



Grower Summary

PO 019a

The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers.

Objective 4: To extend the marketing season for coloured varieties of pot-grown Hellebore to include the months prior to Christmas through cool treatments.

Annual 2018

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AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

Project title: The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers.

Objective 4: To extend the marketing season for coloured varieties of pot-grown Hellebore to include the months prior to Christmas through cool treatments.

Project number: PO 019a

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Report: Annual report, 31 March 2018

Previous report: None

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Date project commenced: 1 April 2017

Date project completed 31 March 2019

(or expected completion date):

Grower Summary

Headline

- A cold treatment from mid-August advanced flowering in Hellebore 'Anna's Red', 'Madame Lemonnier', 'Paradenia', 'Penny's Pink' and 'Royal Emma', and advanced bud development in 'Anna's Red' and 'Royal Emma'.
- A cold treatment from mid-September advanced flowering in 'Madame Lemonnier' and 'Paradenia', and advanced bud development in 'Molly's White', 'Penny's Pink' and 'Royal Emma'.
- Flowering of 'Molly's White' was not advanced by either cold treatment.
- 'Anna's Red' and 'Paradenia' were too tall, based on a height specification of 20-30cm.
- The cost benefit of using cold storage to advance flowering in Hellebores is estimated at 66p-£1.85 per plant (excluding labour costs).

Background

The Bedding and Pot Plant Centre (BPPC) has been established to address the needs of the industry via a programme of work to trial and demonstrate new product opportunities and practical solutions to problems encountered on nurseries. Knowledge transfer events including trial open days and study tours are also included in the programme.

The work programme is guided by a grower-led Management Group that includes members of the BPOA Technical Committee, and representatives from Baginton Nurseries, Coventry the host nursery for the BPPC, and growers representing both the bedding and pot plant sectors.

This is the Bedding and Pot Plant Centre report for:

Objective 4: *To extend the marketing season for coloured varieties of pot-grown Hellebore to include the months prior to Christmas through cool treatments.*

Summary

The market for Hellebore as pot plants has increased in recent years as new seed and micro-propagated varieties have become available. Previously, only white varieties have been marketed prior to the New Year, but new English bred pink and red varieties are now available that may be manipulated to flower before Christmas by subjecting plants to cold treatments.

A trial was run from April to December 2017 to see if it was possible to bring coloured varieties into flower before Christmas.

Forty plug plants of six micro-propagated Hellebore varieties (**Table 1**) were transplanted into 1.5L terracotta coloured plastic pots in week 16, and established within a polythene tunnel until week 21, when they were moved outdoors.

Table 1. Hellebore varieties used in the pre-Christmas production trial, 2017

Variety No.	Variety	Supplier	Breeder
1	'Anna's Red'	Exceptio bv	Rodney Davey
2	'HGC Madame Lemonnier'	Heuger	Heuger
3	'Molly's White'	Exceptio bv	Rodney Davey
4	'Paradenia'	Heuger	Heuger
5	'Penny's Pink'	Exceptio bv	Rodney Davey
6	'Royal Emma'	Just Must Perennials	Thierry van Paemel

Fifteen plants of each variety were subjected to a six-week cold store treatment (2°C, 12 hour day/night, 100 watt incandescent light) from 16 August (week 33, CS1) with an additional fifteen plants of each variety subjected to another six-week cold store treatment from 13 September (week 37, CS2). After the cold store treatment, both sets of plants were left to acclimatise outdoors before being moved under heated glass in week 44. The plants were monitored for bud and flower development, and a final assessment for flowering, plant height and plant quality was completed in week 51.

For '**Anna's Red**' no flowers or buds were recorded in the outdoor and indoor controls prior to week 51 when the first coloured buds were recorded. In treatment CS1, buds showing colour were recorded from week 45 through to week 51, with the first flowers recorded from week 46, earlier than for treatment CS2, where bud development had only just commenced.

For '**Madame Lemonnier**' no buds showing colour or flowers were recorded in the outdoor control until the final assessment in week 51, buds showing colour were recorded on one plant only in the indoor control prior to week 48. '**Madame Lemonnier**' produced the earliest buds showing colour (CS1, week 42) than any other variety. Although flowers and buds showing colour were recorded in both the CS1 and CS2 treatments from week 45, more were produced and earlier in plants that had undergone the cold treatment from mid-August (CS1). Both treatments CS1 and CS2 advanced flower and bud production.

'**Molly's White**' was slower to produce buds and flowers than all the other varieties throughout this trial. No fully open flowers and minimal buds were recorded in the control treatments (weeks 45 to 51, inclusive). Although more flowers and buds showing colour were recorded

for plants that had undergone treatment CS1 than CS2, numbers were low for both throughout the trial.

For '**Paradenia**' although buds showing colour were recorded in both control treatments from week 45 (one plant in each), no flowers had opened by week 51. Buds showing colour were also recorded from week 45 for plants that underwent both cold treatments, however the flowers opened three weeks earlier than plants that underwent treatment CS1 (from week 45) than CS2 (from week 48).

For '**Penny's Pink**' no flowers were recorded in the control treatments, up to and including week 51. Prior to week 48, buds showing colour were recorded on one plant in the outdoor control only, after which numbers started to increase in both control treatments. More open flowers were recorded and earlier in CS1 (week 46) than in CS2 (week 48).

For '**Royal Emma**' no open flowers were recorded either in the outdoor or indoor control treatments throughout the trial (weeks 45-51). Open flowers were recorded in CS1 from week 46, and in all fifteen plants in week 48. For CS2, the number of buds with colour increased between weeks 48 and 51, but the main flush of flower on these plants did not appear prior to the end of the trial in week 51. Both treatments CS1 and CS2 did therefore advance bud and flower production compared with the control treatments, but the effect was more pronounced in those plants that had undergone the earlier cold treatment (CS1).

Plant quality was generally not affected by the cold treatments; the exceptions were 'Anna's Red' and 'Paradenia' which were stretched by both cold store treatments. Flower colour had started to fade in 'Penny's Pink' and 'Anna's Red', likely due to the relatively warm glasshouse temperature.

Considering plant height, for all varieties, plants that had been subjected to the cold treatments were taller compared with those from the outdoor control treatment. Plants from the indoor control were generally only slightly taller than the outdoor control. This suggests that the cold treatments exerted the greatest influence on plant height. We are not aware of specific height specifications for Hellebore, but would expect 20-30 cm to be reasonable for cost effective transport and distribution on Danish trolleys; if using this parameter the height of the 'Anna's Red' and 'Paradenia' would not have been commercially acceptable. Many imported Hellebores from the continent have their foliage removed to expose the flower buds, so foliage height is not an issue at marketing.

In summary, flower buds had initiated naturally prior to the cold treatments, the treatments then advanced flowering for most of the varieties examined in this trial. However, the response appears to be variety dependent; the cold treatments did not advance the flowering of 'Molly's

White' for example compared with the outdoor control and had a detrimental effect on the quality of 'Anna's Red' and 'Paradenia' in terms of plant height. Flower colour and plant height were both affected by glasshouse temperature in some varieties; cooler glasshouse temperatures favour stronger flower colour and more compact plants.

In time, Hellebore breeding using traits from species that naturally flower before Christmas may result in coloured varieties that will flower before Christmas without cold treatments.

Recommended cold storage treatments to advance flowering in the varieties included in this trial are provided in **Table 2**.

Table 2. Recommended cold store treatments to advance flower production in Hellebores

Treatment	Variety
Mid-August	'Anna's Red', 'Madame Lemonnier', 'Penny's Pink', 'Royal Emma'
Mid-September	'Madame Lemonnier'
No cold store treatment*	'Molly's White', 'Paradenia'

*These varieties either did not respond to cold treatments, or lost quality

Financial benefits

This work with Hellebores will potentially broaden the range of plants in flower for the pre-Christmas marketing window to compliment Poinsettia, given appropriate variety selection for key house plant attributes (such as flowers facing upwards and attractive foliage as well as flowers). Consumers have the option to purchase Hellebores during this period, display them as a house plant and then subsequently plant them in the garden rather than disposing of them at the end of the season (as they would for Poinsettia).

Sold as pot plants in flower, some Hellebore varieties can demand higher retail prices with a 10% premium over green plants. Current retail prices for some of the varieties used in this trial include: *Helleborus* 'Emma' and *H.* 'Penny's Pink', £13.50 (1.5 L); *H.* 'Anna's Red' £12.49 – £19.99 (1.5 L); *H.* 'Madame Lemonnier', £14.44 (2 L), from various outlets.

Based on the retail price range for *H.* 'Anna's Red' in a 1.5 L pot, the grower could receive in the region of £5.20 to £8.33 per plant in the natural flowering season. By marketing this product in flower before Christmas it is considered that a premium of 10% may be achievable. This would be a new product line, and a hypothetical wholesale value of 50,000 plants would be estimated at £286,000 to £458,150.

The operating cost for a cold store has been calculated at £21.35/m² (Brown, 2003). This was calculated as the average annual cost to build and run a cold store when spread over a ten year pay-back period, and excludes costs associated with any building the store may be situated within). The cost of cold storage per plant (1.5 L pot, 15 cm diameter, 36 plants /m²)

ranges between 15p and 59p, depending on the number shelves used, for example if using Danish trolleys (**Table 3**).

Hellebore growers would need to set the projected extra income against the associated costs of operating (or hiring) their own cold store at 2°C for six weeks at current energy costs, and would need to include associated costs such as the labour cost to transfer plants to and from the cold store.

For the examples provided, the cost benefit of using cold storage to advance flowering in Hellebores is estimated at 66p - £1.85 per plant (excluding labour costs).

Table 3. Cost of cold storage treatment per plant.

Number of shelves	Cost of cold storage / m ² (£)*	No plants / m ² **	Cold storage cost / plant (£)***
1	21.35	36	0.59
2	21.35	72	0.30
3	21.35	108	0.20
4	21.35	144	0.15

*HNS113 – the feasibility of using low temperature storage as a scheduling aid in nursery stock production. Figure represents the average annual cost to build and run a cold store, spread over a ten year pay-back period, excluding the cost of any building the store may be situated within. **Based on 1.5 L pots, 15 cm diameter, 36 plants/m². *** Figure does not include labour costs for moving plants to and from the coldstore.

Action points

- If customer height specifications allow, and a suitable price premium can be achieved, consider subjecting Hellebores to the following cold storage schedule to advance flowering:

Parameter	Treatment
Duration	Six weeks
Temperature	2°C
Day length	12 hour day / night
Lighting	100 watt incandescent light

Mid-August – ‘Anna’s Red’, ‘Madame Lemonnier’, ‘Penny’s Pink’, ‘Royal Emma’

Mid-September – ‘Madame Lemonnier’