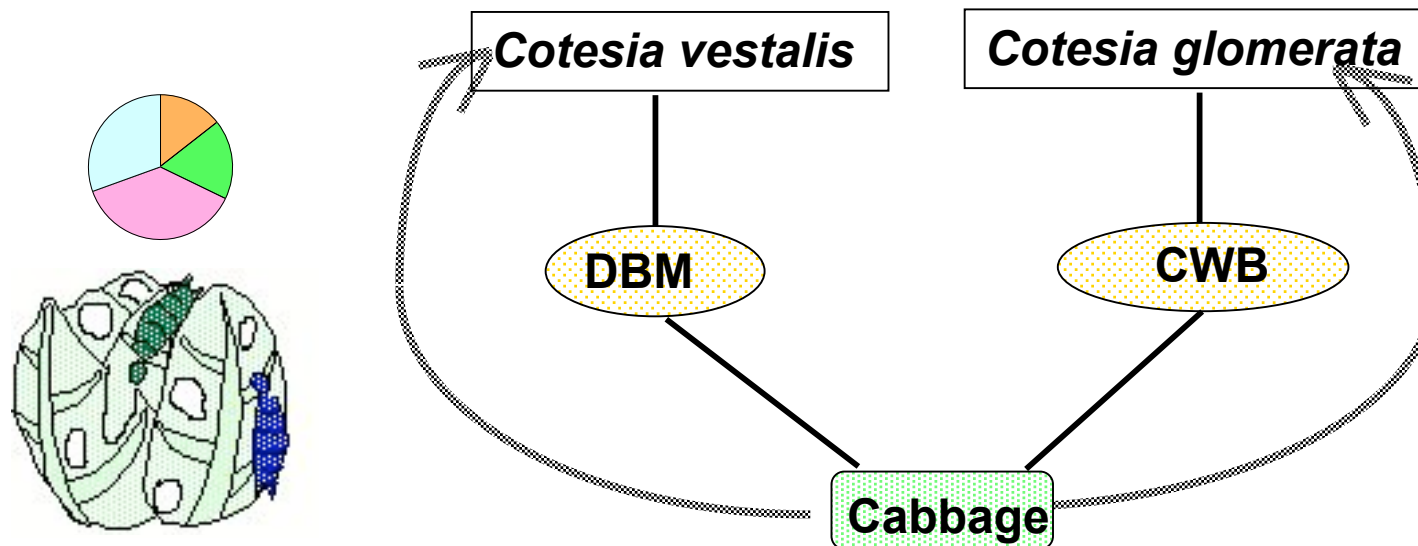
Learning

This wasp can learn the slight differences in blend with good/bad experience.





Coupling





Cotesia vestalis

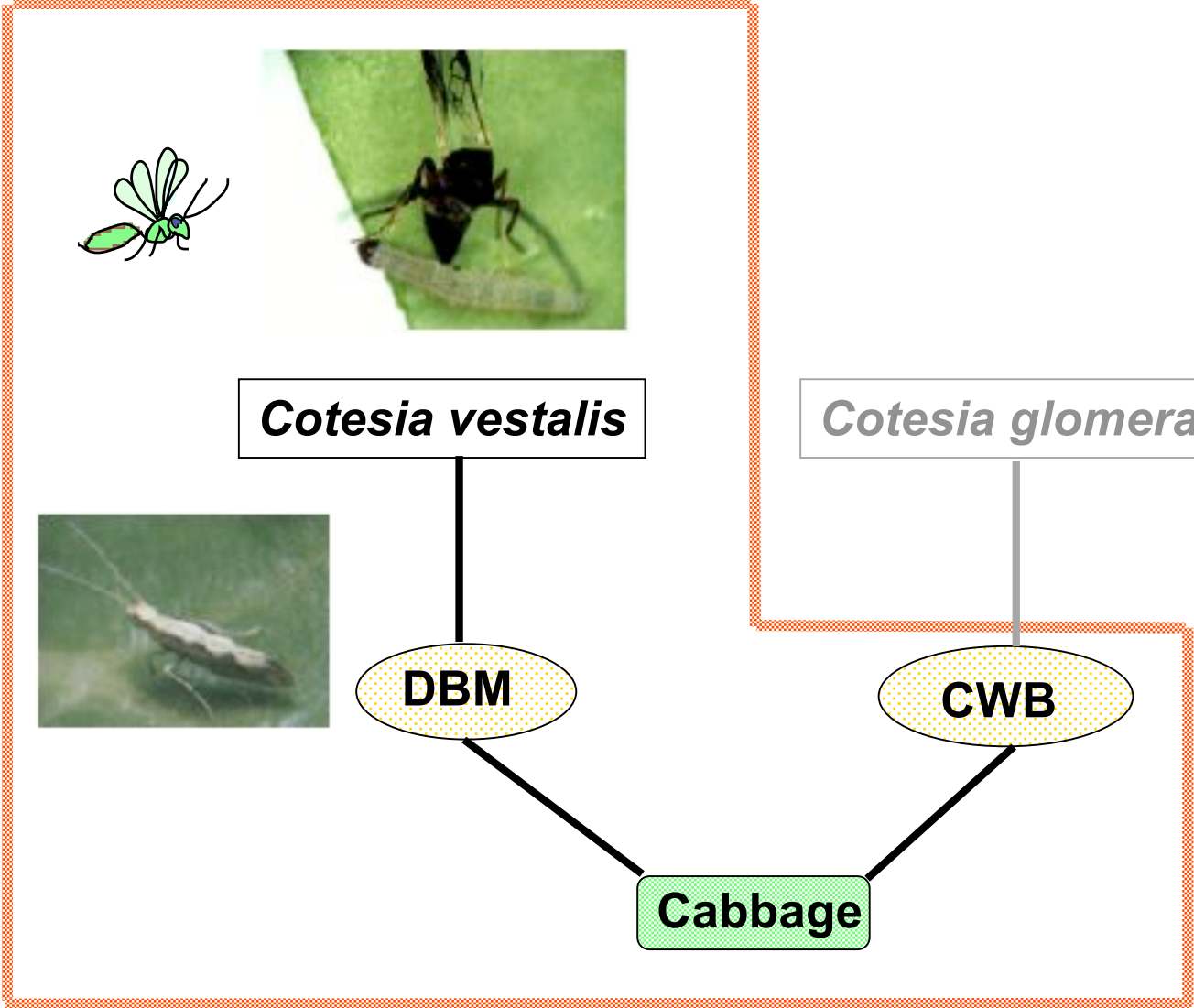
Cotesia glomerata

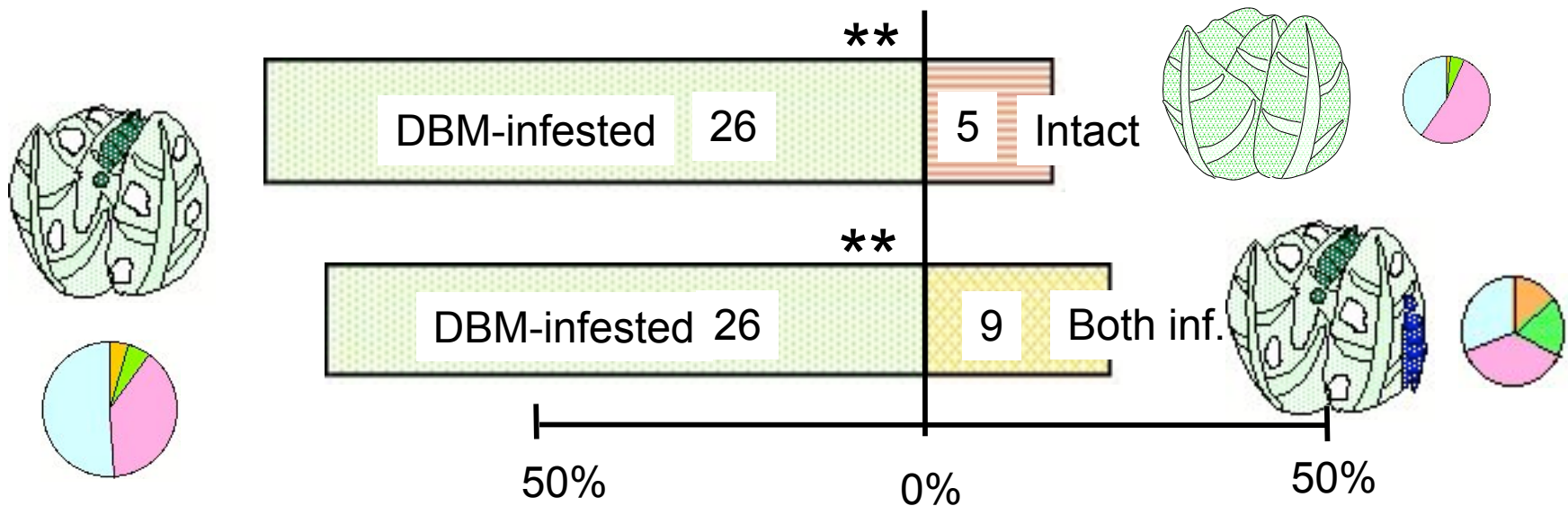
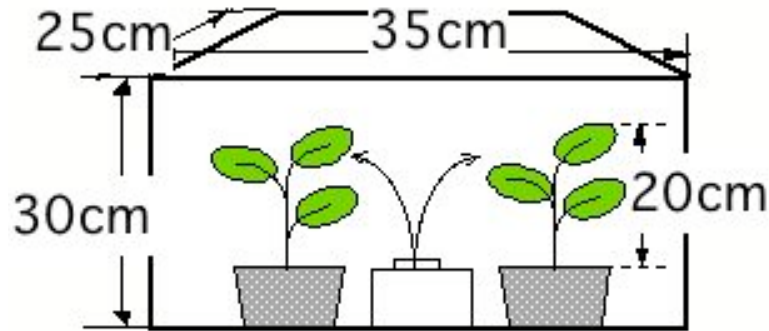
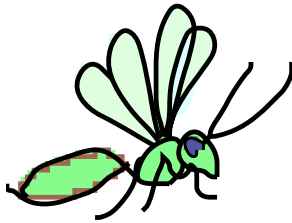


DBM

CWB

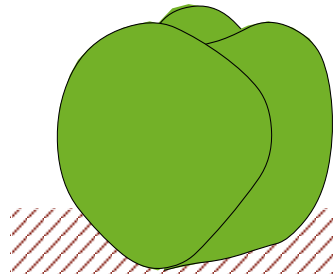
Cabbage



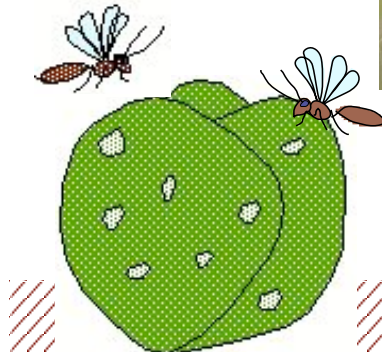


C. vestalis preferred DBM-infested plants.

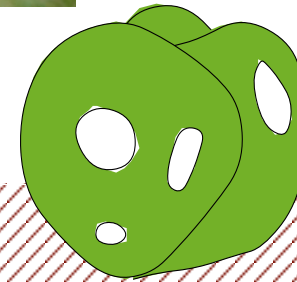
Where is the best place for



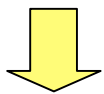
Intact



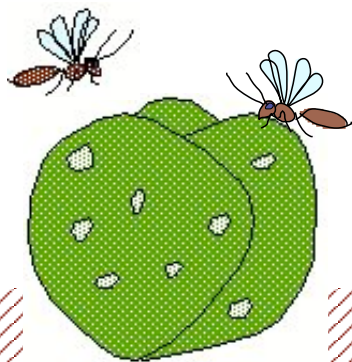
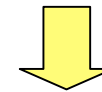
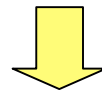
DBM-infested



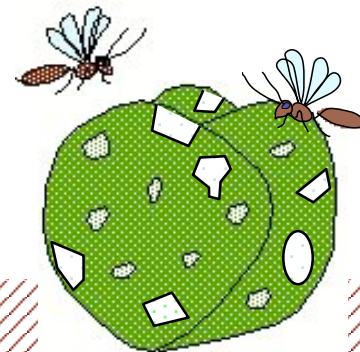
CWB-infested.



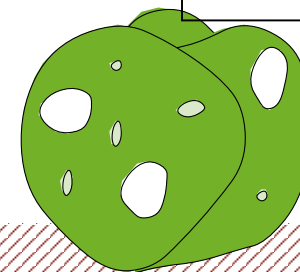
Few days later...



DBM-infested



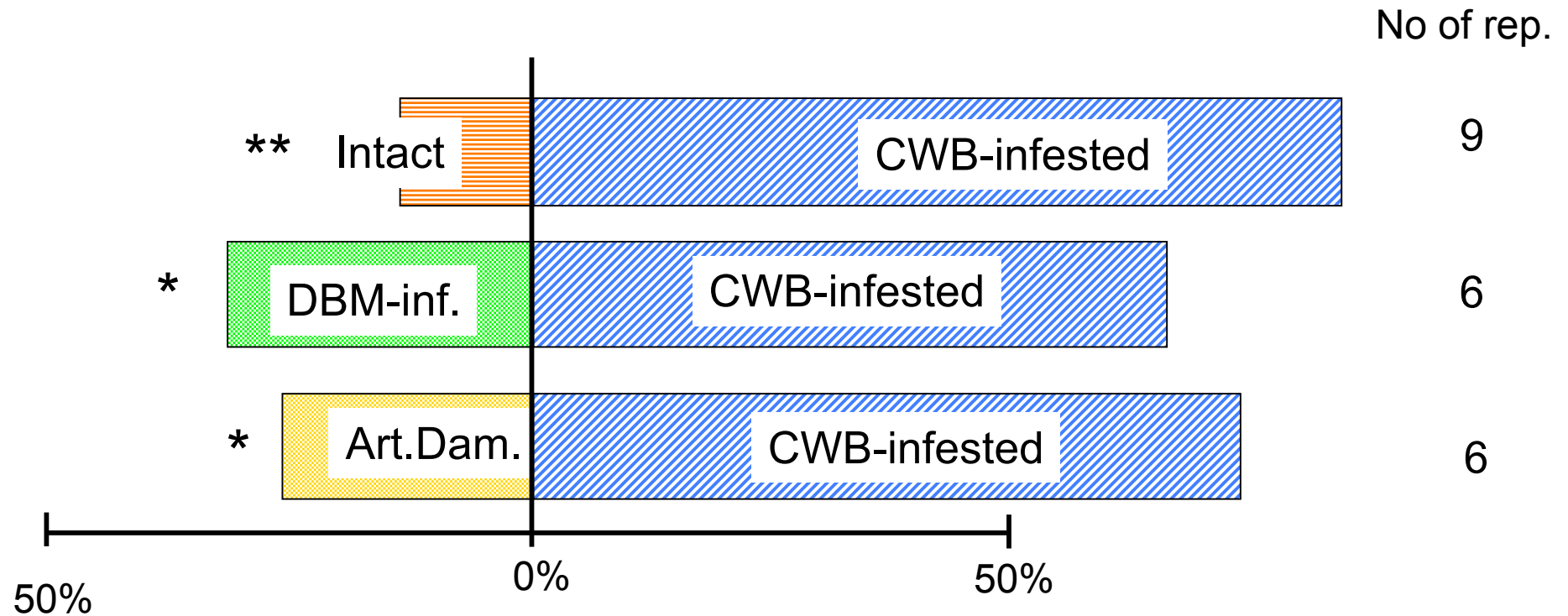
DBM-infested



Both-infested

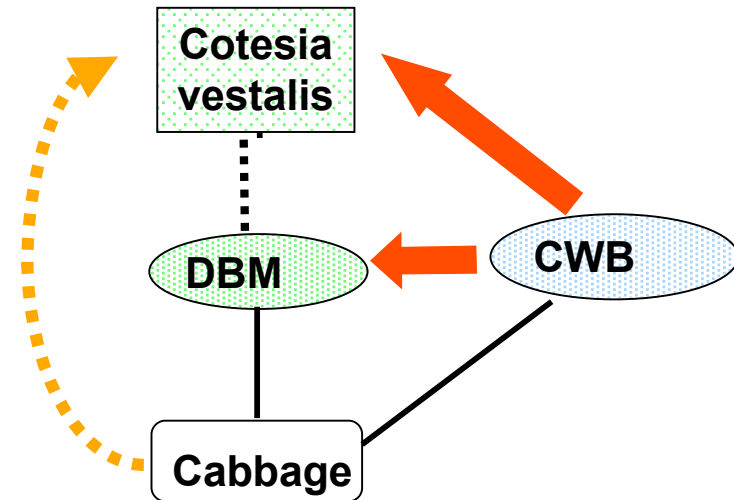
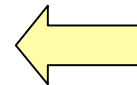
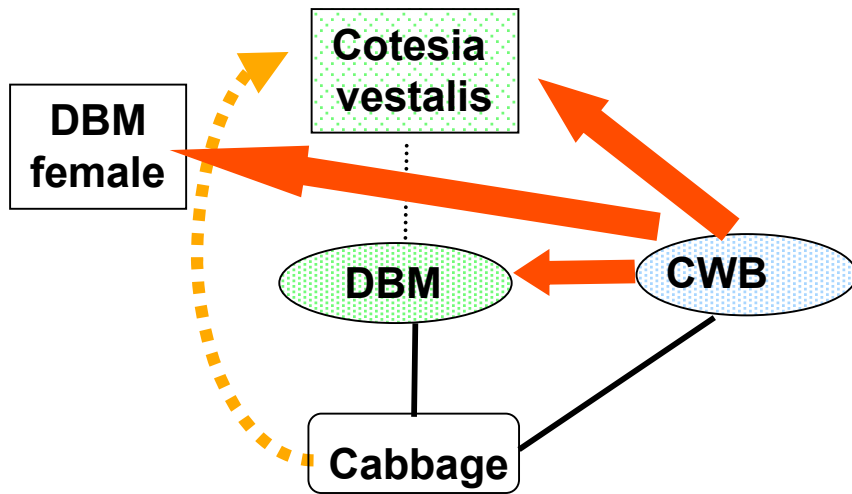
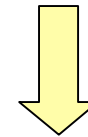
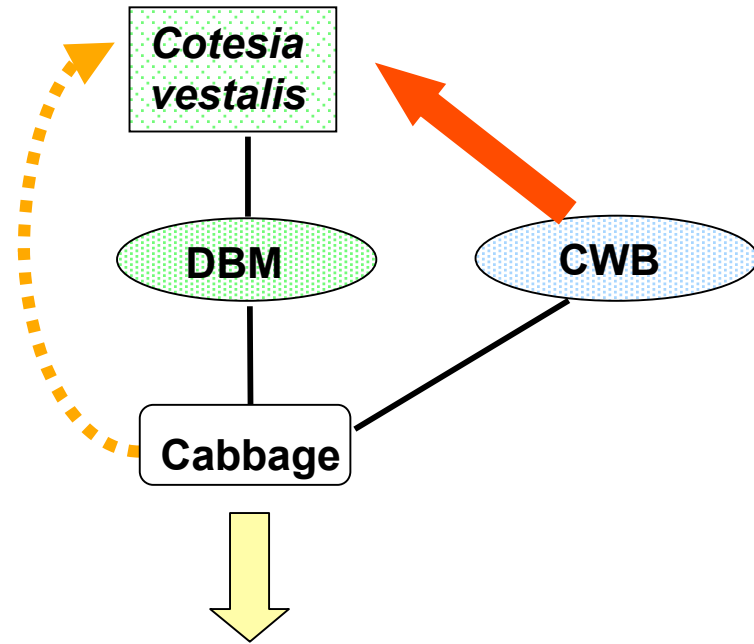
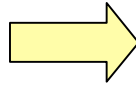
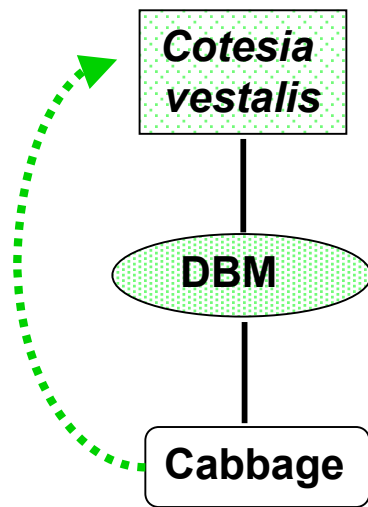
Enemy free space

Oviposition preference of



Leaf quality; CWB-infested = Intact = DBM-inf. = Art. Damaged

→ DBM preferred enemy free space.



Cotesia vestalis

Cotesia glomerata

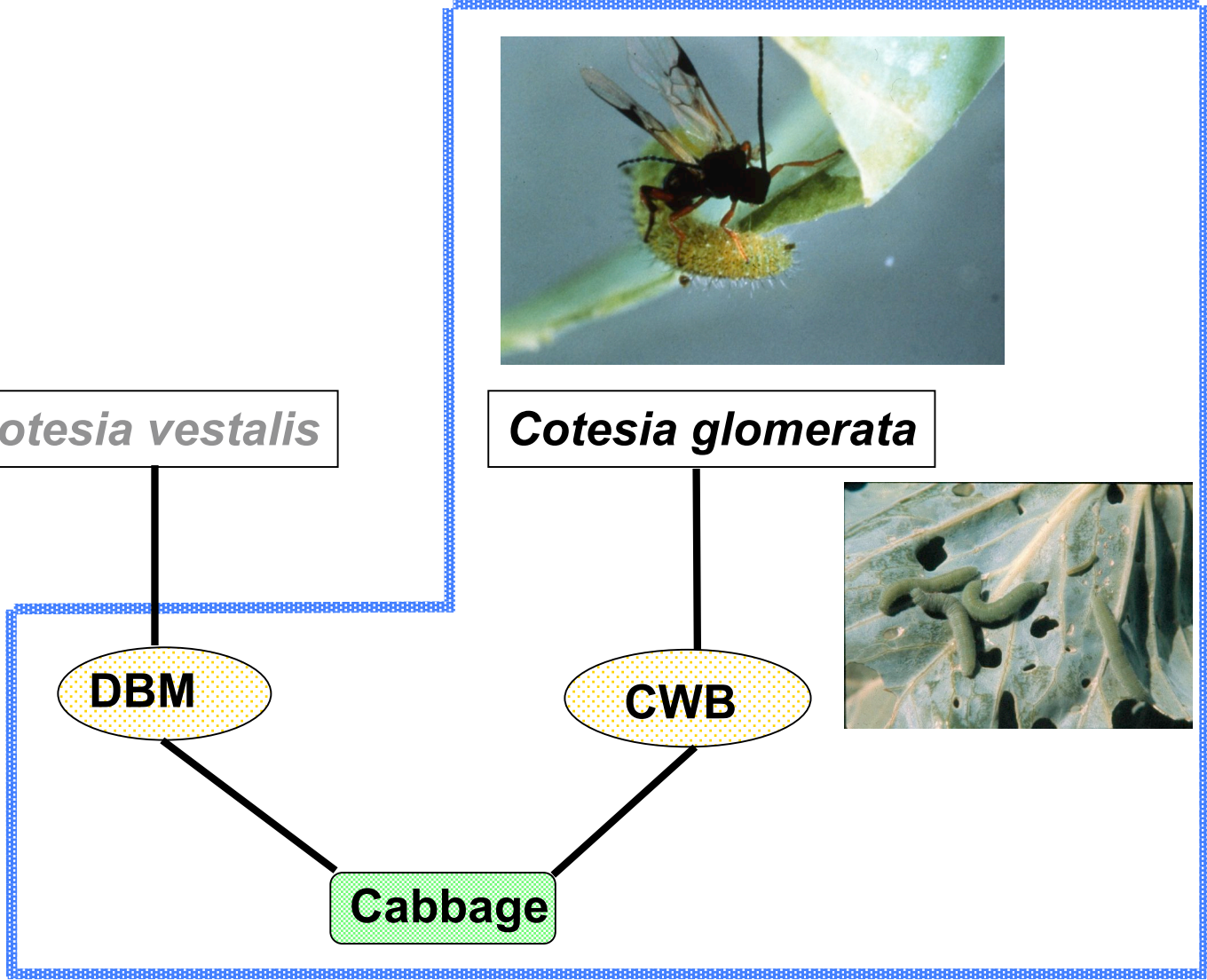


DBM

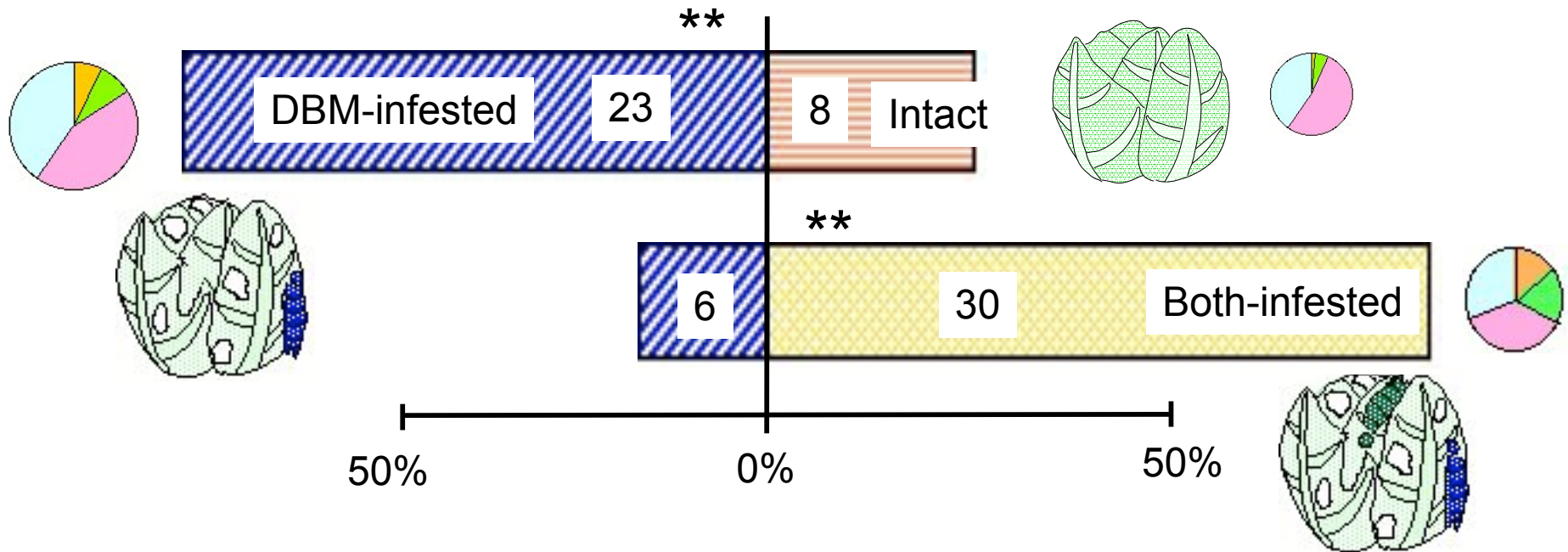
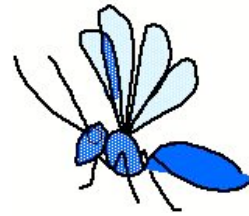
CWB



Cabbage



Cotesia glomerata



Cotesia glomerata preferred both-infested plants.

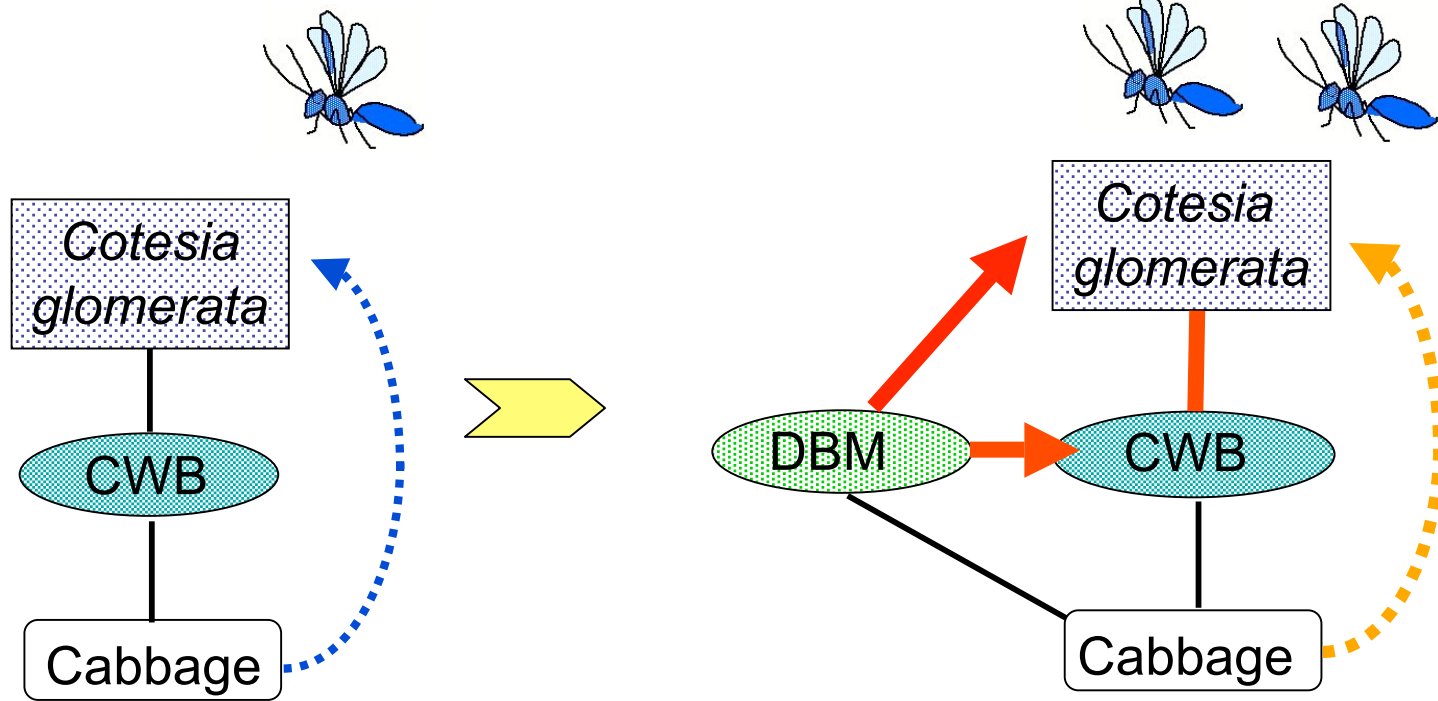
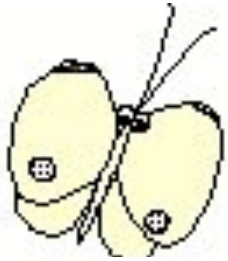
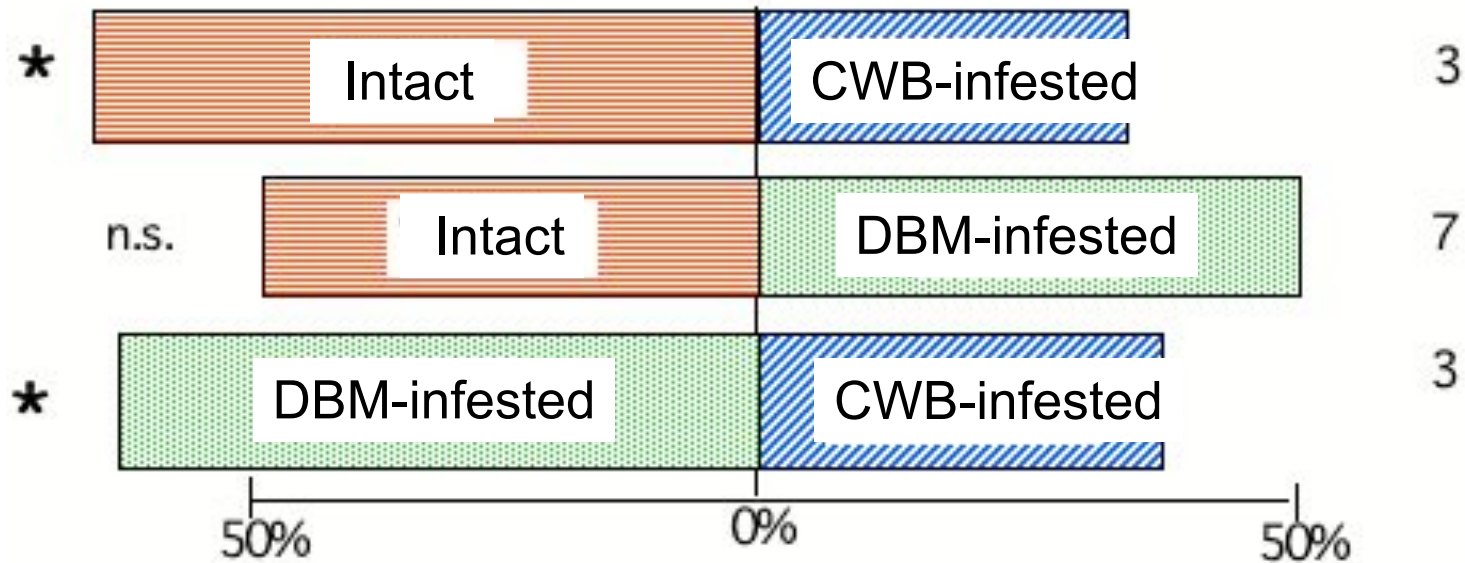




Photo : J. McNeil



Oviposition preference of *Pieris rapae*



WHY?





Ants



Cotesia vestalis

Cotesia glomerata

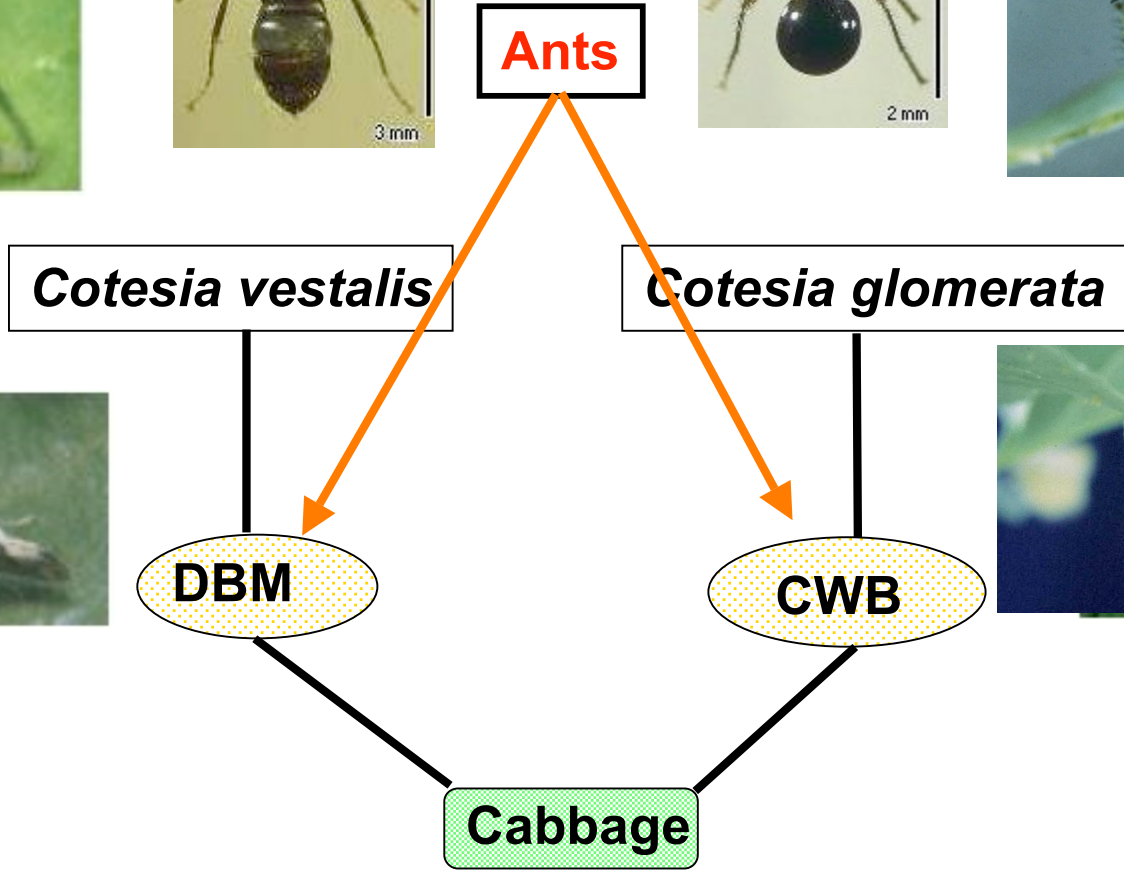


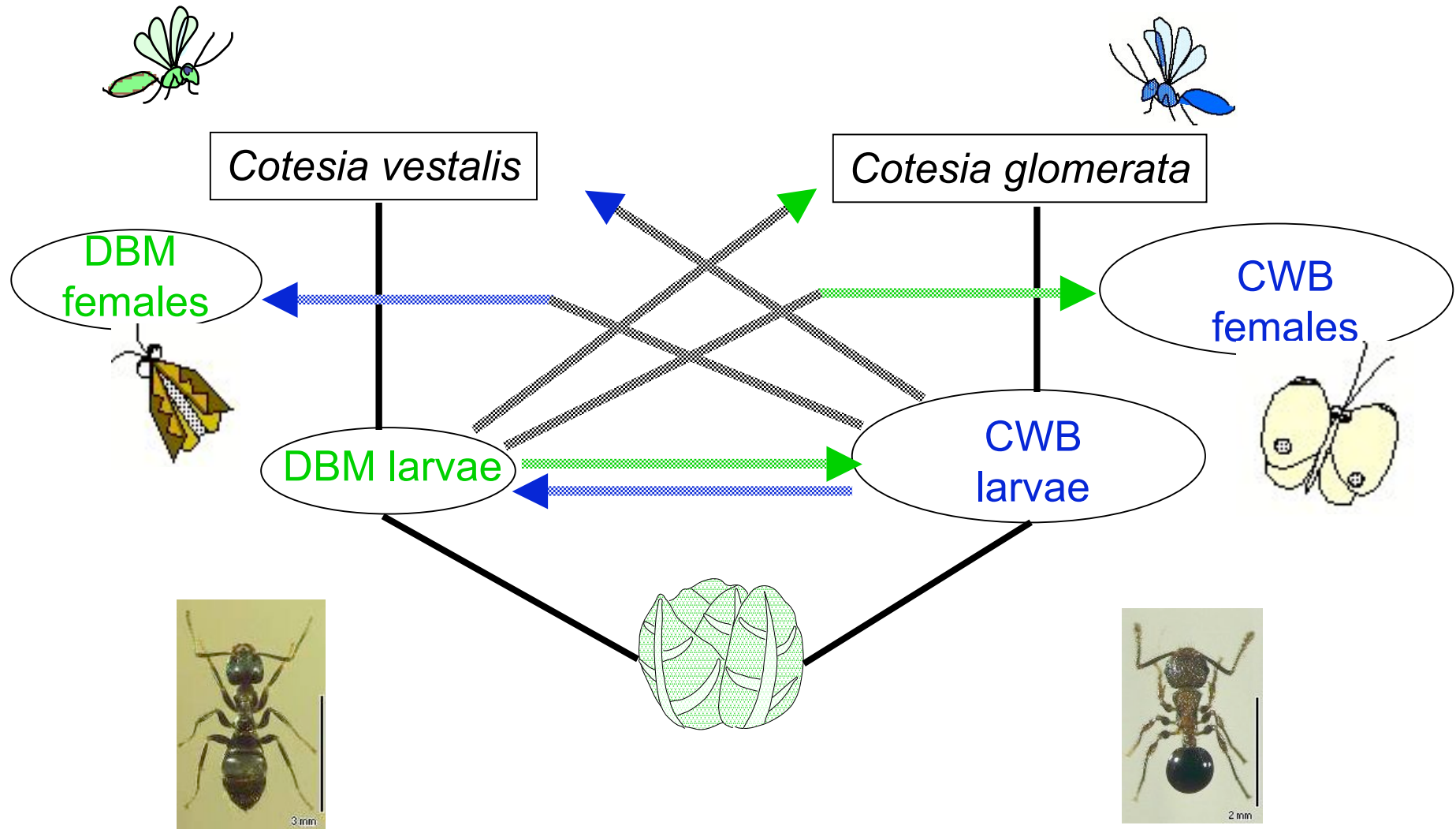
DBM

CWB

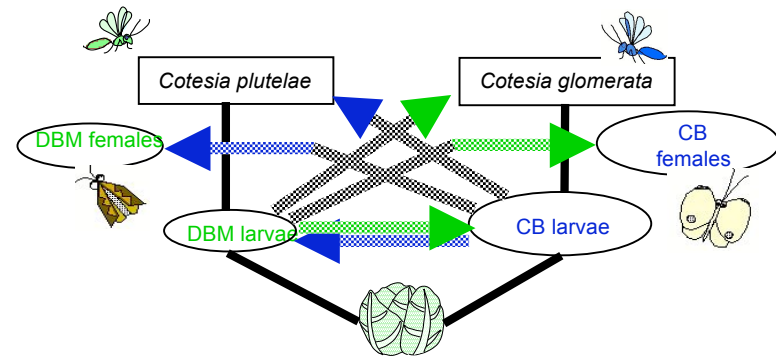
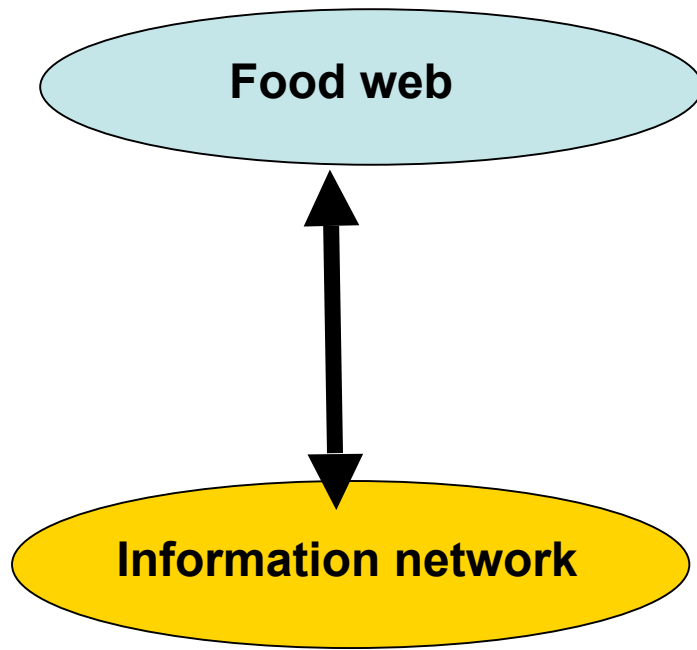


Cabbage





Information network mediated by plant volatiles





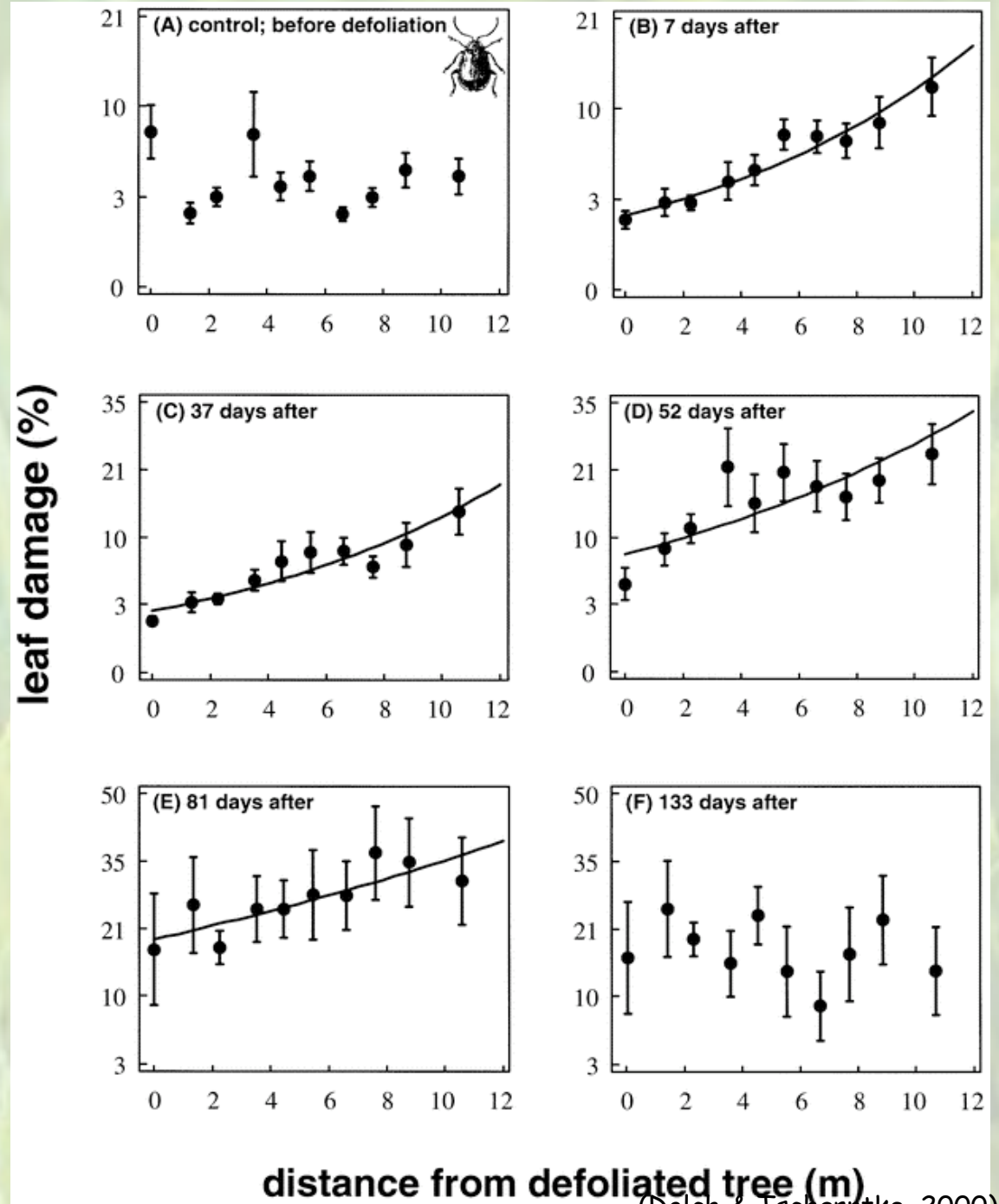
Plant-plant interaction



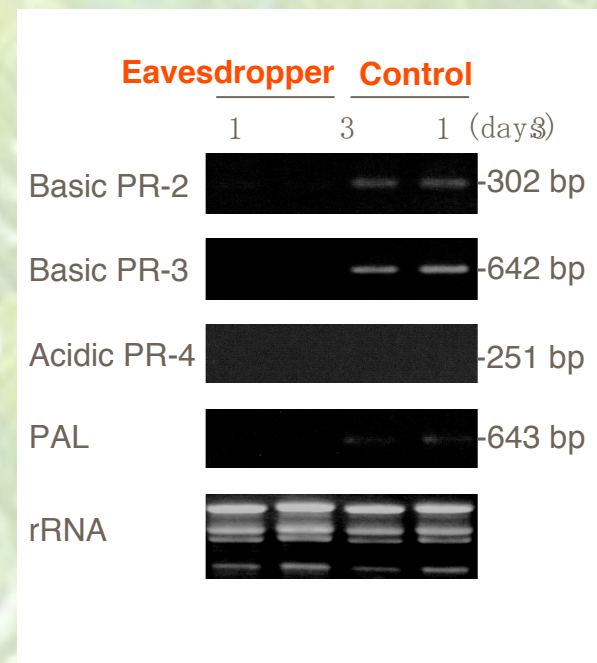
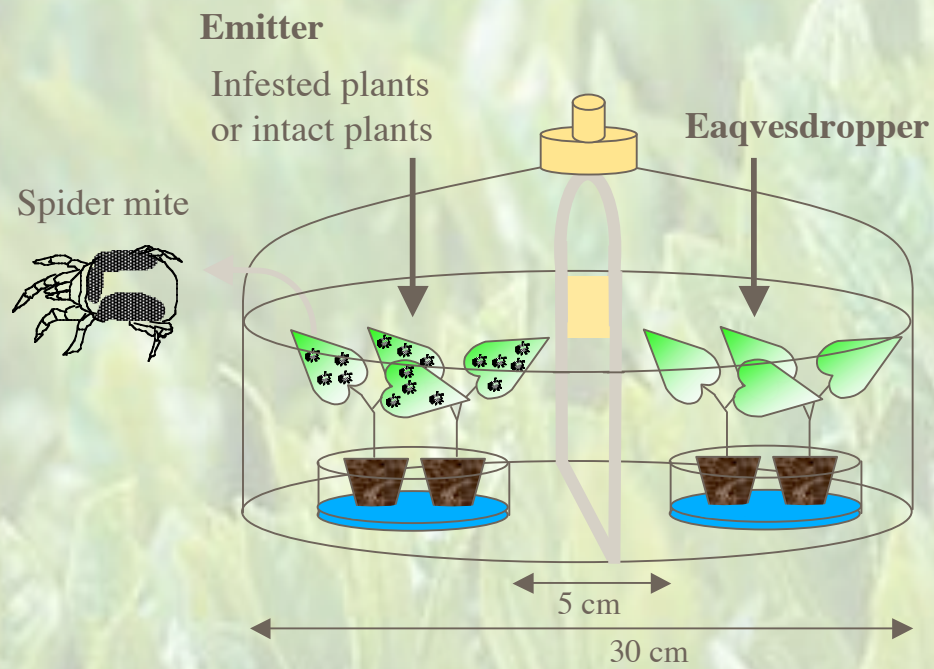
Sagebrush (*Artemisia tridentata*)



Alder



(Dolch & Tscharrntke, 2000)

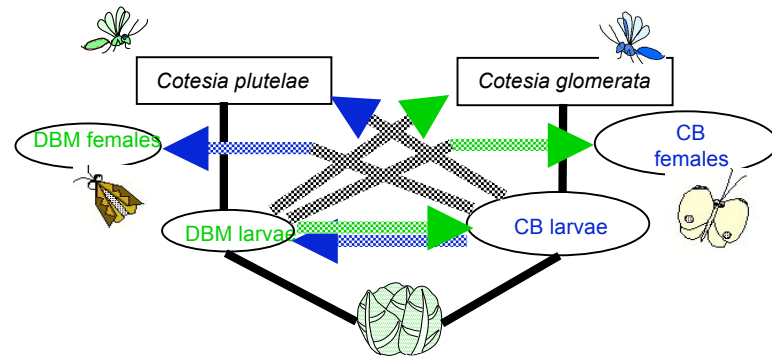
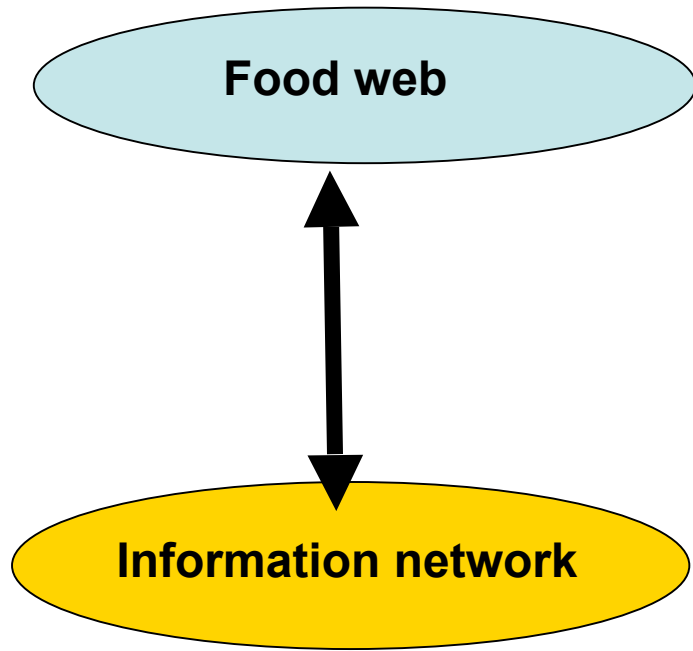


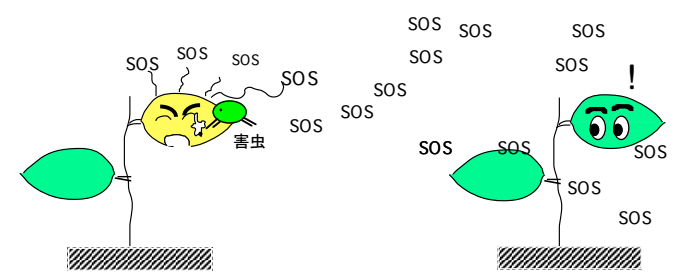
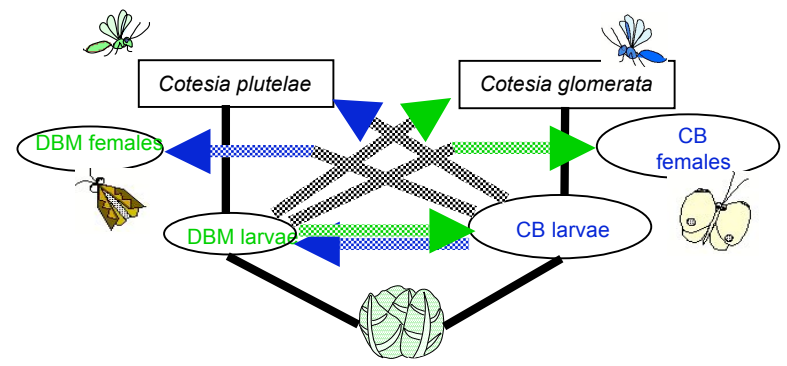
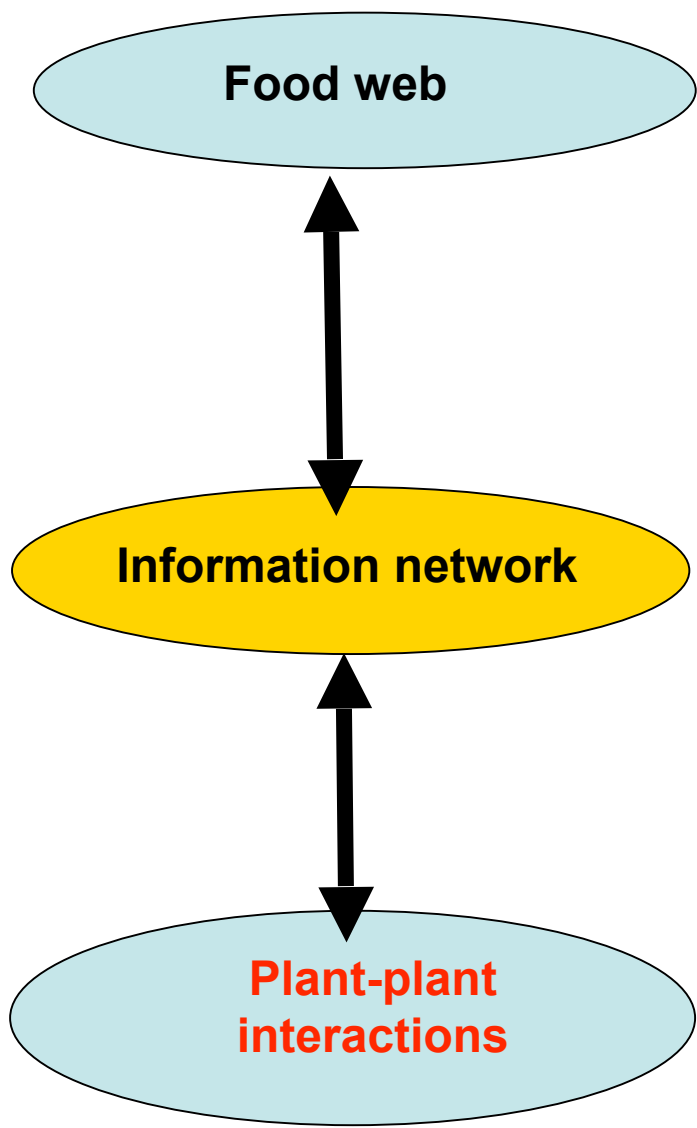
A photograph of a tea plantation with rows of green tea bushes. The text 'Leaf volatile ecology' is centered over the image in a bold, black, sans-serif font.

Leaf volatile ecology

Food web

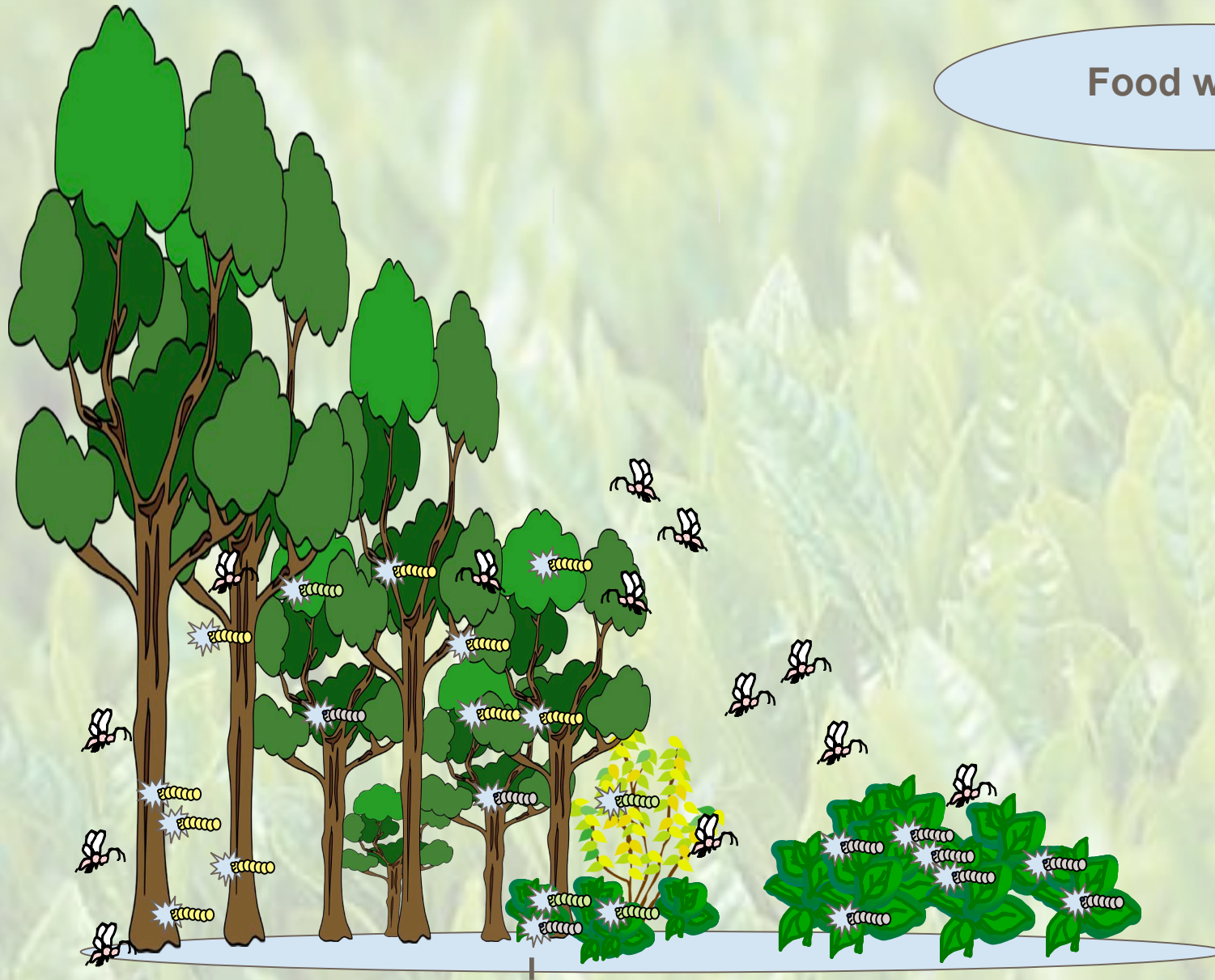






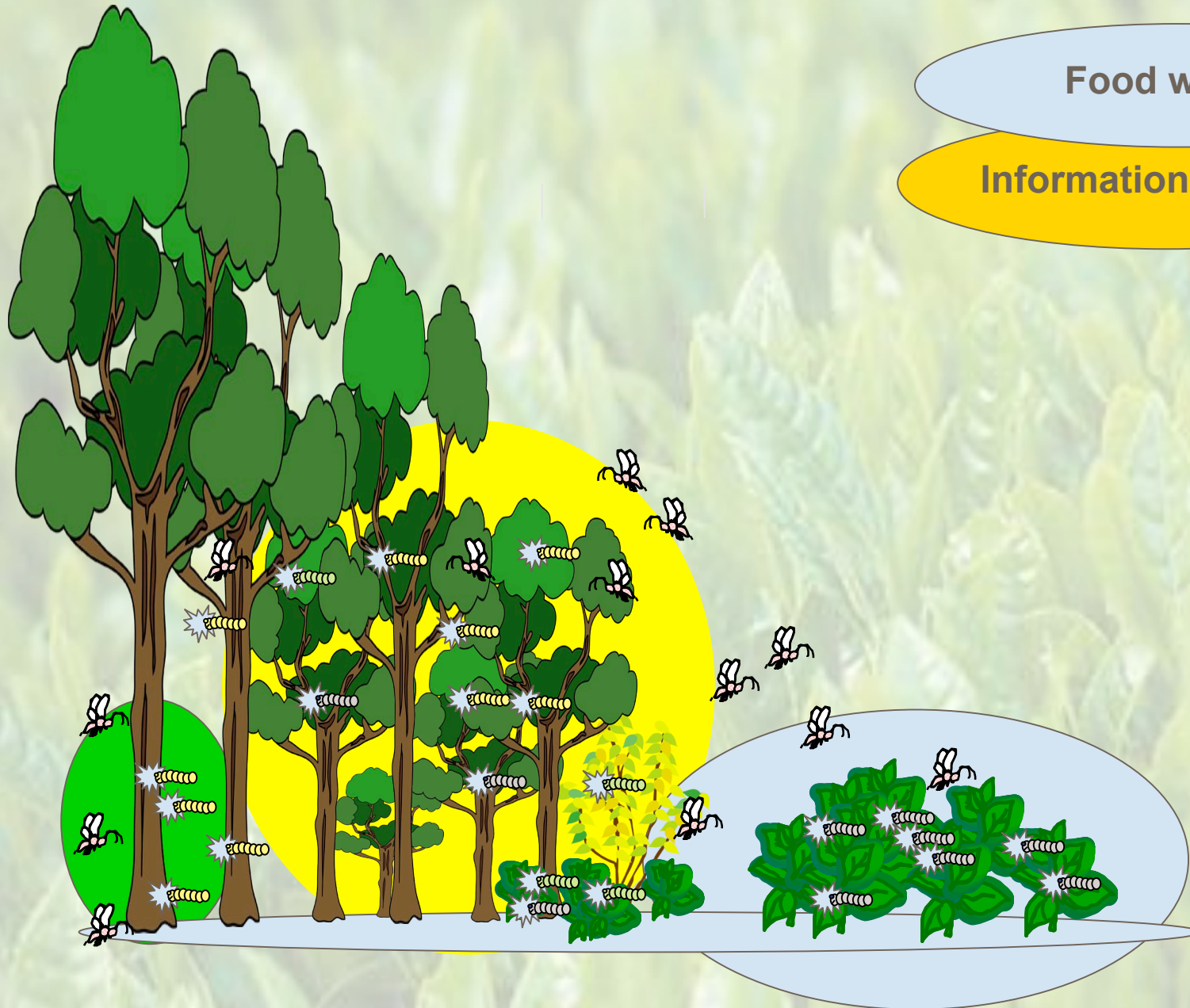


Food web



Food web

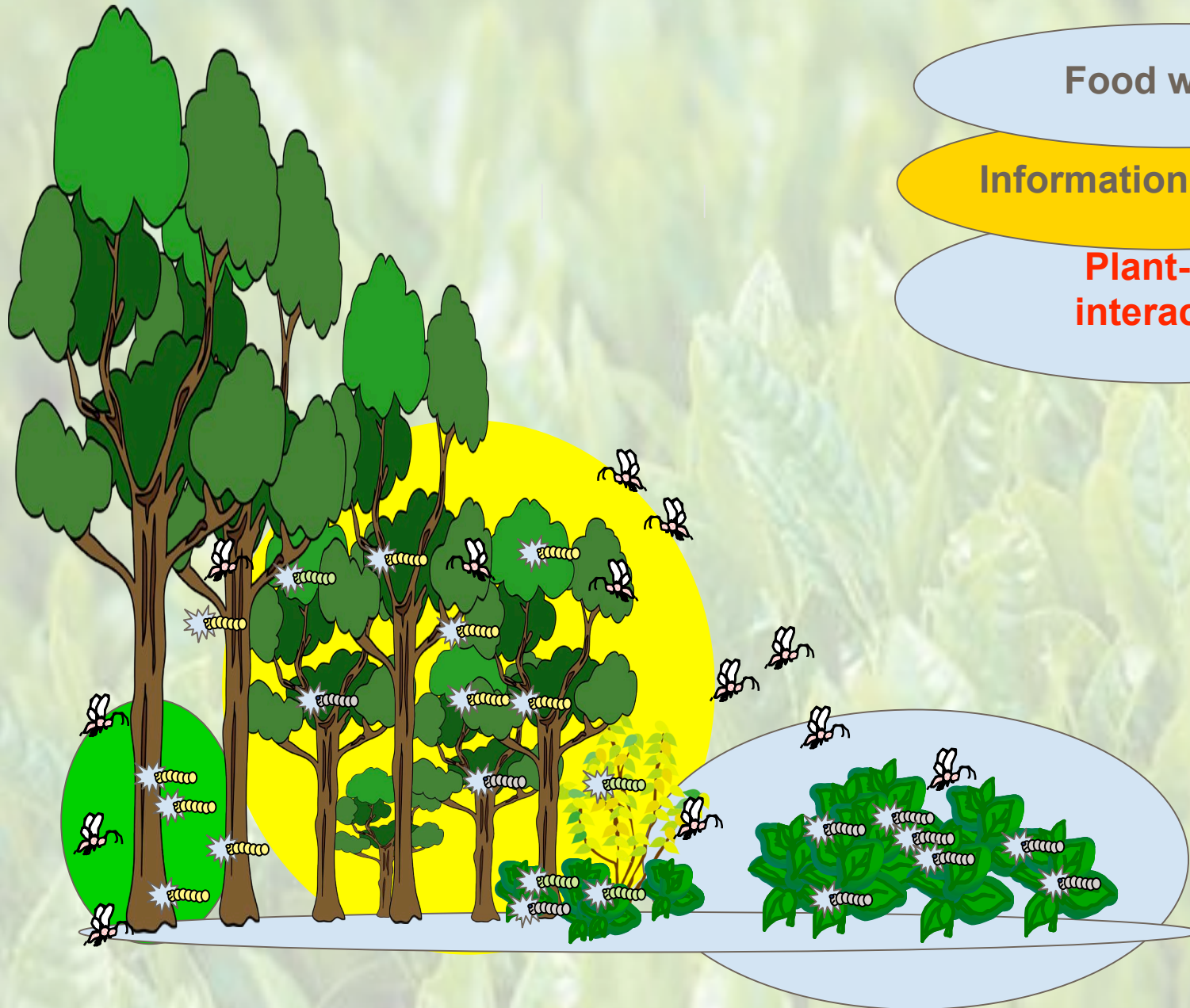
Information network



Food web

Information network

Plant-plant
interactions



時間的群集の変化

