Bulletin 462
December 1988
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Colorado State University

research bulletin

Published by the Colorado Greenhouse Growers' Assoc., Inc. in cooperation with Colorado State University

SCHEDULING SINGLE STEM JAPANESE CUT ASTERS

Part I: Winter and spring responses of Japanese cut asters

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Two- to three-inch cell pack-grown Asters were grown in gravel and subjected to six photoperiod treatments. The average time from potting to harvest was 7½ weeks. The Matsumoto series was best, Ariake series the slowest. There was considerable variation between cultivars. The time to harvest increased as each week of long day pretreatment was supplied. Short days promoted lateral breaks, while long days caused elongation.

Asters *(Callistephus chinensis)* were evidently one of the mainstays in American cut flower production in the late 1800's and early 1900's. Vic Ball (1) tells how his father "cut his eye teeth in flower growing on them in 1901", and of the potential role of single stem types following WW II. Ball indicated that China Asters were grown extensively outside in cloth houses in the 1950's and Post (4) felt they were probably second in importance for cut flower production outdoors.

Post (4) reported that China Asters were responsive to both day length and temperature. He determined that stem elongation did not occur when daily light periods were less than 15 hours unless air temperatures were above 70°F. He also noted that the various classes of asters differed in the number and length of long days necessary for desirable stem elongation.

For the past six years various cultivars of Sakata Asters *(Callistephus sinensis)* have been grown periodically for preliminary evaluations as a greenhouse cut flower crop. In 1985-86 a project was designed to evaluate the photoperiod requirements and scheduling possibilities for year-around production of single stem spray type asters marketed by the Sakata Seed Company, Yokohama, Japan.

Methods

Seeds of the Matsumoto, Chikuma, Ariake series and Kurenai Asters were grown to the desired stage of growth using the STPS system of producing plants described by Goldsberry (2). They were sown in a peat-lite seeding medium and germinated under mist, then moved to a 60°F (night) greenhouse and transplanted into "806" cell packs when the second true leaves were formed. The flats of asters were given long day photoperiods until the specific photoperiod treatment was started at planting time. The cell pack grown plants were shifted to 6-inch standard pots containing steam pasteurized pea gravel when their foliage covered the entire flat and they were still in the vegetative phase of growth. Each treatment contained two pots each with three plants, which were replicated twice. Plants of all stages were grown in a fiberglass reinforced plastic-covered greenhouse heated to 60-62°F day and night and cooled at 70°F. All gravel pots were watered automatically three times per day using a continuous feed program (3). CO_2 was maintained at approximately 1000 ppm during daylight hours and no ventilation.

The experiment was repeated using four different planting dates (groups) ranging from late fall through early spring, Table 1. The following long day (LD) or short day (SD) treatments were applied to each group:

Treatment	Pot Treatment
1	Control, SD from potting until harvest
2	One week LD, SD until harvest
3	Two weeks LD, SD until harvest
4	Three weeks LD, SD until harvest
5	Four weeks LD, SD until harvest
6	Five weeks LD, SD until harvest

[1]*Professor, former graduate and undergraduate Research Assistants, respectively.*

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Blackcloth was used from 5:00 p.m. to 8:00 a.m. to insure 15 hours of darkness for the SD treatment. The LD treatment used incandescent "mum lighting" night break, from 10:00 p.m. to 2:00 a.m.

Each flowering spray was harvested and data taken when the terminal bud began to dehisce pollen. Parameters measured were:

- Stem length — from growing media to tallest flower,
- Days to harvest (DTH) — days from potting to harvest,
- Breaks — number of lateral side shoots, and
- Quality Index — each stem was graded using the following criteria:

Grade	
1	Terminal and surrounding flowers on the same height and opening simultaneously.
2	Flowering height not uniform, most flowers open at harvest.
3	Terminal flower shorter than adjacent flowers, non-uniform flowering and bud height.

Results

In general, the average time from potting to harvest of all groups was approximately 7-1/2 weeks (53 days) regardless of cultivar or photoperiod treatment **(Table 1).** The Matsumoto series performed best and Ariake series had the slowest development. Only those cultivars that appeared to have merit as a cut flower, and evaluated in groups II, III and IV were used for statistical analysis.

Cultivar responses — 'Matsumoto Rose' and 'M Purple' were of higher quality than the other members of the Matsumoto series. 'Chikuma Purple' and 'Kurenai' were comparable, but not as desirable visually **(Fig. 1).** Stem length, days to harvest and number of breaks varied greatly between cultivars. 'Chikuma Purple' had the longest average stems (23.2 inches) compared to the shortest, 'M. White' (20.0 inches). 'Kurenai' flowered the fastest, 52 days from planting and 'C Purple' averaged 57 days. 'M. Salmon' and 'C Purple' developed the most breaks (5.0 average) and 'M Red' had the least (3.8). The Ariake varieties required an average of 63 days to flower and were not included in the final group plantings.

Planting date responses — The spring planting, 29 March (Gp IV), significantly influenced plant responses more than the other planting dates. Stem length, number of reproductive breaks, quality and days to harvest were all improved. There was no significant difference in stem length or days to harvest for plants potted in January or February **(Fig. 2).** The preliminary planting in December 1985, included additional cultivars of the same Aster series that were statistically analyzed in the latter three plantings, however, the

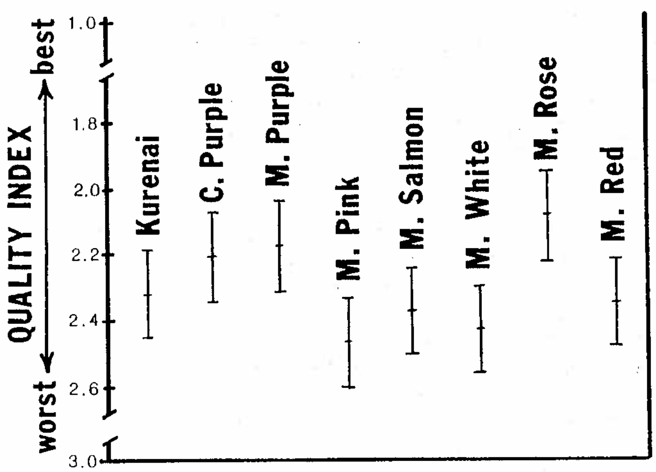

Fig. 1: Quality index of eight Sakata Aster cultivars averaged over three planting dates, six photoperiod treatments, and harvested in early spring. Non-overlapping bars indicate two means were significantly different using HSD (α=.05).

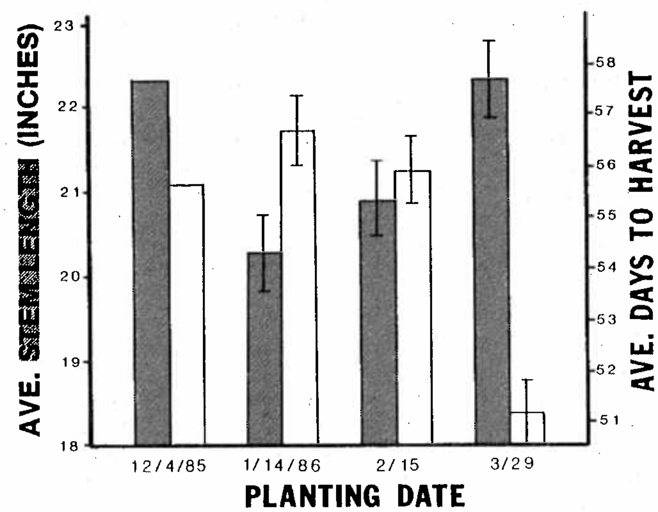

Fig. 2: Stem length and days to harvest of asters averaged over eight Sakata cultivars, planted on four different dates and six photoperiod treatments. (The earliest planting was not included in the statistical analysis.) Non-overlapping bars for each variable indicates two means were significantly different using HSD (α=.05).

Table 1: Schedule for Evaluating Japanese Cut Aster Responses to Photoperiod Treatments for Winter and Spring Flowering.

	Sow	Transplant (Grow Under SD)	Planting and Photoperiod Trts. Started	Flowering Period	Weeks to Flower From Planting
Gp I	9/31	10/16	12/04	Jan.-Feb.	8-8-1/2
Gp II	11/12	11/28	1/15	Early March	7
Gp III	12/06	12/26	2/16	Mid-April	7-1/2
Gp IV	1/20	2/05	3/29	Mid-May	7-1/2

responses were similar. There was a progressive increase in the number of lateral flowering shoots developed on each stem as the planting dates progressed from December to March.

Photoperiod treatment responses — The average number of days from planting to harvest increased significantly and almost linearly as each extra week of LD pretreatment was supplied **(Fig. 3).** The best quality flowers were obtained from photoperiod treatments four and five, which involved three to four weeks of LD treatment followed by SD. The average number of days to harvest for the two treatments varied from 55 to 57. Each additional week of LD resulted in two to three days of delay in harvesting. Flower color was visible at the same time but, in different degrees, on all photoperiod treatment plants in the spring planting **(Fig. 4).**

The relationship of stem length to the number of reproductive breaks was controlled by the photoperiod treatments **(Fig. 5).** The SD promoted lateral reproductive breaks on shorter stems while LD caused stem elongation, but inhibited to a degree, the formation of breaks.

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Appreciation is expressed to the T. Sakata Seed Corporation, Yokohama, Japan for participation in this project.

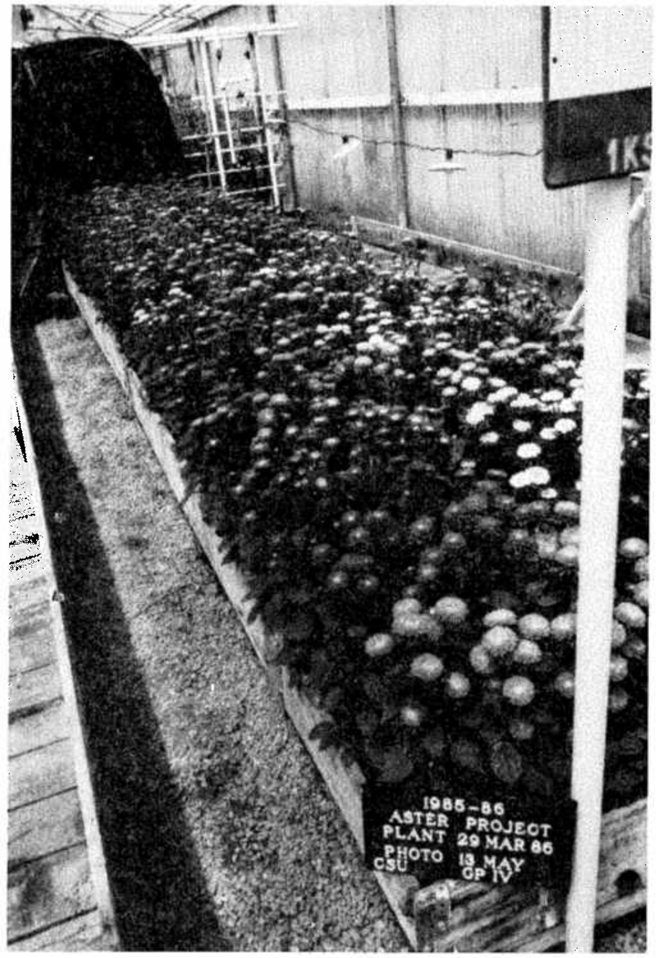

Fig. 4: Final week of SD photoperiod treatment, involving eight cultivars of Sakata Asters planted in pots of gravel on 29 March 1986. Photo 13 May 1986.

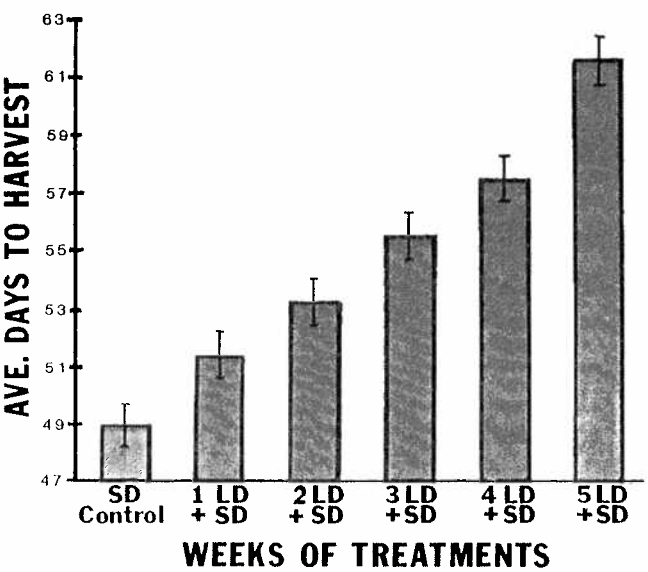

Fig. 3: The number of days from planting to harvest for plants given six LD/SD photoperiod treatments, combined over eight Sakata Aster cultivars and three late winter planting dates. No overlapping bars indicate photoperiod treatments were significantly different using HSD (α=.05).

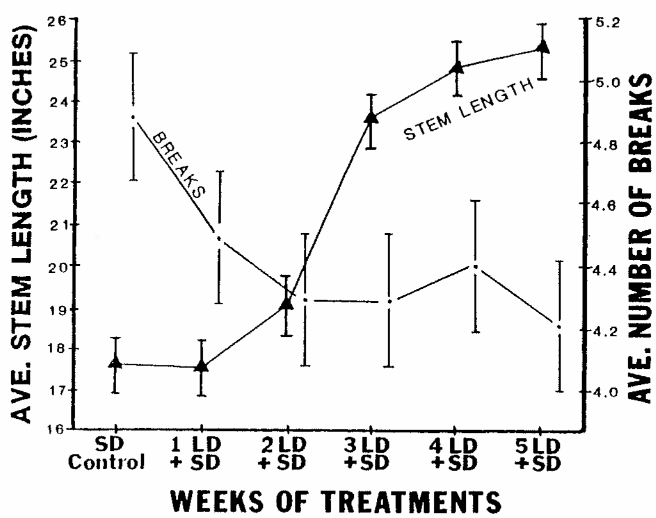

Fig. 5: The average stem lengths and number of flowering shoots developed for six LD and SD photoperiod treatments, averaged over eight Sakata Aster cultivars and three early spring planting dates. Non-overlapping bars indicate two means were significantly different using HSD (α=.05).