

# Auckland Botanic Gardens *Calendula* winter bedding trial, 2019

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## Introduction

Calendulas, or pot marigolds, belong to the daisy family Asteraceae (Compositae). There are 15–20 species of *Calendula* native to southwest Asia, western Europe, Macaronesia and the Mediterranean.

*Calendula officinalis* is the most commonly cultivated species.

Variably named seed mixes are sold for their plant size, range of flower colours and double flowering. Some selections are popular annual garden plants as they self-seed and require little maintenance. They attract various pollinating insects into gardens, will grow in most soil conditions and prefer full sun.

At Auckland Botanic Gardens (ABG) we plant annual beds twice a year, unlike many other gardens which plant annual beds three times a year. We therefore require high performing annuals that have long flowering periods. These mass plantings are highly visible to the public, so it is important to assess plant performance through trials to select those best suited to ABG conditions.

A high performing calendula for winter bedding is one that flowers profusely for 5–6 months, with flowers that do not fade or need deadheading, provides effective ground cover, has a 100% survival rate, is low maintenance and pest and disease resistant.

## Methods

Seed of seven named calendula selections were sourced from Kings Seeds and Egmont Seeds. Open-pollinated seed of the species *Calendula officinalis* was collected from existing plants in ABG.

These were sown on 12th March 2019 and planted in the trial garden on 15th April 2019. Each selection was represented by 10 plants. Compost and a general fertiliser were applied to the soil at the time of planting. Plants were deadheaded when planted. No watering was required throughout the trial.

Data were collected to evaluate plant performance. Weekly flowering records were kept using a flowering scale (0 = nothing, 1 = buds, 2 = flowers, 3 = seed). Once a month, all plants were checked for pests and diseases, particularly powdery mildew and botrytis, and an average percentage of the plants affected in each selection was recorded. When fully mature (early August) width and height of all plants was measured. Width (cm) was measured across the widest part of foliage and values averaged. Height (cm) was measured from soil level to the highest point on each plant and values averaged. An assessment of flower colour using the Royal Horticultural Society (RHS) colour charts was recorded for each selection. At the end of August, an evaluation by a group of staff was conducted to assess plants overall and rate them according to ABG star performer criteria (1 = poor performer to 10 = excellent performer). Cultivars that scored 8 or more are considered top performers and are recommended for Auckland conditions. The overall rating took into consideration flowering period, mix of colours, absence of pests and diseases, habit and vigour.

The trial concluded in mid-October 2019.

## Results

In Table 1 we present the overall results of our *Calendula* trial. Only *C. officinalis* (as a species, not a cultivar) was free of any pests or diseases during the entire duration of the trial. In August, *C. 'Funky Stuff'* was showing 15% of the plant affected by powdery mildew which had increased by the end of the trial. All other named selections showed signs of powdery mildew and botrytis towards the end of the trial.

As with many other annual crops, commercial imperatives have determined that plant breeding is focussed on developing compact plants that flower when relatively young, often to the detriment of garden performance. The *Calendula* selections/seed-lines that we trialled with tight compact habits were prone to fungal disease, presumably due to reduced air circulation through the plants, whereas the tall open *C. officinalis* plants were relatively disease free.

The flowering period for all selections started at a similar time, in mid-June. After a month of continuous rain in August the flowers on all plants were rotting. By mid-September, most were covered in older flowers, some of which were rotting on the plant rather than dropping off, and only *C. 'Ivory Princess'* and *C. 'Kablouna Mixed'* still had flower buds.

The colour palette of flowers was very similar across all selections which were compared using the RHS colour charts (Table 2).

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**Table 1** Summary table of 7 *Calendula* trialled for flowering period, habit and size, pests and diseases and given an overall rating. Selections with an overall rating of 8 or higher are recommended as top performers and indicated by asterisks.

Name	Flowering period and comments	Habit and size (height x width of foliage in cm)	Pest and disease	Overall rating
<i>Calendula officinalis</i> (open-pollinated; Fig. 1)	Mid-June to mid-October. Great flowering display, variable colours.	Loose and uneven habit. 57 x 85	No pests or diseases.	8*
C. 'Candyman Orange and Yellow' (Fig. 2)	Mid-June to mid-October. Flowers rotting on plants.	Variable, dwarf and compact. 26 x 37	Botrytis (50%), powdery mildew (5%).	5
C. 'Daisy Faces' (Fig. 3)	Mid-June to late October. Flowers rotting, perhaps because of continuous rain in August.	Very dwarf and tight habit (probably bred for pots rather than garden). 21 x 35	Botrytis (50%), powdery mildew (5%).	4
C. 'Dwarf Colours Mixed' (Fig. 4)	Mid-June to early October. Attractive flowers.	Compact and very dwarf habit. 25 x 39	Botrytis (5%).	6
C. 'Funky Stuff' (Fig. 5)	Mid-June to mid-October. Flowers are uniform.	Variable to floppy, lax in habit. 54 x 56	Botrytis (5%), powdery mildew (80%).	4
C. 'Ivory Princess' (Fig. 6)	Mid-June to late October. Flowers with variable centres (dark and light).	Variable habit. 54 x 65	Botrytis (5%), powdery mildew (10%).	6
C. 'Kablouna Mixed' (Fig. 7)	Mid-June to mid-October. Variable flower colour and form (some red centres and some same colour as petals).	Variable habit. 48 x 69	Botrytis (10%), powdery mildew (75%).	6

**Table 2** Flower colour using RHS colour chart.

Name	Flower description	RHS colour chart
<i>Calendula officinalis</i> (open-pollinated)	3 colours, single flowers.	1) orange group N25B; 2) yellow orange group 17A; 3) yellow orange group 23A.
C. 'Candyman Orange and Yellow'	2 colours in mix, double flowers.	1) orange group 28A; 2) yellow group 9A.
C. 'Daisy Faces'	3 colours in mix, single flowers.	1) orange group N25B; 2) two tone yellow orange group 22A and orange group N25B; 3) two tone yellow group 11B and yellow group 9A.
C. 'Dwarf Colours Mixed'	2 colours in mix, double flowers.	1) orange group N23A; 2) yellow orange group 14A.
C. 'Funky Stuff'	1 colour, semi double flowers.	1) orange group N25B.
C. 'Ivory Princess'	2 colours in mix, semi double flowers.	1) yellow group 5D; 2) yellow group 12C (much darker yellow on back of tips yellow orange group 14A).
C. 'Kablouna Mixed'	5 colours in mix, semi double flowers.	1) yellow orange group 19A; 2) yellow group 5D; 3) orange group N25A; 4) yellow orange group 17A; 5) yellow orange 16B.



**Fig. 1** *Calendula officinalis*, grown from open-pollinated seed. Photo: Jack Hobbs.



**Fig. 2** *Calendula* 'Candyman Orange and Yellow'. Photo: Jack Hobbs.



**Fig. 3** *Calendula* 'Daisy Faces'. Photo: Jack Hobbs.



**Fig. 4** *Calendula* 'Dwarf Colours Mixed'.  
Photo: Jack Hobbs.



**Fig. 6** *Calendula* 'Ivory Princess'.  
Photo: Jack Hobbs.



**Fig. 5** *Calendula* 'Funky Stuff'.  
Photo: Jack Hobbs.



**Fig. 7** *Calendula* 'Kablouna Mixed'.  
Photo: Jack Hobbs.

## Conclusions

Only open-pollinated *Calendula officinalis* met our evaluation criteria. However, at ABG this species will only be included in our Edible and Herb Gardens because its loose and open habit would not be effective in mass plantings. No other calendula selections that we trialled are considered suitable for annual bedding situations at ABG because of their rotting flowers, uneven habit and susceptibility to mildew and botrytis. In the process of breeding for desirable plant habit and flower traits, the more derived selections appear to have lost some of the hardiness and disease resistance found in the more typical wild form of the species.

## Websites (accessed November 2019)

Flora of China: *Calendula*:  
[www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=105062](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=105062)

POD Gardening: *Calendula*:  
[www.podgardening.co.nz/calendula.html](http://www.podgardening.co.nz/calendula.html)

The Plant List: *Calendula*:  
[www.theplantlist.org/tpl1.1/search?q=Calendula](http://www.theplantlist.org/tpl1.1/search?q=Calendula)

Wikipedia: *Calendula*:  
<https://en.wikipedia.org/wiki/Calendula>

