



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

PO BOF 002

The National Cut-Flower Trials
Centre Programme for 2010-
2012

Annual 2011

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Project Leader:	Lyndon Mason
Contractor:	Cut Flower Centre Ltd
Industry Representative:	Susan Lamb, Lambs Flowers
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Headlines

- Lisianthus grown in Spanish tunnels have been identified as producing a very high quality crop in terms of stem weight and vigour, and should be considered as a new production opportunity for UK flower growers.
- Further trials have confirmed opportunities for UK growers to exploit new 'trumpet' cultivars of antirrhinums and new German cultivars of China asters grown in Spanish tunnels, and of new ornamental brassicas and dwarf sunflowers as field crops.
- Modern cultivars of double flowering *Aster ericoides* have shown significant market potential, but further work is needed to look at scheduling and the control of excessive growth.
- As in previous years phlox have shown considerable potential as tunnel crops in the UK.

Background and expected deliverables

The past 20 years have seen a marked increase in *per capita* purchases of cut-flowers in the UK. Consumption has moved up from what was once a very low level by European standards, and there has been a spectacular, continuing increase in the imports of cut-flowers to the UK. Despite this, the UK's own production of cut-flowers is still limited. The production of more cut-flowers in the UK would benefit from closeness to markets, delivering freshness without air-miles, but a lack of know-how may be critical in holding back expansion and enterprise. In 2007 the Cut Flower Centre was established at Kirton, Lincolnshire, to supply this practical knowledge. In 2009 the Centre moved to Rookery Farm, Holbeach St Johns, Lincolnshire, where it is now run as a discreet unit under the control of the Centre's Management Group.

The Centre delivers:

- Demonstrations, trials and problem-solving experiments relevant to UK cut-flower production, covering current crops and, especially, potential new crops for the UK
- Evaluations of promising, newer cut-flower crops on a commercial scale
- Technology transfer of the results, helping establish 'Best Practice' for the crops and cultivars promoted
- A forum to identify and facilitate further R&D projects relevant to UK cut-flower production.

The Centre also aims to assist in the commercialisation of newer crops and cultivars through providing a 'shop window' and by providing samples of cut-flowers for the wider industry to assess.

Summary of the project and main conclusions

Amaranthus (*Amaranthus caudatus*)

Responding to a specific request from a grower, a small selection of amaranthus cultivars was grown in 2011 to assess their potential as a cut-flower crop in the UK. Plugs of five cultivars - 'Caudatus Red', 'Pygmy Torch', 'Oeschberg', 'Red Cathedral' and 'Green Thumb' - were transplanted in week 21 to a 'Pro-Tech' tunnel. Cropping started in week 30. The length and form of the inflorescences varied considerably. The smaller-flowered types were thought to have potential as cut-flowers for supermarket sales, whereas the larger types have scope for being grown by a specialist grower, for example, for architectural displays in larger settings, and so it is planned to continue with a variety demonstration in 2012. From comments received, it would be useful to look at an earlier cropping stage that might have more commercial potential. New cultivars will also be looked at in 2012.

Antirrhinum ('Trumpet' cultivars) (*Antirrhinum majus*)

These new varieties have consistently impressed growers, packers and supermarket technologists with their novel form and vigour and quality of the stems. In 2011 a variety demonstration was set up and a late crop was tested in both the 'Haygrove' and 'Pro-Tech' tunnels at the Centre.

Plugs of cultivars 'Yellow Peloric', 'Trumpet Pink' and 'Ivory White Peloric' were transplanted into 3m-long beds in the 'Haygrove' tunnel in week 17. Stem weights and spike lengths varied considerably between the three cultivars, though all were judged satisfactory. 'Yellow Peloric' gave the heaviest stems and long flower spikes. Consistent with the three weeks later transplanting than in 2010, the first flush was in week 25 (week 22 in 2010). Trimmed (60cm) stem weights in 'Yellow Peloric' and 'Ivory White Peloric' in 2011, about 50g, were similar to those obtained in 2010 (just over 50g for a 66cm-trimmed stem). Replicating the normal supermarket supply chain and carrying out vase-life testing, samples of all three cultivars had a vase-life of 10 days. The second flush produced many more stems, though these were much lighter (just under 30g for a 60cm-stem) than in 2010 (nearly 50g for a 55cm-stem).

Plugs of cultivar 'Tangerine' were transplanted into the 'Haygrove' and 'Pro-Tech' tunnels in week 27. Despite the late planting, stem length, trimmed weight and flower spike length were about the same as the best from the earlier planting, though there was insufficient time for a second flush.

Aster ericoides

A series of trials at the Centre has demonstrated the potential of *A. ericoides* cultivars as a pinched crop for September-flowering in Spanish tunnels. In 2011 further cultivars were trialled as early- and late-planted crops and further observations were made on the plants over-wintered in tunnels from 2010.

Rooted cuttings of ten cultivars were transplanted into plots in a 'Pro-Tech' tunnel in week 19. The crop was pinched. Most varieties produced strong plants which cropped around week 42, somewhat later than the equivalent plants in 2010. Among these cultivars, stem length varied from 77 to 159cm, stem weight from 35 to 62g, and the number of stems cropped per plot from about 100 to just over 200, so the importance of varietal differences was confirmed. Ranking the varieties by aspects of performance, 'Cassy' ('Moercas'), 'Linda' and 'Cirina Dark' produced above-average numbers of longer-than-average stems, but these were of low weight. 'Blue Tail', 'Cape Town' ('Moertown') and 'Cassandra' produced the heaviest stems, but these were relatively low in number as well as being relatively short.

The late-planted trial was conceived as a late-crop to follow a round of column stocks. Rooted cuttings of six cultivars were pinched and allowed to break before transplanting into beds in a 'Pro-Tech' tunnel in week 28. Three varieties, 'Cairo' ('Moerci'), 'Cape Town' ('Moertown') and 'Chicago' ('Moergo'), cropped in week 41, but with stem lengths and weights about half that of the better, early-planted crop. The other three cultivars, 'Blue Tail', 'Cassy' ('Moercas') and 'Dark Mark' either failed to flower or the stems were too short to crop.

Some varieties planted in 2010 and over-wintered in a 'Pro-Tech' tunnel survived the harsh 2010/2011 winter better than others. Part of the crop was pinched (in week 21) and part left intact. The over-wintered plots that were not pinched in the spring grew out of control: the first flush needs to be cut-back to yield a late flush.

Two separate vase-life tests were carried out, each involving about ten cultivars, mostly from the 2011 trials but including some from the over-wintered plants, either pinched or non-pinched. In one trial the vase-life of the different cultivars varied between 8 and 16 days, while in the second it varied from 7 to 21 days, a good measure of agreement. Vase-life was therefore largely more than sufficient for an expected guaranteed life of 5 or 7 days in mixed bouquets. A general comment was that the stems were too long (and often the branches too wide) and would require a significant amount of trimming before packing; this should be

addressed by improving crop husbandry and varietal selection. The 'Double Fun' series were noted as the best performers overall.

China asters ('German' varieties) (*Callistephus chinensis*)

With continued interest in these striking cultivars of China aster, further trials on a number of cultural aspects were carried out at the Centre in 2010. One trial involved using the growth retardant daminozide to reduce the excessive growth that can occur in early plantings of vigorous cultivars, but even the higher rate of retardant resulted in only a 10% reduction in stem length in early plantings, while application to the later plantings was ineffective. A further trial with 'B-Nine SG' was therefore carried out in 2011. Five varieties of the popular 'Krallen' series and six from the 'Gremlin' series were used in 2011. In week 25 each variety was transplanted into beds in a 'Pro-Tech' tunnel. Half of each bed was treated with 'B-Nine SG' at 6g of product per litre twice, in weeks 32 and 34. In the 'Krallen' varieties applying 'B-Nine SG' gave a fairly consistent, but only 3% overall, reduction in stem length compared with the controls. In contrast, in the 'Gremlin' varieties the result of using 'B-Nine SG' was unconvincing, inconsistent and resulted in an overall less than 2% reduction in length. The effect of retardant treatment on the weight of stems (trimmed to 65cm) was inconsistent, though some varieties produced heavier, sturdier stems when the retardant was used. However, differences due to cultivar and retardant treatment were not statistically significant. There was no significant effect of regulator treatment on the numbers of side-shoots produced. In vase-life testing of a sample of four cultivars, vase-life ranged from 4 to 9 days, meaning that, while some cultivars would be suitable for bouquet work, further selection for post-harvest quality is desirable.

Eryngium (*Eryngium* spp.)

Responding to a grower's request, in 2011 a small selection of *Eryngium* cultivars was grown to assess the varieties available and their potential as a crop in the UK. Plugs of cultivars 'Marbella', 'Blue Bell', 'Arabian Dawn', 'Deep Blue', 'Magical Purple Falls', 'Magical Blue Falls' and 'Magical Cloud' were transplanted into plots in a 'Pro-Tech' tunnel and outdoors in week 27 and 32. As expected, few flowers were produced in 2011; the further performance of this planting will be assessed in 2012.

Hardy foliage

A wide range of hardy foliage plants was planted in outside beds in spring 2010 and 2011, including varieties of *Calicarpa*, *Cornus*, *Corylus*, *Cotinus*, *Hedera*, *Hypericum*, *Philadelphus*, *Photinia*, *Quercus*, *Salix*, *Symphoricarpus* and *Viburnum*. Further information will be included

in the next report, once the bushes have become established, though many species are showing promise and have generated interest from the industry

Lisianthus (*Eustoma grandiflorum*)

Cut-flowers of lisianthus are now popular in the UK and, although regarded as somewhat 'exotic', the possibility of growing a short summer spot crop in a tunnel was confirmed in trials at the Centre in 2010. Growing in the 'Haygrove' tunnel fitted with side skirts and end-doors that were kept shut in windy weather, the results were impressive, with high-quality blooms, a good stem strength and negligible pest and disease problems. But since the growing period in 2010 was particularly warm and dry – ideal for growing lisianthus – further trials were needed to test this result in a more 'normal' year.

In 2011 nearly thirty cultivars were trialled. Plugs of about ten cultivars were planted in a 'Haygrove' tunnel in each of weeks 18, 19 and 20. To test season extension, further plugs of the ten varieties already planted in week 20 were transplanted in week 21 to the 'Pro-Tech' tunnel (without end-doors). The plots growing in the 'closed' tunnel produced strong, high quality stems, and only inconsequential pest or disease problems were seen (there was no downy mildew and little evidence of root diseases). However, the late planting in the 'open' tunnel grew less strongly, with significant amounts of *Fusarium* and some *Pythium* seen, and the crop was abandoned after the cover was damaged in a gale. It is notable that a long established lisianthus grower visited the CFC site and commented that while the crop was not as strong and vigorous as the 'Haygrove' tunnel crop, it was still better than his equivalent glasshouse crop and is therefore well worth repeating in 2012, but using a slightly earlier planting date. The difference in pest and disease levels between the two tunnels may have been related to the different microclimates, or to the methods of soil sterilisation used in each: the 'Haygrove' tunnel was treated with dazomet (as 'Basamid') in autumn 2010 and left sheeted-down over winter, whereas the 'Pro-Tech' bays were sterilised with dazomet in spring 2011.

Cropping times and stem lengths and trimmed weights revealed considerable varietal differences, some cultivars evidently being more suited to cultivation in tunnels. Most cultivars planted in weeks 18 and 19 were cropping in weeks 32 to 33, respectively, with the odd cultivar later; the week-20 plantings cropped over weeks 32 to 36. Of the 28 plantings, eight failed to reach the average length of 70cm needed for trimming to specification, but only six had a trimmed stem weight of less than 80g. Untrimmed stem lengths and trimmed stem weights, averaged across the cultivars, showed no clear trend with later planting, although stems from the middle planting date were shorter and lighter (each by about 10%) than the

earlier and later plantings. However, sometimes the standard deviation values indicated a large variation within plots, so supposed varietal differences should be treated with caution.

A selection of eight cultivars from the trial was used to test vase-life under standard conditions. Half of the cultivars reached or exceeded a 9-day vase-life, the criterion for use in straight bunches. However, all cultivars reached the 7-day vase-life that would be required for use in bouquets.

Ornamental brassicas (*Brassica oleracea*)

For economic success ornamental brassicas need to be grown on a low-cost basis, and this is likely to involve direct-drilling. In 2009 a small trial was set-up at the Centre showed just how sensitive brassica drilling is to poor soil conditions. In 2010 a further trial was located on a commercial nursery with a more appropriate soil type, where the direct-drilled crop performed particularly well. New lines of ornamental brassicas, still under code numbers, also formed part of the programme at the same nursery. Some proved very promising, had potential as novelties, or were potential alternatives to 'Crane' cultivars.

In 2011, ten further lines were evaluated at the same nursery. Seed was sown in plugs in week 22 and transplanted to field plots in week 27. None of the varieties presented any issues over their growing, though 'Sunny Bright' consisted of mixed seed, consequently resulting in a mix of head sizes. The overall selection produced a good range of head colour, from white to purple/pink, while many produced attractive heads, notably 'Snow Bright', with white veining in the pink/white/green leaves. Average stem length varied from 40cm (for 'Kohju No. 2', which was considered too short) to 62cm (for 'Dream White', possibly too tall). The percentage of stems cropped varied much between varieties – from only 5 or 10% in 'Sunny Bright' and 'Kohju No. 2', to 90% or more (in the tall varieties, 'Lake Swan', 'Suruga Hatshi' and 'Dream White'). The heads were harvested in week 40 and samples were subjected to standard vase-life testing following 2 days in a cold-store then 4 days representing the transport/retail period; 'Chrysal Clear Professional 2' was used as a conditioner and a universal flower food was used in the vases. Vase-life ranged from a satisfactory 12 days (in 'Sunny Bright', 'Dream Light', 'Suruga Hatshi' and 'Lake Swan') to 23 days (in 'Moon Light', 'Hakuju' and 'Dream White').

Phlox (*Phlox paniculata*)

Plots of phlox cultivars were planted in 2009 in the 'Pro-Tech' tunnel. They provided a further demonstration of the potential of the crop in the UK, and gave samples for flower packers to show to supermarket buyers. In 2011 the plots started to crop in early-July, again giving

stems of far superior quality than an outdoor crop. Average trimmed stem weights varied from 32 to 38g. The number of stems cropped varied from a low 31/m² for 'Sugar Missy' to 104/m² for 'Miss Fiona'. The second flush was still developing when the polythene cover had to be removed from the tunnel due to deteriorating weather. Several cultivars were subjected to vase-life testing, most having vase-lives of 9 to 11 days; although flower drop started between vase-days 4 and 6, other flowers continued to open to replace them. Exceptionally, cultivar 'Miniature Pink' had a vase-life of 14 days and did not drop flowers over this period.

Rudbeckia (*Rudbeckia hirta*)

Rudbeckia is another potential cut-flower crop, and its inclusion in the programme of the Centre was suggested by a supermarket representative. As an initial demonstration, cultivars 'Hirta My Joy' and 'Hirta Green Eye' were transplanted into plots in the 'Pro-Tech' tunnel in week 21. Although the flowers were attractive in themselves, the stems were too vigorous and unruly to be considered practical for commercial use. The cultivars tested were seed-raised annuals, but more robust perennial varieties of rudbeckia are also available, and the latter will be tested in 2012.

Sedum (*Sedum spectabile*)

The 2010 plantings of three sedum cultivars grew poorly in their establishment year but much more vigorously in year 2. The high weight and quality of sedums as cut-flowers suggested that further trial plantings should be made in 2011, and plants of 'Mr Goodbud', 'Magical Bon Bon', 'Magical Lizzy' and 'Magical Twist' were transplanted into outside beds in week 24 for further observations. The vase-life of sedums has not yet been tested and it is planned to do this in further trials.

Stocks (column) (*Matthiola incana*)

Column stocks for autumn-flowering were last included in the Centre's programme in 2009, when the suggested advantage of using block-raised plants was tested. This showed that there was no advantage due to using blocks over plugs.

Stocks are prone to failing or abnormal flower initiation when grown in summer temperatures. However, the 'Katz' series of column stocks was bred for resilience to higher temperatures, so work was planned to investigate summer cropping of 'Katz' varieties at the Centre in 2011. The plugs did not arrive at the Centre until late-August 2011, but nevertheless they were planted in the 'Pro-Tech' tunnel, which by then had had its cover removed when the weather deteriorated. The plants were in full flower in early-December, and, although battered, were of basically good quality and appeared to last well in the vase. This raised the

question of whether, irrespective of its advantages as a crop in a warm summer, this series might be suitable as a late tunnel crop or, perhaps, a crop in poor quality cold glass. Subsequent discussions with the breeder have confirmed that this is worth investigating further. Unlike many stocks varieties, the 'Katz' series is selectable for double flowers "only with difficulty" and automated methods are not sufficiently sensitive, so it has been suggested that selection in this case is not economic. However, in the right circumstances a profitable crop might still be obtained when growing in a Spanish tunnel or in minimally heated or unheated glass, provided the percentage of double flowers is consistently higher than 50%. For this reason records were kept of the numbers of double and single flowers obtained. The overall percentage of plants producing double flowers varied from 32 to 57% in different lines, or from 40 to 62% if plants with non-opening flowers were excluded (in which case about half of the eight lines yielded around 60% of doubles). Further tests would be needed to determine if the performance of the different 'Katz' lines are consistent year-on-year.

Sunflowers (*Helianthus annuus*)

In 2010 sunflowers were included in the Centre's trials for the first time. Although sunflowers are already a well-established crop in the UK, their size means that harvesting and handling require significant resources. To this end it was planned in 2010 to investigate new dwarf cultivars and using a plant growth regulator on standard cultivars. However, adverse weather – dry weather limiting germination and establishment, followed by wet, windy weather adversely affecting growth – prevented any meaningful results being obtained. The work was therefore repeated in 2011.

Eight cultivars, some available only with code numbers, were seeded by hand into outdoor beds in weeks 19 and 22. Stem lengths and weights and flower diameters were recorded at about peak cropping for a sample of 30 stems of each plot. The percentage of seed germination varied from 38 to 100, but as some of these are trial varieties this shows that further work is needed by the breeder to ensure the germination rate is commercially viable. Cropping dates varied from 10 to 18 August across the cultivars sown in week 19, and from 18 August to 2 September for the sowing in week 22. In the earlier sowing 'Early Sunrise' (KB 114), 'Jua Maya' and 'Stellar Sun' (KB 105) were faster to crop than the other varieties, whereas cropping dates for the later sowing were more uniform – with the exception of 'Stellar Sun' (KB 105) which was again quick to crop. Flower diameters varied from about 15 to about 19cm for the various cultivars. The flowers of 'Jua Maya' were consistently relatively compact. For most, but not all, cultivars, stem lengths were greater from the later sowing, but this was not always accompanied by increased stem weight, there appearing to be no

obvious relationship between the two. 'Happy Face' (KB 116) was the most dwarf cultivar trialled, from both sowings, while its stem weight remained high.

Seed of standard sunflower 'Sunrich Orange' were sown, using the same methods as above, in an outside bed in each of weeks 19, 22 and 26. The growth retardant 'B-Nine SG' was applied to part of each bed. But it was visually obvious that the retardant application had had no effect on plant height, and no further observations were made.

Vase-life tests were carried out on a selection of sunflower cultivars. For most, it was 11 days, but 'Dafna' was exceptional with a vase-life of 15 days.

Sweet Peas (*Lathyrus odoratus*)

Recurrent expressions of interest in developing a low-input system of sweet pea production led to trials at the Centre in 2011. A metal 'A' frame with netting was erected along the length of the 'Pro-Tech' tunnel. Five varieties of sweet pea were transplanted from pots along either side of the framework in week 22. They were thinned to one plot at 30cm-spacings and one plot at 50cm-spacings for each variety, each plot being *ca* 5m-long. The 50cm-plants were pinched once, while the 30cm-plants were not pinched. The first stems were picked in mid-July, cropping continuing for an extended period. The initial results were very encouraging, with a large number of long, high-quality stems being produced from both growing formats. The average length of stems approached 30cm, with slightly longer stems from the 50cm, pinched plots. The yields obtained were very high, usually between 1000 and 2000 stems per 5m-long plot. However, floret numbers were consistently low throughout the cropping period, with 3.3 to 3.8 florets per stem, and vase-life was only 5 days in the samples tested.

General

A major part of the Centre's extension work was once again providing large numbers of samples, mainly of 'trumpet' antirrhinums, lisianthus, *Aster ericoides* and 'German' asters, and more limited numbers of other species, to major supermarkets and packers, and, in some cases, to local florists. The lisianthus were especially well received, and the MG considered that some supermarkets would pay a premium for it as a UK crop, though this would have to be balanced by the long time the crop is in the ground. The 'trumpet' antirrhinums also impressed, though with a concern that they might be more cheaply sourced from abroad. 'German' asters, *A. ericoides* and phlox were also promising, though more attention must be paid to the marketing stage of *A. ericoides* and phlox. While the sweet peas were considered a good quality product for a relatively low-cost production system, it

was felt they would not compete with a more specialist F1 product raised under glass and giving a more florets and a much longer stem.

Financial benefits

The project has identified tunnel-grown lisianthus as potential new UK production system. Other novel crops have also been developed and are at a stage where they could be tested on a small commercial scale. Two or three new products would help to maintain a significant number of larger or medium-sized businesses. Now that the CFC is developing a clear market potential for “new” crops, it is proposed that the preparation of basic costings will be an integral part of its remit in the future. The basic costings will include as much information as possible including planting costs, yield, basic production costs etc but clearly it will be difficult to provide accurate labour figures owing to the issue of scaling up small scale trial plots to a realistic commercial situation.

Action points for growers

Growers looking for new opportunities might consider the case for growing new cultivars of ‘trumpet’ antirrhinums, lisianthus and ‘German’ asters as tunnel crops, and of dwarf sunflowers and ornamental brassicas as field crops.