

WELSH COLLEGE OF HORTICULTURE

HORTICULTURAL DEVELOPMENT COUNCIL FUNDED PROJECT

ON

NATURAL SEASON CHRYSANTHEMUMS

FINAL REPORT FOR WORK CONDUCTED JULY - DECEMBER 1988

INTRODUCTION

Discussions between Natural Season Chrysanthemum producers in the North West and ADAS Advisors highlighted several problems relating to the production of blooms for the Christmas market. A trial was designed, to elucidate some of the problems highlighted, and carried out in the 1988 season in the glasshouse unit at the Welsh College of Horticulture.

Trial Objectives

1. To investigate the cause and possible control of flower capitulum 'rot' in the cultivar May Shoemith.
2. To investigate two potential methods of advancing the flowering date of Shoemith Salmon and American Beauty:
 - a. the use of a higher than normal temperature regime in September and October
 - b. the use of blackout.
3. To observe varietal variation in flowering date within a range of Shoemith Salmon and American Beauty cultivars.
4. To investigate the effect of Alar treatment on stem strength, pedicel length, date of flowering and flower colour in the cultivars:

Red Galaxy; Pink Long Island Beauty; American Beauty and Shoemith Salmon.

Crop Culture and Treatment Applied

Two glasshouses, 94' x 43' and 92' x 30', were prepared for planting; the glass cleaned and the soil sterilised to a depth of 8". HCH dust was incorporated into the ground as a precaution against Western Flower Thrip and base dressing applied in accordance with Ministry of Agriculture recommendations for a liquid fed crop (except two beds May Shoesmith).

Rooted cuttings of American Beauty cultivars, Shoesmith Salmon cultivars, May Shoesmith and Red Galaxy, were planted in Week 31 and of Pink Long Island Beauty in week 28. All cultivars were planted at 31 plants/m², stopped 10 days after planting and rubbed out to allow only two shoots to develop from each plant.

All the crop, except May Shoesmith, was liquid fed in accordance with ADAS recommendations, routine sprays of Decis and Hostaquick used for greenfly and WFT. Routine sprays of Thiram and Bravo were used to control botrytis. Temperatures in House 1 (94' x 43' were set to give a typical natural season temperature regime (10°C min. throughout venting at 17°C) and in House 11 a higher temperature regime (15°C min. planting to mid-October, then lowered to 12°C venting at 17°C).

The following treatments were applied:

1. Pink Long Island Beauty:

Planted week 28, grown only at 10 c and treated with three growth regulator programmes:

a. No Alar applied

b. Two sprays of Alar applied:

0.06% ai Alar 16th September
0.06% ai Alar 26th September

c. Four sprays of Alar applied:

0.06% ai Alar 24th August
0.06% ai Alar 16th September
0.06% ai Alar 26th September
0.06% ai Alar 17th October

2. Red Galaxy:

Grown only at 10°C and treated with three growth regulator programmes:

a) No Alar applied

b) One spray Alar applied: 0.06% ai Alar, 26th September

c) Three sprays Alar applied:

0.06% ai Alar 16th September
0.06% ai Alar 26th September
0.03% ai Alar 17th October

3. May Shoemith:

Grown only at 10°C using a slow release fertiliser base dressing rather than liquid feeding. All plants sprayed with Alar at the bud visible stage (0.125% ai) and again 10 days later (0.25% ai).

Two separate treatments were applied:

- i) a. bed one - watered normally
- b. bed two - water application reduced by half during the period from mid-September to disbudding.

and

- ii) fungicide treatment from disbudding;

Bravo and Thiram fortnightly

or

Bravo and Rovral fortnightly.

4. White American Beauty (Strain C):

Two beds planted in each house with one bed blacked out in each house, 7.00 p.m. - 8.00 a.m., 24th August to 21st September.

Three growth regulator programmes were also applied to each bed of plants:

- a. No Alar treatment

- b. Three sprays Alar applied:

0.125% ai Alar 16th September

0.25% ai Alar 14th October

0.25% ai Alar 24th October

- c. Six sprays Alar applied:

0.06% ai Alar 30th August

0.06% ai Alar 6th September

0.125% ai Alar 16th September

0.125% ai Alar 30th September

0.25% ai Alar 14th October

0.25% ai Alar 24th October

5. Bright Bronze Shoemith Salmon:

Two beds planted in each house with one bed in each house blacked out,

7.00 p.m. - 8.00 .m., 31st August to 21st September.

Three growth regulator programmes were also applied to each bed of plants:

a. No Alar treatment

b. One spray, 0.125% ai Alar, late pre-disbudding

c) Two sprays: 0.125% ai Alar, early pre-disbudding
0.125% ai Alar, late pre-disbudding.

6. Variety trials:-

Two beds grown at 12°C - assorted cultivars of American Beauty and Shoemith Salmon

All treatments were replicated twice in each house and results are the average of two plots.

Results

1. Pink Long Island Beauty

Alar treatment had a small effect on overall plot height:

No Alar plants	5'6"	at flowering
Two Sprays Alar	5'2"	at flowering
Four Sprays Alar	4'10"	at flowering

Alar treatment had no effect on stem strength, flower pedicel length or strength, flower colour or date of flowering.

2. Red Galaxy

Alar treatment had no effect on stem strength, pedicel strength and length, flower colour or date of flowering.

In neither case was stem or pedicel length or strength a problem.

3. American Beauty

All treatments, temperature, blackout and Alar affected the date of flowering, Table 1, and Alar treatment also had a marked effect on stem length, neck length and neck strength, Table 11. No treatment had a marked effect on the percentage crop flower size, 24 or 30, and all plots produced a greater number of blooms than was expected - 3.8/plant cf 2.0/plant, Table 11.

4. Bright Bronze Shoesmith Salmon

As with American Beauty the date of flowering was affected by temperature and daylength, Table III, but no effect of Alar on flowering date was observed. All treatments resulted in short stemmed blooms probably as a result of using a planting date that was later than desirable.

5. May Shoesmith

None of the treatments applied affected the flowering date of this variety which bloomed during the second and third week of December. Leaf samples taken at intervals throughout the autumn indicated some correlation between water application and the incidence of head shatter and also a correlation between tissue calcium levels and watering, but there would appear to be an inverse relationship between tissue calcium levels and the incidence of flower shatter, contrary to expectation, Table IV. The incidence of head shatter in the bed was small, much less than that experienced by local growers and confined to small blooms.

Recorders observed a significant amount of neck kinking immediately beneath the flower head just prior to harvest thus spoiling the quality of the marketable bloom. Flower size was generally larger where water had not been withheld, Table IV, which may indicate some relationship between vigour of growth and the subsequent shattering of the bloom.

6. Varietal variation: American Beauty and Shoesmith Salmon cultivars.

Observations indicate considerable variation between flowering dates, Shoesmith Salmon cultivars and in suitability for production in the North West, American Beauty cultivars. The order of flowering of Shoesmith Salmon cultivars at 15-12°C was:

Shoesmith Salmon, approximately 60% harvested pre-Christmas

Yellow Shoesmith Salmon, approximately 40% harvested pre-Christmas

Orange Shoesmith Salmon, approximately 40% harvested pre-Christmas

Bright Bronze Shoesmith Salmon, approximately 10% harvested pre-Christmas

Crimson Shoesmith Salmon 0% harvested pre-Christmas.

There was little observed difference in the flowering date and flower quality of American Beauty 'Strain C', Early Yellow American Beauty and Yellow American Beauty 'Strain D'. Early White American Beauty was far less uniform, flowered later and produced blooms with a large incidence of neck weakness despite the application of six sprays of Alar.

Conclusions

Results obtained would indicate that the date of flowering of American Beauty and Shoesmith Salmon cultivars can be advanced by the use of either blacking out treatment or a higher production temperature. In view of the cost of heating, local growers favour the use of blacking out. Precise dates for blackout treatment cannot be established accurately on the basis of one year's trial but late August appears to be suitable for Christmas flowering of American Beauty whilst early to mid-August blackout treatment of Bright Bronze Shoesmith Salmon may produce flowers for the Christmas market.

Good crop establishment and break/shoot growth (2-4 cm) is necessary before the start of blackout treatment so planting dates in week 30 and week 28 respectively should be considered. The observed variation in flowering date of Shoesmith Salmon cultivars may necessitate different blackout schedules for each colour.

Alar treatment effects vary between cultivars; flower colour loss was not observed with any of the treatments used and delay to flowering was only seen in American Beauty cvs where the delay must be considered in planning the crop schedule, since blooms with acceptable neck strength cannot be produced without the application of Alar. There would appear to be no need to use Alar on Red Galaxy and Pink Long Island Beauty but no such conclusion can be reached regarding Shoesmith Salmon cultivars as the late planting date resulted in a crop that was too short throughout.

The cause of flower shatter in May Shoesmith remains elusive; withholding water during the flower development phase does not appear to be a contributory factor as had been previously thought, neither does botrytis infection since evidence of this disease was found on some but not all the shattered flower. A spray programme using Rovral and Bravo or Thiram and Bravo applied alternately at fortnightly intervals gave adequate botrytis control without leaving an unacceptable amount of spray deposit on the foliage. Further work will be necessary before the cause of flower shatter and/or a suitable preventative production blueprint can be established.

A further trial in the 1989 season to study other potential causes of flower shatter in May Shoesmith and to establish more reliable blackout dates for Shoesmith Salmon cultivars and American Beauty cultivars is planned; please see attached.

TABLE I

The effect of temperature, Blackout and Alar treatment of flowering date in
American Beauty Strain C

	Natural Season Temperature Regime (10°C)						Higher Temperature Regime (15°C - 12°C)					
	With Blackout			Without Blackout			With Blackout			Without Blackout		
	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar
Date of 50% Flowering To nearest day	8th Dec	14th Dec	13th Dec	16th Dec	21st Dec	23rd Dec	5th Dec	7th Dec	6th Dec	13th Dec	17th Dec	19th Dec
% Crop Harvested 16-12 to 23-12	4	24	7	52	48	37	0	0	0	8	44	50
% Crop Harvested pre-Christmas	100	100	100	86	57	43	100	100	100	92	89	75

TABLE II The effect of temperature, blackout and Alar treatments on 'flower quality' in American Beauty Strain 'C'

'Flower quality' parameters	Natural Season Temperature Regime (10°C)						Higher Temperature Regime (15°C - 12°C)					
	With Blackout			Without Blackout			With Blackout			Without Blackout		
	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar	No Alar	3 Sprays Alar	6 Sprays Alar
Total Number of flowers harvested	264	269	266	256	240	234	266	274	272	267	247	241
% Crop	41	38	34	48	60	46	42	44	39	36	62	56
% Crop With Short stems 55cm	51	49	49	44	32	39	48	47	53	43	29	36
% Crop Neck Length 5 - 7 cm	0	59	99	0	2	35	0	8	73	0	0	40
8 - 10 cm	2	51	4	6	55	12	0	67	16	0	95	44
11 cm	98	2	0	94	0	0	100	19	3	100	0	0
% Crop with weak necks	79	3	0	88	4	0	98	13	2	93	0	0

TABLE III

The effect of temperature and blackout treatment on the flowering date of Bright Bronze Shoemith Salmon.

	Natural Season Temperature Regime (10°c)		Higher Temperature Regime (15°c 12°c)	
	With Blackout	Without Blackout	With Blackout	Without Blackout
Total Number of flowers harvested	80	70	110	94
Date of 50% flowering	3rd January	9th January	24th December	29th December
Percentage of crop harvested pre-Christmas (23rd December)	16	8	40	33

TABLE IV

The effect of watering treatments on flowering performance in May Shoesmith.

	Watered as necessary	Watering reduced by half mid-September - Disbudding
Number of flowers harvested	400	401
Percentage crop size	24	56
" "	30	31
" "	36	9
Percentage of heads shattered after harvest	26	17
Percentage of heads shattered on the bed	4	2
Tissue Calcium levels:		
16th September	0.94%	0.94%
12th October	1.00%	0.93%
3rd November	1.5%	1.5%