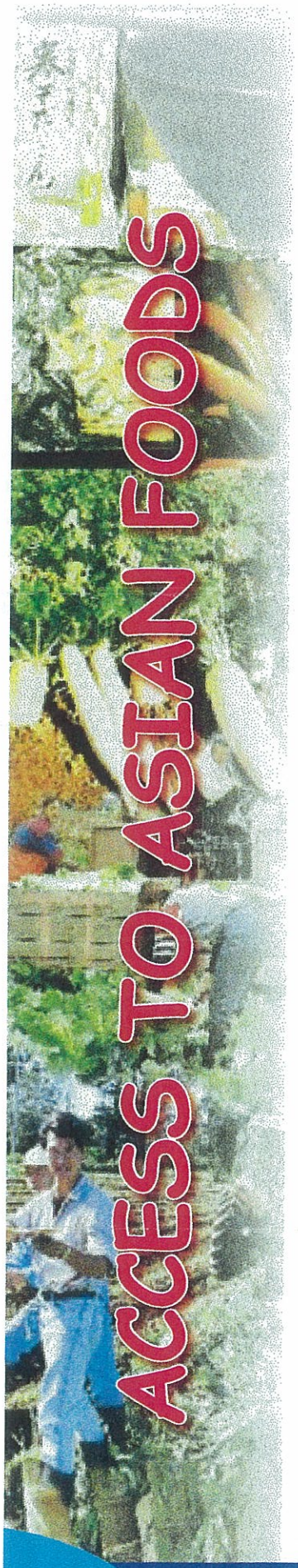

Anti-cancer potential of Asian Brassicas

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Members of the Brassica family include a wide range of both 'Asian' and 'Western' horticultural crops (eg. cabbage, mustard, rocket, pak choy, daikon, broccoli), all of which contain compounds known as glucosinolates. Certain glucosinolates and, more importantly, their breakdown products, isothiocyanates, have been linked to a reduction in the prevalence of certain types of cancer (eg. colorectal cancer).

One isothiocyanate that has recently received much publicity for its anti-cancer action is sulphoraphane, a compound that is derived from glucoraphanin, a glucosinolate of high abundance in broccoli. However, many other glucosinolates exist with anti-cancer potential, located within different members of the Brassica family.

Figure 1. *Sprouted-seed of several horticultural Brassicaceae have 10-100 times the potency of mature field-grown plants.*

Part of our project has been focussed at outlining the range and concentration of glucosinolates present in Asian members of the Brassica family, with an aim to assess the anti-cancer potential of these in comparison to broccoli. We have particularly concentrated on glucosinolate levels in seed and sprouted-seed, as glucosinolate concentration is generally higher in these tissues than in the more mature vegetable (Figure 1). In fact, an industry has developed in the United States marketing broccoli sprouts (BroccoSprouts™) based on the health aspects of sulphoraphane, and the high concentration found in sprouts.

Vegetable Seed	Anti-cancer Potential (higher value is more potent)
radish	293.4
daikon	280.3
broccoli	270.1
kohl rabi	78.3
garden cress	55.0
rocket	43.1
kale	39.4
water cress	28.2
Chinese broccoli	19.6
cabbage	17.3
choy sum	15.4
mizuna	14.2
senposai	13.3
red giant mustard	12.1
pak choy	12.0
black mustard	9.9
Japanese turnip	9.6
broccoli raab	9.1
tatsoi	8.3
Chinese cabbage	5.9
komatsuna	5.0
white mustard	0.0

Table 1. *Estimated anti-cancer potential of seed of Asian and Western vegetables based on 'CD-values' of isothiocyanates derived from glucosinolates identified in seed. Higher values indicate higher anti-cancer potential.*

We have subsequently identified 22 glucosinolates present in the seed of a range of Asian and Western cultivated species. Based on the known potential of individual glucosinolates (or more accurately, their isothiocyanate derivative) to induce the anti-cancer enzyme 'quinone reductase', the anti-cancer potential of each species was crudely estimated (Table 1).

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Our findings indicate that apart from broccoli, the seed of a number of horticultural species within the Brassica family have anti-cancer potential. Based on constituent glucosinolates and the level present, radish, daikon, and broccoli had the highest anti-cancer potential of all seeds tested. Anti-cancer potential of these three vegetables was of a similar level, but more than three times the level of the next highest-ranked vegetable (kohl rabi). Those with moderate anti-cancer potential included seed of garden-cress, rocket, kale, and watercress. The remaining vegetable seeds had moderate to low anti-cancer potential.

This trend also appears to occur in sprouted-seed, although glucosinolate levels are generally lower. It should be stressed that the current rating does not relate to mature vegetables, which vary considerably in both tissue-type and physiological development. Further evaluation of plant extracts is required to confirm anti-cancer potential, with the current study providing a crude estimate of which vegetables are more likely to be beneficial.

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NESB vegetable growers successfully complete FCU course

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Through the project *"IMS for pests and diseases of Asian vegetables"*, DPI Victoria, Swinburne University and Edulink have provided Farm Chemical Users (FCU) courses to growers of Asian vegetables with a Vietnamese background.

The team provided training over a nine month period to 17 non-English speaking background (NESB) growers from the Geelong region. Six growers attended a FCU refresher course and 11 attended the full FCU course for the first time.

Trainers viewed the courses as a pilot exercise for future work with grower groups from a single ethnic group. The program was specifically designed for NESB growers and consisted of 13 two-hour units. The group's ethnic homogeneity allowed the trainers to employ a translator at the initial set up meeting, and then later use informal occasional translating by the most proficient multilingual people in the group.

Tan Gia Bui from Lara receives a certificate following successful completion of the FCUC

The trainers were able to respond to the needs of the group by offering a range of learning and assessment options which included:

- classroom based sessions (some hands-on activities such as calculation of chemical application requirements and experiencing a range of personal propective equipment).
- support of course work by regular on-farm visits to all participating growers by the DPI project officer (activities such as on-site risk assessments).
- chemical store visits.
- a library visit to gain experience in accessing information online.

Sixteen growers successfully completed their courses.

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