

PEST AND BENEFICIAL INSECT ASSEMBLAGES IN CANOLA, MUSTARD AND CANOLA-MUSTARDS IN NORTHERN NEW SOUTH WALES.

The glucosinolate content of canola (*Brassica napus*) affects the taste and quality of the oil and Australian plant breeders continue to actively select canola and mustard (*Brassica juncea*) plants with the aim of reducing and in the case of Bio-diesel mustard increasing the glucosinolate content as much as possible. Mustards have higher glucosinolate levels than canola, however they are also reported to be more tolerant to moisture stress (drought) and germinate faster, both of which are desirable traits for growing in dryer regions (Holland et al. 2002). Plant breeders have now produced mustard plants with glucosinolate levels the same as, or similar to, that found in canola, thereby enabling canola-quality-mustards (canola-mustard) to be grown in the dryer region of northern NSW. Plant breeders have also produced Bio-diesel mustards with high oil and glucosinolate levels.

Glucosinolates play an important role in the host plant-insect (pest) relationship. Glucosinolates, in combination with flavonoids and (by hydrolysis in the presence of the enzyme myrosinase) isothiocyanates (mustard oils) are responsible for attracting and stimulating the feeding and oviposition of pest species, eg. diamondback moth, cabbage butterfly, *Helicoverpa* spp. and cabbage and turnip aphids. Conversely, to many insect species glucosinolate is toxic and thus responsible for deterring and repelling many potential pest species. Glucosinolates and their isothiocyanate products are also known to act as antibiotics, fungal growth inhibitors and toxins to nematodes. In 2002 a small preliminary study conducted on early experimental varieties of canola-mustard indicated that aphids were more abundant in canola-mustards than in canola (Nicholas, unpublished). The study also found differences between canola and canola-mustards in species and abundance of lepidopteron pests.

Aims

The aims of this project are

1. to compare the new varieties of high & low glucosinolate canola and mustards with conventional varieties of canola for their attractiveness to current and, where identifiable, potential insect pest species.
2. to form the basis of further study on how pest and beneficial insect assemblages associated with canola, canola-mustards and Bio-diesel mustards will change with the climate and atmospheric changes forecast for Australia. Two follow up PhD projects have been proposed.

The following questions will be addressed:

1. Do the physiological and glucosinolate differences between canola and canola-mustards result in different pest and beneficial insect complexes?
2. How will this affect pest management strategies?

Basic methods: Field trials consisting of canola, mustard, canola-mustard and bio-diesel varieties will be monitored to assess the differences in insect species and population size. Laboratory and glasshouse experiments will be carried out to compare the survival, longevity and fecundity of key insect pests feed on each of the three *Brassica* types. Insect populations at Tamworth and/or on the Liverpool Plains will be compared with the more northerly Bellata to investigate possible differences due climate factors (eg. temperature). The project will not independently analyse the crops for glucosinolate levels but rely on existing data.

Outcomes for the Canola Industry

What is immediately important to the Australian canola oil industry is what pests will be more prevalent in canola-mustards and bio-diesels under northern region growing conditions and how will this affect pest management, crop quality and yield. Will, from a pest perspective, canola-mustards and bio-diesel mustards be viable option for northern region growers?

This study will potentially provide the Australian canola oil industry with information in key areas:

1. the ecology and on-plant spatial distribution of the pest and beneficial insect.
2. information for use in assessing the economic viability of the new crops, as compared with canola, with regards to pest management.
3. publishable information, via grower workshops, scientific and trade journals, about possible new pest management practices.
4. information enabling plant breeders to select canola and canola-mustard varieties suited to the northern region based on susceptibility to local pests.

This study is proposed as a Honours project (1 year) for a selected student from the UNE School of Environmental and Rural Science.

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Reference

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