



Grown professionally so you can buy with confidence

As diverse as the group of vegetables are that make up this group, so are their growing methods. From greenhouse to field-grown, the latest techniques and technologies are used to grow the best quality produce. Developments in technology have meant most crops are grown all year.

In New Zealand we have an assurance programme known as New Zealand GAP which stands for Good Agricultural Practice. It provides a traceable, accountable system from crop to customer and ensures that best practices are employed in the production, packaging and distribution of vegetables.

By meeting the standards required under New Zealand GAP, growers are able to demonstrate to their customers that their products are of a high quality, produced in a sustainable manner and are safe to eat. In a nutshell, it means you can buy with confidence.

New Zealand GAP has been successfully benchmarked against international quality assurance programmes, such as Global Gap, Global Food safety Initiative and New Zealand and Australian supermarket programmes.

www.newzealandgap.co.nz



Health Authorities recommend we eat at least 5 servings of fruit and vegetables each day.
Three of the servings should be vegetables.

Reference:

Hedges & Lister. Plant & Food Research Report 2300: Nutritional attributes of Asian vegetables. October 2008.
This report may be downloaded from www.vegetables.co.nz

*Written with assistance from the New Zealand Institute for Plant & Food Research Limited
and funded by the Fresh Vegetable Product Group of Horticulture New Zealand*



PO Box 10232 Wellington 6143

ASIAN VEGETABLES



Asian cuisine with its exotic aromas, flavours, herbs, spices and wonderful combinations will expand your taste horizons. Asian vegetables have become more available and now provide new flavour experiences and different nutritional options.

Asian vegetables have been grown in New Zealand since the Chinese first settled here in the late 1800s but have only recently become commercially available. Although there are hundreds of varieties only a limited number reach retail stores on a regular basis.

As with other less common vegetables there is limited research on some Asian vegetables, however, generally research has looked at their cancer protection potential. There is good evidence to support this and further research will provide more information. Much of the information in this booklet is based on small studies or assumptions.

To get the best out of these vegetables

Some nutrients, including phenolics and vitamin C, may be lost in the cooking process as they are water soluble and heat sensitive. Heat releases carotenoids and they are fat soluble so they are absorbed better from cooked foods, rather than raw, and absorbed best by the body when eaten in a meal where a 'healthy' fat or oil is present.

Cooking methods such as steaming, microwaving and stir frying are ideal as they cook foods for a short time in a small amount of water. Stir frying is the best method of cooking as it eliminates nutrient losses through leaching into cooking water. The short cooking time prevents enzyme loss but there is enough heat to optimise the bioavailability of carotenoids.



Micronutrients in Asian greens

Micronutrients are nutrients that are required by the body in small amounts. They are important for day-to-day body functioning and deficiencies can result in serious health consequences. Unlike macronutrients (carbohydrate, fat, protein), micronutrients do not contain calories. They can be divided into vitamins and minerals.

The major functions of the main micronutrients contained in Asian greens are described below.

Vitamins

Name	Major function	Found in
Vitamin A (some carotenoids convert to retinol in the body)	Important for normal vision and eye health Involved in gene expression, embryonic development and growth and health of new cells Assists in immune function May protect against some cancers and heart disease	All Asian brassicas Amaranth Garland chrysanthemum
Vitamin C (also called ascorbic acid, or ascorbate)	A protective antioxidant – may protect against some cancers Necessary for healthy connective tissues – tendons, ligaments, cartilage, wound healing and healthy teeth Assists in iron absorption Role in hormone and neurone functions	All Asian brassicas Amaranth Chinese box thorn Garland chrysanthemum Hairy melon
Vitamin E (Tocopherols and Tocotrienols)	Support for heart, lungs, prostate and digestive tract An antioxidant, it may protect against atherosclerosis and some cancers	All Asian brassicas
Folate	Required for DNA synthesis Important for preventing neural tube defects Key role in preventing stroke and heart disease, including reducing blood homocysteine levels with vitamin B12 May protect against colonic and rectal cancer	All Asian brassicas Amaranth Chinese box thorn Garland chrysanthemum

Note: some of this information is based on the assumption that less common vegetables will have a similar nutrient composition to closely related vegetables that have been researched more thoroughly.

Micronutrients in Asian greens

Minerals

Name	Major function	Found in
Calcium	Important for strong, healthy bones and teeth	Amaranth
	Involved in processes including muscle contraction, blood clotting, and nerve function	Chinese broccoli Chinese flat cabbage Garland chrysanthemum leaves Mustard cabbage
Iron	Key nutrient required for oxygen transport Role in cellular function and respiration	All Asian brassicas <i>except</i> Chinese white cabbage Amaranth Garland chrysanthemum Water spinach
Magnesium	Component of bones Role in enzyme, nerve, and heart functions Important for protein functions	Amaranth Garland chrysanthemum Water spinach
Potassium	Maintains water, electrolyte and pH balance Important for cellular activity and nerve messages	Amaranth Garland chrysanthemum Flowering Chinese cabbage Hairy melon Mustard cabbage Water spinach

Note: some of this information is based on the assumption that less common vegetables will have a similar nutrient composition to closely related vegetables that have been researched more thoroughly.

Phytonutrients in Asian greens

Phytonutrients are believed to help protect against chronic diseases such as heart disease, cancer and problems associated with ageing. This is largely attributed to their antioxidant activity. A number of phytonutrients are found in these vegetables.

Main phytonutrients

	Phenolics	Flavanoids	Carotenoids	Glucosinates	Chlorophyll
Chinese broccoli	•	•	•	•	•
Chinese white cabbage	•	•	•	•	•
Peking cabbage	•	•	•	•	•
Flowering Chinese cabbage	•	•	•	•	•
Chinese flat cabbage	•	•	•	•	•
Amaranth	•	•	•	•	
Chinese box thorn	•		•		
Garland chrysanthemum	•		•		
Water spinach	•		•	•	•
Hairy melon	Insufficient data				

Main phytonutrients in Asian greens

Phenolics

Phenolics describe a variety of phytonutrients which are a group of over 4,000 compounds which occur widely in plants. They serve a variety of purposes in plants, including protection against fungal disease, insect attack and UV light, as well as attracting pollinators and seed dispersers. These compounds may impart taste (often bitter or astringent) and some also provide aroma and colour. Because they are such powerful antioxidants, levels of phenolics generally correlate well with antioxidant activity.

Flavanoids

Flavanoids are potent antioxidants and reportedly have a wide range of biochemical functions. Research indicates they are involved in a number of important functions in the body, such as immune system, genes, blood flow and liver function. Flavanoids have also been shown to have anti-allergic, anti-inflammatory, anti-microbial and anti-cancer properties. The beneficial effects are thought to be in part due to their antioxidant activity.

Carotenoids

Carotenoids are a group of pigments best known for their anti-oxidant activity. They are responsible for the red, yellow and orange colours in many fruits and vegetables; however, often the colour is masked by chlorophyll to the extent that some of the largest amounts of carotenoids are found in dark green leafy vegetables.

Glucosinates

Glucosinolates are sulphur-containing compounds, broken down by enzymes into further compounds, e.g. isothiocyanates and indoles. It is these breakdown products that have been of particular interest to scientists.

Isothiocyanates are thought to protect against cancers as blockers and cancer suppressors. In addition, some isothiocyanates have anti-inflammatory activity, which is important as inflammation can be involved both in cancer development and in heart disease.

Indoles – the most nutritionally important indole is indole-3-carbinol (I3C), which has been studied particularly in relation to hormone-sensitive cancers such as prostate and breast. More research is required in this field.

Chlorophyll

Chlorophyll is the pigment that gives a plant its green colour. Relatively little is known of its health effects. Some research suggests that it may be important in protecting against some forms of cancer.

Introducing Asian brassicas



The names of Asian brassicas can be confusing as they are called different names in different areas of China; for example, Chinese white cabbage is called bok choy, buk choy, pak choy or baak choi. Some Asian brassicas are called cabbages – even though they don't resemble Western cabbages.

Peking cabbage

黃芽白 (wong nga pak, wong nga baak, wong bok)

Peking cabbage is one of the most common Asian vegetables grown in New Zealand. The pale green leaves form an elongated compact head. Select heavy, compact heads with crisp whole leaves; the stalks should be crisp and juicy and the leaves not unlike cos lettuce. Peking cabbage can be used raw in salads or cooked in various ways, but it is most commonly used in fast cooking methods such as stir frying.

Chinese white cabbage

白菜 (bok choy, pak choi, baak choi)

Choy/choi is the Chinese word for any leafy vegetable. There are many different Chinese white cabbages but the most common variety in New Zealand is bok choy, which has a thick white stem and smooth round leaves. The stems are crisp and juicy and the leaves are similar to cabbage or silver beet. Shanghai bok choy can occasionally be found; it has thick pale-green stems, the leaves are similar but it is generally smaller. Used like cabbage or spinach, all types of bok choy are suitable for quick cooking methods such as steaming and stir frying. Miniature bok choy leaves are found in some green salad mixes.

Chinese flat cabbage

菊花菜, 塔菜 (tat soi)

This flat leafy cabbage grows round and relatively flat like a plate. The leaves have a slightly tougher texture than Chinese white cabbage and the flavour is stronger. Select small cabbages with lots of young leaves clustered at the centre. Like other cabbages, Chinese flat cabbage suits quick moist cooking methods although the young centre leaves can be used raw in a salad. Miniature Chinese flat cabbage is regularly found in mesclun salad mixes.

Introducing Asian brassicas

Chinese broccoli

芥蘭 (Chinese kale gaai laan)

Chinese broccoli has long green stems, white flowers and green leaves with a white haze. The flowers should be in bud rather than in full bloom. It has a very strong broccoli flavour and can be used where broccoli would normally be used.



Flowering Chinese cabbage

菜心 (choi sum)

Flowering Chinese cabbage has pale yellow flowers on long thin green stems with small green leaves and it is available all year round. Prepare flowering Chinese cabbage like broccoli and use quick cooking methods. Use all parts of the stem, including the flowers, however, it is best eaten when the flowers are in bud rather than in full bloom.



Mustard cabbage

芥菜 (gai choi, kai choy)

There are many varieties of mustard cabbage and they are usually only found in Asian markets. Their highly nutritious mustard-flavoured leaves are used mainly in stir fries, pickles or soups. The most common mustard cabbage is the large-leaved Swatow variety which has thick fleshy ribs which are usually the same grass-green colour from base to tip.

Introducing Asian brassicas

These vegetables belong to the same brassica family and consequently have similar nutrients, so this group is dealt with collectively.

What's good in Asian brassicas?

Asian brassicas are highly nutritious. Most are excellent sources of vitamin C and good sources of vitamin A. They usually contain high levels of micronutrients including vitamin C, vitamin A precursors, vitamin K, folate, vitamin E and fibre. All Asian brassicas are a good fibre source and contain phenolics, carotenoids, chlorophyll and glucosinates. They contain many antioxidants and the darker the colour, the higher the antioxidant level.

With the exception of Chinese white cabbage, Asian brassicas are good sources of available iron. However, unlike spinach, they do not contain oxalic acid, which binds iron to the spinach so that it is not available to the body. Chinese flat cabbage, Chinese broccoli, Garland chrysanthemum leaves and Mustard cabbage also provide calcium.

What are the health benefits?

The leafy, stalky brassicas in particular contain good amounts of phytochemicals, such as the antioxidant pigments B-carotene, lutein and zeaxanthin, as well as flavonoids and other phenolics, carotenoids and chlorophyll. Because of their antioxidant activity, these phytochemicals are believed to help protect against chronic diseases such as heart disease and cancer, as well as health problems associated with ageing.

In Asian brassicas, glucosinolates produce breakdown products which have anti-cancer properties which are different to those in other vegetables. One breakdown product, isothiocyanate sulforaphane, is abundant in broccoli and present in low levels in flowering Chinese cabbage, Chinese white cabbage and Peking cabbage and is thought to protect against cancer, both as a cancer blocker and a cancer suppressor. Some isothiocyanates have anti-inflammatory properties and can protect DNA from damage by carcinogens or free radicals.

It has been found that the consumption of Asian brassicas can also reduce the risk of lung and colorectal cancers. Another breakdown product, glucosinolate indole, has been linked to the prevention of hormone sensitive cancers such as prostate and breast cancers due to its effect on oestrogen activity and metabolism.

Other interesting Asian green vegetables

Amaranth

莧菜 (Chinese spinach, en choy)

Many varieties of amaranth are grown and sold in bunches with the roots still attached. The green leaves have deep red coloured veins which distinguish red amaranth from other Asian greens. Green amaranth is also available. Cooked like spinach Amaranth suits short quick moist cooking methods, however, it also goes well in soups.

What's good in amaranth?

Amaranth is very nutrient-rich. It contains high levels of micronutrients including vitamin A precursors, vitamin C, B2, B6, folate, calcium, iron and potassium. Some studies have shown it has twice the iron level of spinach. It is low in energy (calories) and high in fibre. However, the presence of anti-nutritional factors (oxalates) may limit some of the nutritional benefits, such as iron and calcium uptake. Cooking in water eliminates these factors; however, it also destroys heat labile vitamins C and folate.

Amaranth contains relatively high levels of phytochemicals (carotenoids, β -carotene, lutein, violaxanthin). It is a phenolic-rich vegetable; however, it has the lowest levels within the Asian greens family. The red-leaf variety is thought to have stronger antioxidant activity than the green-leaf variety.

What are the health benefits?

Consumption of amaranth limits the production of inflammation-causing compounds. Studies found that the compound, galactosyl diacylglycerol, produced in amaranth was found to be effective in inhibiting colon, lung and breast cancer cells.

Chinese box thorn

枸杞 (gau gei choi)

Chinese box thorn leaves have a slight peppermint flavour. It has a straight unbranched stem and is covered closely by small oval leaves, and in some varieties, thorns. Remove the leaves from the stem and add to soups.

What's good in Chinese box thorn?

The leaves of Chinese box thorn have high levels of vitamin C and folate, and moderate levels of antioxidant activity.

What are the health benefits?

Due to the phenolics present, Chinese box thorn promotes antioxidant activity and radical scavenging within the body.



Other interesting Asian green vegetables

Garland chrysanthemum

茼蒿 (tung ho, chong ho)



Garland chrysanthemum is a winter vegetable generally used in a stir fry or soup. The leafy stalks are bluntly lobed and the stalks more like lettuce with a slightly rough texture. Its leaves have a subtle, but distinct, 'floral' flavour which is best enjoyed in small quantities, accompanied by other flavours. It should be cooked briefly until tender as overcooking can produce a bitter taste.

What's good in garland chrysanthemum?

Garland chrysanthemum is a moderately nutritious vegetable containing useful amounts of potassium, calcium, iron, and vitamins B1, B2, B6 and vitamin A precursors (β -carotene). It is rich in folate and vitamin C.

What are the health benefits?

One study has associated garland chrysanthemum with a lower risk of developing lung cancer.

Hairy melon

节瓜 (fuzzy melon)



This hairy green-skinned gourd is shaped like a marrow or overgrown eggplant. The skin is edible but is usually peeled or the hairs rubbed off with a paper towel. The flesh has a fresh cucumber-like taste with a marrow-like texture. Remove the seeds and treat as you would a marrow.

What's good in hairy melon?

There has been little research conducted on this Asian vegetable therefore limited nutritional information is available. Early studies found high levels of vitamin C and only small amounts of core nutrients.

What are the health benefits?

An antihistaminic effect was noted and a reduction in the demand for food which suggests a possible role in as an anti-obesity agent.

Water spinach

通菜 (ong choi)



Water spinach is an aquatic or semi-aquatic plant and grows best in tropical climates. Scientists are very interested in it for its possible anti-diabetic properties. Water spinach has hollow stems and arrow shaped leaves which taste slightly similar to spinach. The shorter the stalks and the larger the leaves are at the tip, the more tender the leaves are. It can be used in a variety of ways, stir fried, soups or raw as almost all parts of the plant are edible, but the tender shoot tips and younger leaves are preferred.

What's good in water spinach?

No information has been discovered regarding the core nutrients present in this vegetable, although they may be similar to spinach. Water spinach contains moderate levels of carotenoids (β -carotene, lutein, violaxanthin, neoxanthin) and the stems have a higher phenolic and antioxidant activity than the leaves.

What are the health benefits?

Water spinach has many health benefits including treatment of eye and liver disease, constipation prevention, lowering high blood pressure and inhibiting the growth of human lymphoma cells. Its ability to help maintain and regulate blood sugar levels is also of interest.

Ideas for cooking Asian greens

stir fry 炒 stew 燜 salad 涼拌
soup/boil up 湯 pickle 醬菜

- Asian greens are best cooked with moist heat.
- Simmer, drain and chop Peking cabbage, place on a platter and top with a braise or stew.
- Add box thorn leaves to rice or pasta salads.
- Use Peking cabbage leaves as wraps for savoury mince mixtures.
- Peel and dice hairy melon and use in stews or braises.
- Make coleslaw of finely sliced Peking cabbage, sliced cucumber, grated carrot and add a sesame oil dressing.
- Stir fry sliced Asian greens, garlic and chilli with beef, duck, pork or squid, and add soy sauce.
- Simmer flowering Chinese white cabbage, drain and toss with soy sauce and sesame oil or oyster sauce.
- Add Hoisin sauce to Asian greens with seafood.
- Dice and blanch stems of Chinese broccoli, Chinese white cabbage or flowering Chinese cabbage, and add to noodles or pasta.



Ideas for cooking Asian greens

stir fry 炒 stew 燜 salad 涼拌
soup/boil up 湯 pickle 醬菜

- Use diced Peking cabbage in Chinese wontons or dumplings.
- Serve steamed Chinese white cabbage with Peking duck or barbecued pork.
- Chop Peking cabbage or flowering Chinese cabbage, add to mussel fritters and serve with sweet chilli sauce.
- Stir fry water spinach with garlic and chilli and when wilted stir in coconut cream.
- Make Asian vegetable soup using a pork base or chicken stock.
- Dice mustard cabbage stems and leaves and make into pickles.
- Mix finely chopped Chinese white cabbage, chopped roasted garlic and cream cheese and use as a dip.
- Use Chinese white cabbage in 'boil ups' with pork shoulder or ribs.
- Brown white fish fillets in a little oil and ginger, add peeled, sliced hairy melon and simmer for about 30 minutes.
- To prepare Chinese broccoli, chop the leaves roughly, peel the stem to get rid of the fibrous layer and cut into evenly-sized pieces.
- Hairy melons can be stuffed, cut into slices and stir fried, or added to soups.

