

# **Glucosinolates: value of an Arabidopsis model**

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**BBSRC-funded multidisciplinary project on glucosinolate metabolism in Arabidopsis:**

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# What is our project about?

modulate glucosinolate metabolism in *Arabidopsis thaliana*  
by genetic engineering

assay the role of these secondary metabolites in tritrophic  
interactions (plant-herbivore insects-enemies)

→ apply to crops producing glucosinolates  
lead to new pest management strategies ?

# **Why do we use *Arabidopsis thaliana*?**

**glucosinolate producer**

**natural variation in glucosinolate content and composition**

**extensively studied model plant**

**availability of information and tools useful in molecular biology :**

**small genome completely sequenced and availability of cloned genes**

**easiness to generate transgenic plants**

**collections of mutant lines**

# What are we going to do?

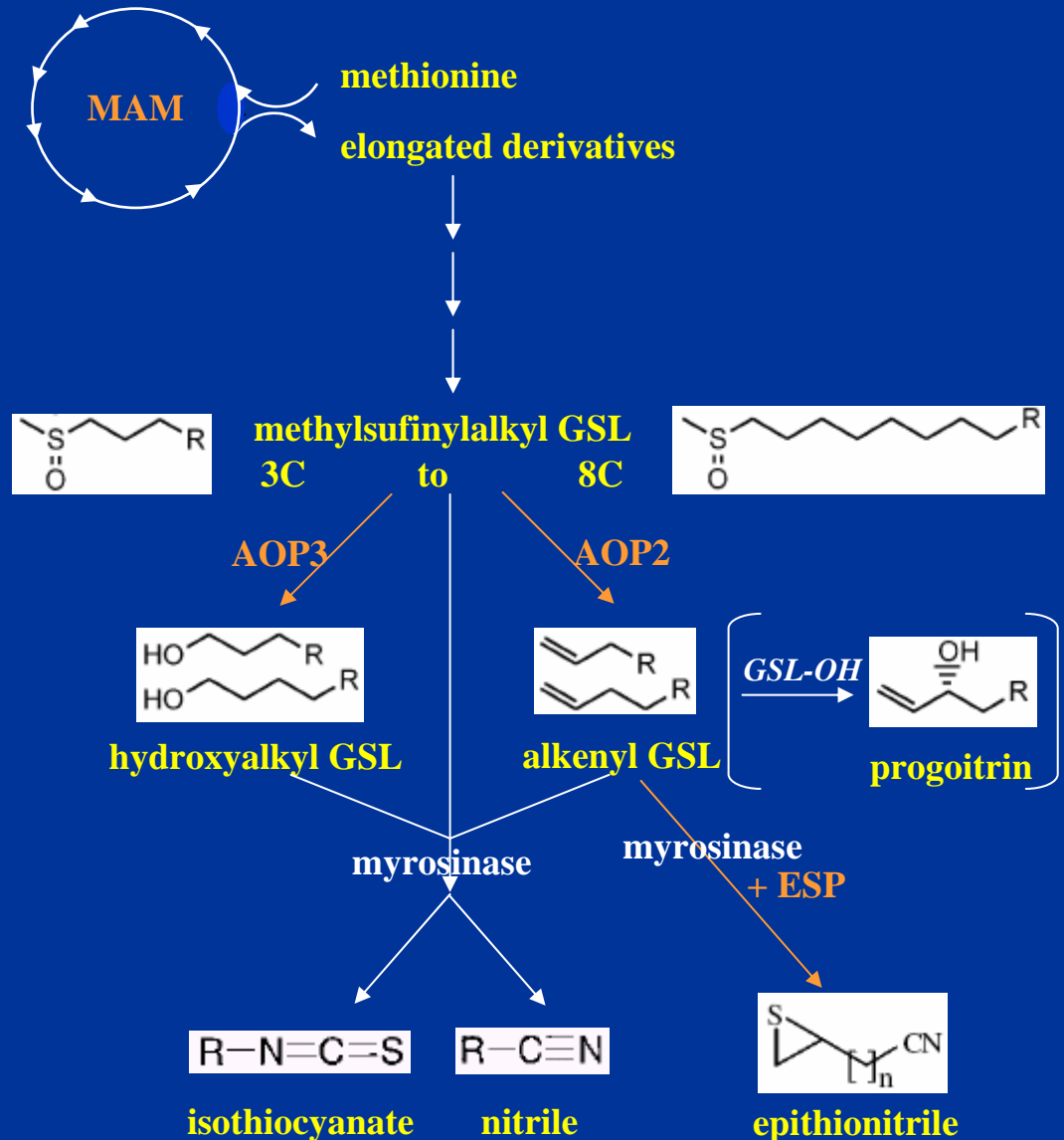
## Glucosinolate metabolism

1. Side chain elongation

2. Glucosinolate biosynthesis

3. Side chain modifications

4. Glucosinolate hydrolysis



# What effects do these changes have on the behaviour of insect pests?

## From the literature we know that:

- isothiocyanates are toxic to insects in the gas phase, upon contact and after ingestion
- in many cases nitriles and thiocyanates seem less active
- isothiocyanates and nitriles serve as attractants and intact glucosinolates act as oviposition and feeding stimulants to specialist insects
- isothiocyanates attract parasitoids of specialist insects

## But

- most of these experiments were done using artificial diets
- only a few were done on near-isogenic lines
- the effects of epithionitriles on insects are unknown

(for review: Wittstock *et al.* (2003) *in*: Romeo JT (eds): *Integrative Phytochemistry: from Ethnobotany to Molecular Ecology*. Vol37)

# What is our strategy?

## lepidopteran

cabbage looper (*Trichoplusia ni*)

diamondback moth (*Plutella xylostella*)

*Cotesia plutellae*

generalists

**Brassicaceae specialists**

parasitoid wasps

## aphid

peach-potato aphid (*Myzus persicae*)

woolly cabbage aphid (*Brevicoryne brassicae*)

*Diaeretiella rapae*

**Arabidopsis model**



**protection of Brassicaceae  
crops from insect pests**