

Auckland Botanic Gardens *Brassica oleracea* trial, winter 2022

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Introduction

Brassicaceae (*Brassica* spp.) are a genus of plants native to Europe, with their origins dating back to the cultivation of wild cabbage in the north Mediterranean (Phillips and Rix, 1993; iNaturalist). *Brassica oleracea* is the most economically important of the *Brassica* species and one of the most versatile of all cultivated food plants (RGB Kew). Vegetable brassicas of this species include thousands of named cultivars, which can be divided into the following groups: Acephala (kales), Alboglabra (Chinese broccoli), Botrytis (cauliflower), Capitata (cabbages), Cymosa (broccoli), Gemmifera (Brussels sprouts), Gongyloides (kohlrabi), and Viridis (collard greens) (Bateman, 1998; Wikipedia). Broccoli and cauliflower are commonly grown in the home garden as the flower head and leaves can be eaten raw or cooked. Although they are best known for their culinary uses, some forms are also grown for ornamental purposes, such as those with purple foliage or green flower heads, and new cultivars are released to the market regularly.

Auckland's subtropical climate makes growing some *Brassica* difficult due to the potential for pests and diseases to infect plants. *Brassica* are often grown outdoors during winter when the climate is wet and cold, although some can be grown year round. The most common problems are snails and slugs (especially in winter), white cabbage butterfly, aphids, and whitefly (Lucas, 2005).

Auckland Botanic Gardens (ABG) uses plant trials to test and identify plants that do well in Auckland conditions with desirable characteristics including little or no pests or diseases, long floral displays, productive harvest, uniform habits, and minimal maintenance requirements.

This allows ABG to make recommendations of plants suited to the Auckland climate and ensures high performing plants are displayed.

The aim of this trial was to find top performing *Brassica oleracea* selections that produce a healthy and edible crop that stays pest and disease free, whilst creating an attractive display².

Methods

Seven cultivars of commercially available *Brassica oleracea* from Egmont Seeds and Kings Seeds were selected for the trial, based on their appearance, disease resistance and flower quality (Table 1). These *Brassica* cultivars were sown in the Botanic Gardens nursery in February 2022, grown on, and planted out in April 2022 in the trials garden at ABG. Ten plants of each cultivar were planted in rows (Fig. 8–9). The rows ran north to south and were exposed to the prevailing wind. Plants were spaced at 50 cm apart. Prior to planting, trial beds were prepared with compost and mulch. Plants were watered during the first two weeks after planting, and snail bait was used once during this time to ensure they had a fair start to life. No subsequent maintenance of the plants was undertaken.

Monthly observations were made to assess the percentage of each plant affected by pests or diseases. The first date of flowering (production of a head) was recorded. At maturity, the average height and width (cm) of plants was measured before flowering started.

The head and foliage colours were recorded using the Royal Horticultural Society (RHS) colour charts. An evaluation by a group of staff was conducted in mid-July to assess plants overall and rate them according to ABG star performer criteria (1 = poor performer to 10 = excellent performer).

Table 1 General information and source of seven *Brassica oleracea* cultivars.

<i>Brassica oleracea</i> cultivar	Group	F ₁ /Heirloom	Type	Source
<i>B.</i> 'All Year Round' (Fig. 1)	Botrytis group	Open pollinated	Cauliflower	Egmont Seeds
<i>B.</i> 'Alverda' (Fig. 2)	Botrytis group	F ₁ Hybrid	Broccoflower	Egmont Seeds
<i>B.</i> 'De Cicco' (Fig. 3)	Cymosa group	Heirloom	Broccoli	Egmont Seeds
<i>B.</i> 'Green Macerata' (Fig. 4)	Botrytis group	Heirloom	Cauliflower	Kings Seeds
<i>B.</i> 'Romanesco' (Fig. 5)	Botrytis group	Heirloom	Broccoli	Egmont Seeds
<i>B.</i> 'Twister' (Fig. 6)	Botrytis group	F ₁ Hybrid	Cauliflower	Egmont Seeds
<i>B.</i> 'Violet Sicilian' (Fig. 7)	Botrytis group	Heirloom	Cauliflower	Kings Seeds

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² This trial differs from a recent *Brassica oleracea* trial also at ABG (Bodley et al., 2022), that instead evaluated ornamental kale selections.



Fig. 1 *Brassica oleracea* 'All Year Round'.
Photo: Samantha van Ryn.



Fig. 2 *Brassica oleracea* 'Alverda'.
Photo: Samantha van Ryn.



Fig. 3 *Brassica oleracea* 'De Cicco'.
Photo: Samantha van Ryn.



Fig. 4 *Brassica oleracea* 'Green Macerata'.
Photo: Samantha van Ryn.



Fig. 5 *Brassica oleracea* 'Romanesco'.
Photo: Samantha van Ryn.



Fig. 6 *Brassica oleracea* 'Twister'.
Photo: Samantha van Ryn.



Fig. 7 *Brassica oleracea* 'Violet Sicilian'.
Photo: Samantha van Ryn.



Fig. 8 Trial beds with *Brassica oleracea* 'Violet Sicilian' in centre view.
Photo: Samantha van Ryn.



Fig. 9 Trial beds with *Brassica oleracea* 'All Year Round' (left) and *B. oleracea* 'Romanesco' (right).
Photo: Samantha van Ryn.

Cultivars that scored 8 or more were considered top performers and are recommended for Auckland conditions based on the results of these trials. The overall rating took into consideration the flowering period, absence of pests and diseases, quality of flower head, habit, and vigour. Two flower heads of each cultivar were also harvested and subjected to a qualitative taste test by staff. Plants were left following harvest to determine whether they would set seed or resprout new heads.

Results

Upon maturity, the tallest cultivars were *B. 'De Cicco'*, *B. 'Green Macerata'* and *B. 'Alverda'* (Table 2). The widest cultivars were *B. 'De Cicco'*, *B. 'Romanesco'* and *B. 'Alverda'*. *B. 'De Cicco'* grew the fastest of all cultivars, reaching maturity the quickest, and was first to produce a flower head. *B. 'Green Macerata'* took the longest to reach maturity, experienced the greatest size variation between individual plants and took the most time to produce a head of all the cultivars. There was considerable variation in head size between cultivars.

All cultivars had produced a head by mid-July (Table 2), although there were differences in peak flowering times. *B. 'All Year Round'* and *B. 'Twister'* produced heads that resembled traditional cauliflower in terms of shape and colour, and both started to form patches of purple as the heads aged (Table 3). *B. 'Green Macerata'* and *B. 'Alverda'* had a similar shape and growth pattern,

although their head colour was a distinct lime green. *B. 'All Year Round'*, *B. 'Alverda'*, *B. 'Green Macerata'*, and *B. 'Twister'* had patches of yellow and purple on leaves, which grew larger as the plants matured.

As *B. 'De Cicco'* was the earliest to produce a head, it was also the quickest to flower and bolt. By early August, all heads were beginning to sprout and lose their shape, with the exception of *B. 'Twister'*, which retained its traditional appearance for an extra week. Although two heads of each selection were harvested in late July for the taste test, none of those plants sprouted a new head by early October. Once the head had been harvested, the plant became understandably more afflicted by rot, particularly in the outer leaves. The remaining heads that were not harvested all succumbed to rot by late September.

All cultivars were flowering by late August, with plants displaying buttercup-yellow flowers from sprouted heads. All cultivars produced seed pods by mid-October, with the exception of *B. 'All Year Round'* and *B. 'Alverda'*, and it is yet to be determined whether any seed is viable.

On all plants there was evidence of slug and snail damage throughout the growing period. *B. 'Green Macerata'*, *B. 'Romanesco'* and *B. 'Violet Sicilian'* were the least affected by these pests (Table 2). Pest damage generally increased as the plants matured (June – October). No whitefly, aphids or other pests were observed throughout the growing season.

Table 2 Height and width (cm), slug and snail damage, and overall rating of seven *B. oleracea* cultivars. Star performers are indicated with an asterisk (*).

<i>Brassica oleracea</i> cultivar	First head appeared	Habit and size (height by width in cm)	Pests and disease (proportion of plant afflicted)	Overall rating
<i>B. 'All Year Round'</i>	5/7/2022	Uniform. 39 × 52	5%	9*
<i>B. 'Alverda'</i>	5/7/2022	Uniform. 46 × 61	5%	6
<i>B. 'De Cicco'</i>	17/6/2022	Uniform, upright, sprouting. 52 × 69	5%	7
<i>B. 'Green Macerata'</i>	13/7/2022	Some size variation. 48 × 60	<2%	5
<i>B. 'Romanesco'</i>	5/7/2022	Uniform, upright. 45 × 66	<2%	9*
<i>B. 'Twister'</i>	5/7/2022	Uniform. 41 × 49	5%	8*
<i>B. 'Violet Sicilian'</i>	7/7/2022	Uniform, upright. 45 × 54	<2%	8*

Table 3 Foliage and flower head colours recorded using the RHS colour charts.

<i>Brassica oleracea</i> cultivar	Foliage colour	Flower head colour	Comments
<i>B. 'All Year Round'</i>	Green group 136C & D	Yellow-green group 150D	Traditional cauliflower appearance. Head formed purple patches as it aged. Yellow/purple patches on leaves.
<i>B. 'Alverda'</i>	Green group 136C & D	Yellow-green group 149B	Vibrant lime-green flower head, like <i>B. 'Romanesco'</i> but traditional broccoli shape. Leaves turning purple and yellow.
<i>B. 'De Cicco'</i>	Green group 133C	Green group 133C	Bolted, buttercup-yellow flowers on head. Multi-sprouting after initial flower.
<i>B. 'Green Macerata'</i>	Green group 137C	Yellow-green group 149B	Reached maturity later than the rest. Some leaf margins purple.
<i>B. 'Romanesco'</i>	Blue-green group 122B	Yellow-green group 149A	Vibrant flower head colour with an interesting pattern.
<i>B. 'Twister'</i>	Green group 136C & D	Yellow-green group 150D	Traditional cauliflower appearance. Head turned purple in places. Leaves turning yellow and purple.
<i>B. 'Violet Sicilian'</i>	Blue-green group 122B	Purple group N79B & Yellow-green group 154D	Plants have purple N79B/C on new leaf margins and midribs.

Although the growing season saw relatively low rainfall, all cultivars developed rot on their older leaves.

Some flower heads (*B.* 'Alverda', *B.* 'Green Macerata' and *B.* 'Twister') began to rot as they started to sprout in August, with all rotting by the end of September, except *B.* 'De Cicco' and *B.* 'Violet Sicilian'.

The group evaluation determined the star performers were *B.* 'All Year Round' and *B.* 'Romanesco'. These two, and selections with an overall rating of 8 or higher, namely *B.* 'Twister' and *B.* 'Violet Sicilian', are recommended for Auckland conditions.

We harvested two heads of each cultivar and steamed two florets from each in a microwave oven. The majority of the *Brassica* heads were tasty both when raw and cooked. Although *B.* 'Alverda' and *B.* 'Green Macerata' produced neat, green heads, their florets were small, dense, and woody, making for an undesirable texture (Table 5). A few cultivars lost their colour when cooked, while others became brighter.

Table 5 Taste descriptions of seven *B. oleracea* cultivars.

<i>Brassica oleracea</i> cultivar	Colour (after cooking)	Taste
<i>B.</i> 'All Year Round'	No change	Traditional cauliflower taste. Soft, delicious.
<i>B.</i> 'Alverda'	Lighter green	Standard cauliflower taste. Woody texture.
<i>B.</i> 'De Cicco'	No change	Traditional broccolini taste. Slightly sweet. Delicious.
<i>B.</i> 'Green Macerata'	Lighter green	Taste was fine but texture was woody and unpleasant.
<i>B.</i> 'Romanesco'	Lighter green	Delicious. Soft and sweet cauliflower taste.
<i>B.</i> 'Twister'	No change	Traditional cauliflower taste.
<i>B.</i> 'Violet Sicilian'	Lost most purple	Traditional cauliflower taste.

Conclusions

From this trial, we recommend *B. oleracea* 'All Year Round' and *B.* 'Romanesco' which rated 9 in the overall evaluation with consistent flowers, attractive habits, minimal pests and diseases and low maintenance. They both also performed well in the taste evaluation. *B.* 'Twister' and *B.* 'Violet Sicilian' rated 8 in the evaluation and are also recommended for an attractive display and their palatable taste. Within most cultivars, there was some variability in size of individual plants. We recommend planting these *Brassica* in isolated pockets, rather than large mass plantings or as a single bedding crop. This suggested inclusion in mixed plantings would likely help to reduce the likelihood of pests and diseases affecting individual plants.

References

- Bateman, D. (1998). *New Zealand Gardening Encyclopaedia*. David Bateman Ltd.
- Bodley, E.; Kree, V.; Mason, J.; Hobbs, J. (2022). Auckland Botanic Gardens kale winter bedding trial, 2021. *New Zealand Garden Journal* 25(1): 2–4.
- Lucas, R. (2005). *Managing pests and diseases: A handbook for New Zealand gardeners*. Craig Potton Publishing.
- Phillips, R. and Rix, M. (1993). *Vegetables*. Pan Garden Plants Series, London, UK.

Websites (accessed December 2022)

- iNaturalist: Cabbage, Broccoli, and Allies (*Brassica oleracea*): <https://inaturalist.nz/taxa/54516-Brassica-oleracea>
- Royal Botanic Gardens Kew: Plants of the world online: www.ipni.org and <https://powo.science.kew.org/>
- Wikipedia: *Brassica oleracea*: https://en.wikipedia.org/wiki/Brassica_oleracea

