

Annual dianthus (*Dianthus barbatus* hybrids) as a cut flower

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Grower summary

- Hybrids of traditional sweet williams producing neat single stems.
- Main cultivars: 'Amazon' series – best yield/stem length (PanAmerican seed), 'Sweet' series (PanAmerican seed) and 'Bouquet' series (PanAmerican seed).
- Good range of flower colours including: red, pink, purple, rose and white.
- Annual crop grown outdoors or in cold glasshouses or polythene tunnels.
- Best grown as an unpinched crop from transplants/modules for single stem production.
- Plant late April (avoiding any frost risk) to late July for flowering from July to the end of October.
- Planting density depends on market/quality requirements but typically 30 to 40 plants/m².
- Support is not essential.
- Calcium nitrate applications are required to avoid tip necrosis due to calcium deficiency.
- Plants are susceptible to rust, powdery mildew and aphids.
- Rotation/sterilisation may be needed to avoid the build up of *Fusarium* wilt.
- Stem lengths of 50 to 60cm should be the target for bouquet/ 'straight' line use.
- Consistent quality is achievable through the season, but more research work is needed to produce an even weekly cropping programme.
- Vase life 11 to 18 days (in plain water).

Introduction

Traditional sweet williams, *Dianthus barbatus*, are biennials requiring a cold period before flowering can take place (vernalisation). Plant breeding has resulted in hybrids and inter-specific F1 hybrids of long stemmed annual dianthus that do not require vernalisation and can flower in their first year. Examples of these include the series 'Amazon', 'Sweet' and 'Bodestolz'.

Some hybrids are fragrant and the appearance of the cultivars

depends on the amount of *D. barbatus* in their parentage. They are relatively low maintenance crops, branching from the base and requiring little or no support, and are suitable for growing in the field, in polythene tunnels as well as in glasshouses.

With a range of vibrant flower colours and glossy green leaves, they thrive grown cold but are heat-tolerant, producing strong, upright stems over a long season. They are popular for use in bouquet work and have potential as 'straight' bunches.



'Amazon Neon Cherry'



'Sweet White'



'Bouquet™ Rose'

Cultural requirements and production methods

Cultivars

Plant series available include 'Amazon', 'Bouquet' and 'Dynasty' (all inter-specific hybrids) and 'Bodestolz' and 'Sweet' (*D. barbatus* hybrids). Most series include red, pink, purple, rose and white flowered cultivars as shown on the previous page.

Scheduling

Trials at the National Cut Flower Centre (NCFC) have shown that it is possible to schedule plants to give a cropping period and continuity that should be acceptable to the UK market place. This was achieved by planting under polythene tunnels between weeks 17 and 30 which produced crops over the period weeks 26 to 43.

Propagation

Plants used in the NCFC trials were obtained as plugs but it is possible to produce seedlings by following the germination guidelines provided by the seed company.

Transplanting

Transplant young plants to ground beds at a density of between 30 to 40 plants/m², the optimal density is around 36 plants/m². Some cultivars produce a low percentage of early-flowering 'off-types', which can be discarded.

Growing conditions

A temperature range of 18 to 22°C is broadly acceptable, though some plant series may differ. Low temperatures (for example down to 7°C) can be tolerated in some cases though it will delay growth. Plants are frost-tolerant, but frost will damage the flowers. Plants thrive when grown at naturally high light levels, but supplementary lighting is not required. NCFC trials showed that the quality of plants grown in Spanish tunnels was higher than those grown in the field.

Nutrition and irrigation

Once established, plants should be fed with 200ppm calcium nitrate each week to prevent the development of leaf tip necrosis. No other special requirements are required.

Plant manipulation and support

Plants can be pinched, but NCFC trials showed no benefit of pinching. Plant chemical growth regulators are not required

for cut-flower production. Plant support is not usually required but a single layer of netting can be provided.

Pest and disease control

Aphids can be an issue on plants especially in the growing point and on young leaves. Rust (*Puccinia arenariae*) can be destructive to the lower foliage and a preventive fungicide spray programme should be applied as per sweet williams. Powdery mildew may also require a preventative spray programme. Wilt (*Fusarium oxysporum f.sp. barbati*) leads to yellowing of new growth and stunting. Crop rotation or sterilisation may be required to prevent the build up of this disease.

Disorders

Leaf tip necrosis caused by a lack of calcium can be an issue (calcium uptake is often related to high humidities and reduced transpiration levels in the plant).

Picking, specifications and packing

Plants are usually harvested when three to five florets have opened, stem length should be at least 60cm. The cut stems have the potential to be used in either bouquets or 'straight' lines.



2. Correct picking stage for dianthus

Post-harvest care

Storage should be in water at 4°C for up to 7 to 10 days. The flowers may be sensitive to ethylene. NCFC trials using Chrysal RVB enhanced vase-life slightly.

A summary of the National Cut Flower Centre trials work

Polythene tunnel versus field-grown crops

Early trials, in 2007, compared cropping date and stem quality in polythene tunnel and field grown plants of eleven cultivars, mainly from the 'Amazon' and 'Sweet' series. Plug-plants were planted in polythene tunnels and field plots in week 22. Under protection, cropping started earlier in some, but not all, cultivars, and flowers were cropped between weeks 27 and

36, though with some gaps. The tunnel raised stems were consistently longer, and usually heavier, than those raised in the field.

This first year of trials produced a number of good quality flowers, especially from the polythene tunnels, confirming there was clear production potential for growing more annual dianthus in the UK if continuity could be improved.

Planting date and continuity

Following on from the 2007 work the effects of planting date on continuity were investigated in 2008. Plug-plants of several cultivars from the 'Amazon' and 'Sweet' series were planted in tunnels in weeks 17, 19 and 28, and in field plots in week 18. For most cultivars, picking started in weeks 26 to 30 for the earlier tunnel plantings, in weeks 35 to 41 for the last tunnel planting, and in week 29 ('Amazon' series) or 32 ('Sweet' series) for the field-grown crop planted in week 18. These results were for non-pinned crops.

There was a strong effect of planting date on the proportion of stems above or below 60cm in length, for the non-pinned tunnel plantings. The earlier (week 17) and late (week 28) plantings had a much higher proportion of stems in the longer grade, whilst the planting at week 19 gave few longer stems. By far the largest number of flowers was produced by the 'Sweet' series planted in week 19, though these were mostly less than 60cm long.

Much of the desired picking period was covered, but the results showed that a final planting underneath a polythene tunnel in week 28 was about 3 weeks too late to achieve full continuity over the whole period.

Planting date and seasonal extension

With a view to extending the season, later planting dates were further investigated in a trial in 2009. Plug-plants of 'Amazon Neon Cherry', 'Neon Purple' and 'Rose Magic' were transplanted into a tunnel in weeks 24, 28 and 30. Planting in tunnels in these weeks produced flowering stems from week 34 to week 43. The week 28 planting yielded the most stems whilst the week 30 planting yielded the least. Stem length and weight were little affected by these variations in planting date.

Using polythene tunnel grown plants good quality stems could be obtained over a wide season, from about week 26 to about week 43.

Planting density

In the previous mentioned trial the plug-plants of 'Amazon Neon Cherry', 'Neon Purple' and 'Rose Magic' were also planted at three higher densities: 64, 80 and 96 plants/m². Over this range of planting densities it was found that there was little difference in cropping date or stem yield, length or weight. At the higher planting densities the increased competition between such vigorous plants appeared to eliminate any possible benefits of greater stem numbers being produced.

There appears to be little opportunity to manipulate the crop quality of annual dianthus through varying the planting density.



3. A standard planting density of 36 plants /m² appears to be optimal

Pinching

The 2008 trial also looked at the effects of pinching or not pinching. Although the findings were not completely consistent across all cultivars, in general pinching (or not) did not affect the start of cropping, there was little effect on the total yield of stems (usually 150 to 200 stems/m²) and there was little effect on the proportions of stems above or below 60cm in length. However, non-pinned plants produced longer and much heavier stems than pinched plants.

Pinching was therefore considered detrimental to stem quality.

Post-harvest quality

In preliminary vase-life testing in 2007 there were variations in water uptake and vase-life between cultivars, though flower and leaf quality were generally good. In a larger test in 2008, stems of eleven cultivars, from early and late plantings, were conditioned on plain water or Chrysal RVB and then tested in vases of plain water under standard conditions. The main findings were:

- Apart from two cultivars, most had a vase-life between 11 and 18 days
- Using flower conditioner improved vase-life by 1 day only
- Stems from early and late plantings had similar vase-life
- With a few exceptions, both flower and leaf quality through vase-life were good.

Provided varieties with poorer post-harvest qualities are screened out, annual dianthus can produce good quality stems with acceptable vase-life.



4. Annual dianthus has good vase-life qualities

Cultivar assessments

Most experience has been gained with cultivars of the 'Amazon' and 'Sweet' series, the former generally producing good yields of long stems, the latter often with lower yields or shorter stems. Even within a series, there can be marked differences in performance; for example, in the 2009 trials 'Amazon Neon Cherry' produced consistently shorter, lighter stems, under a range of conditions, than 'Neon Purple' or 'Rose Magic'.

Cultivars can show significant differences in productivity and quality and in their responses to agronomic factors, and a range of cultivars and colours should be tested on site before planting substantial areas.

Conclusions from the trial work

- Reasonable continuity of annual dianthus production over an extended season was obtained by growing crops in polythene tunnels and manipulating planting dates, though in some plantings a stem length requirement of 60cm might be difficult to achieve. Annual dianthus should not be marketed at the same time as sweet williams because of likely consumer preference for the latter. The former probably needs to have its own distinct branding if marketed as a 'straight' line.
- There is demand for annual dianthus for use in bouquets, and further evaluations on commercial holdings showed that the first lead stem produced by the plant is, as expected, of much better quality and suitable for bouquets. The side-shoots are of lower quality and only suitable for bunching. Hence, for bouquet work the higher planting densities might be more appropriate, but for bunching work the lower density would be the most cost effective.
- Cultivar selection is an important factor: for example, in the NCFC trials cultivars of the 'Sweet' series were naturally smaller than those of the 'Amazon' series, and three times as many stems might be needed to achieve the same bunch weight.
- Productivity and quality were relatively little affected by varying the planting density, so there are no advantages of using high densities (seed is relatively expensive).
- Pinching is detrimental to flower quality, so annual dianthus should be left unpinched.
- In general the post-harvest quality and vase-life of annual dianthus are good, with a modest response to use of a flower conditioner.

Further information on the National Cut Flower Centre project and trials work

Further details can be found in the following project reports, available from the HDC:

- Final Report on HDC Project PC/BOF 268 (2008): Establishing a Trials Centre for the Cut-Flower Sector.
- Final Report on HDC Project PC/BOF 268 (2009): Establishing a Trials Centre for the Cut-Flower Sector.
- Annual Report on HDC Project BOF 002 (2010): The National Cut-Flower Trials Programme for 2010-2012.

The industry led National Cut Flower Centre was set up in 2007 with HDC and Lincolnshire Fenlands LEADER+ support. In 2009, with HDC funding the centre moved to a dedicated site at Rookery Farm, Holbeach St Johns, Lincolnshire. The remit of the centre is the stimulation of UK polythene tunnel and field-grown cut flower production through providing know-how from practical trials carried out under UK conditions.

Acknowledgements

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