From Boutonnières To Bedding Plants

Carnations have come a long way. New cultivars of seed-propagated dwarf carnations can be grown for splashes of color in flower beds, containers and bowls.

By Meriam Karlsson

'Monarch Yellow' and 'Monarch Purple' dwarf carnations, available from Goldsmith Seeds. (Photos and graphs courtesy of Jeff Werner, University of Alaska, Fairbanks, Alaska.)

For years, carnations have been grown as cut flowers. Efforts to develop carnations into flowering potted plants and bedding plants are ongoing and have finally met with success. Seed propagated dwarf carnations are now available.

These carnations have a naturally compact growth habit and branch without pinching. Some great new ideas for the new dwarf varieties include use in outdoor color beds and inclusion in container plantings or colorful bowl plantings.

LIGHT AND TEMPERATURE REQUIREMENTS

Carnation is a long day plant, one requiring at least two or three weeks with days longer than 13 hours to initiate flower buds. The buds, following initiation, develop into flowers at any day length. Under short days, flowering is slower, but basal branching increases. In cut flower production, long days are used for several weeks to ensure fast flowering. Longer days also result in taller plants, longer flower stems and reduced branching. Growing conditions with both short and long days are, therefore, used in cut flower production to assure satisfactory flowering, branching and overall plant growth.

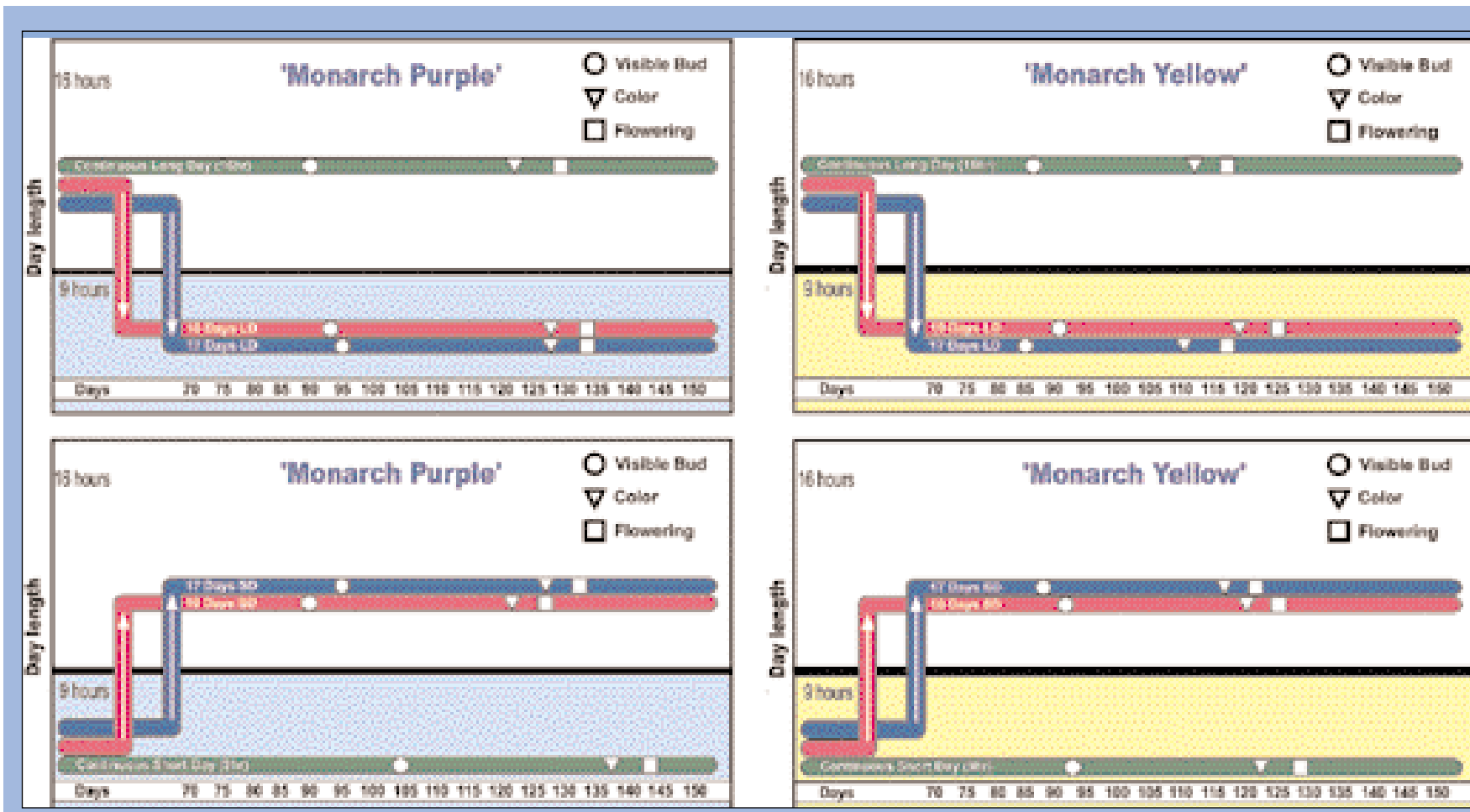


Figure 1. Days from start of treatments (21 days from seeding) to visible flower buds, first purple or yellow in the flower bud (color) and first open flower (flowering) are shown for dwarf carnation 'Monarch Purple' and 'Monarch Yellow' grown at 60° F. The plants were grown continuously at 16-or 9-hour days or moved from the initial to the second day length after 10 or 17 days.

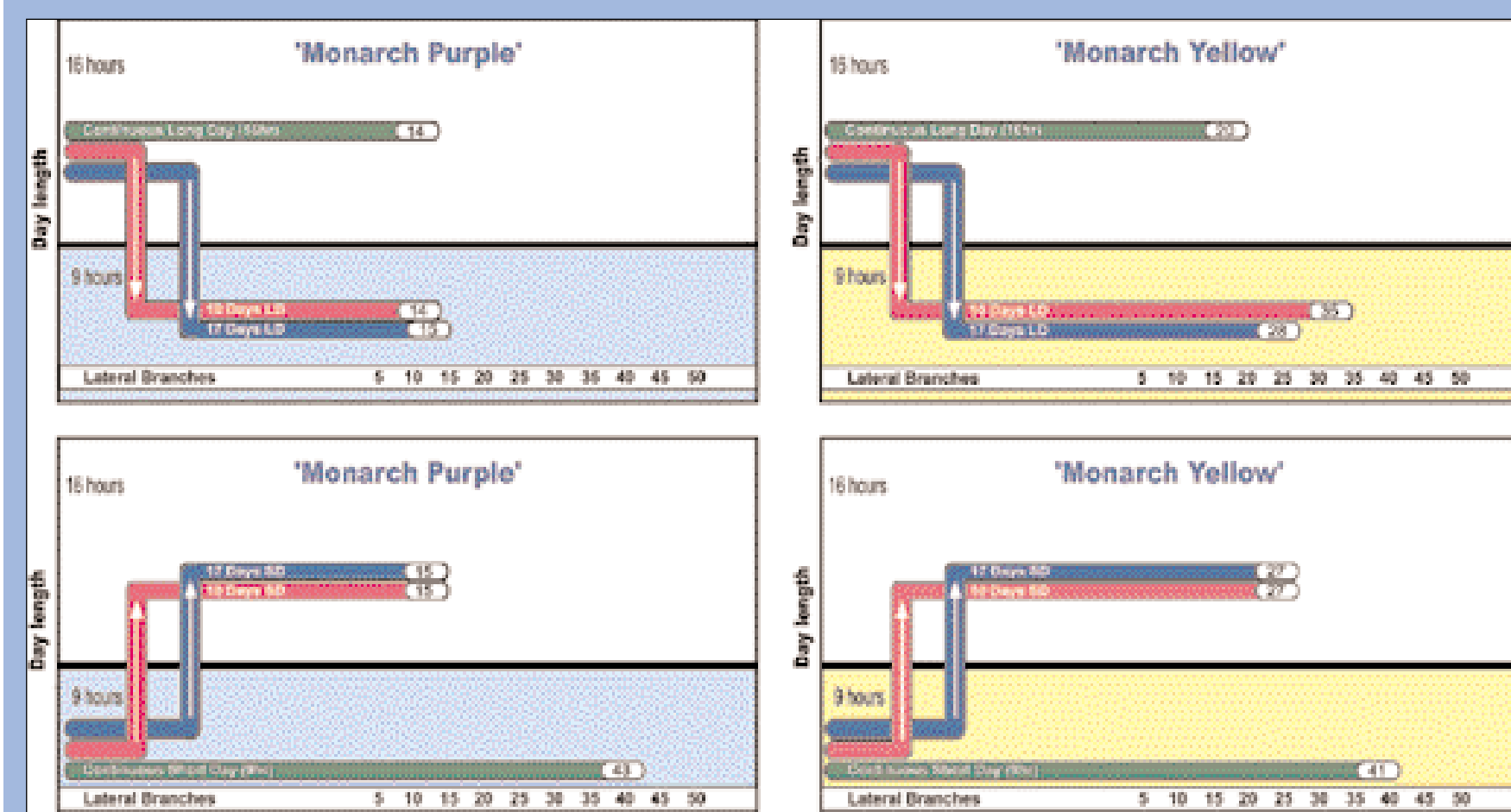
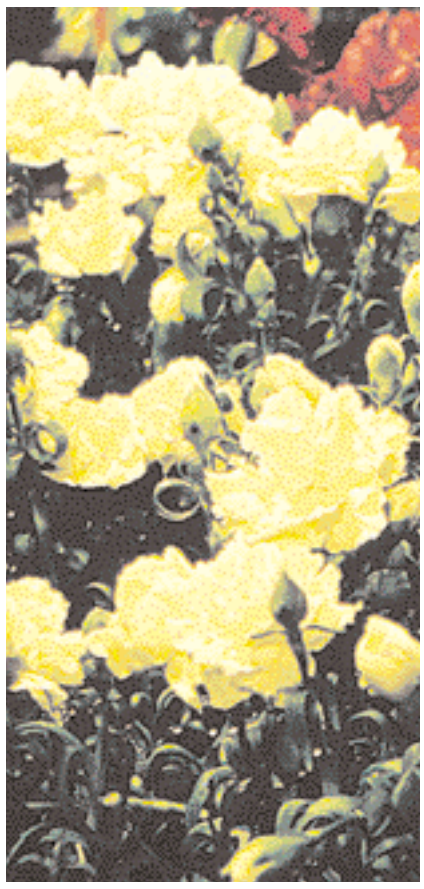


Figure 2. Number of lateral branches is shown for dwarf carnation 'Monarch Purple' and 'Monarch Yellow' grown at 60° F. The plants were grown continuously at 16- or 9-hour days or moved from the initial to the second day length after 10 or 17 days.

Carnations develop best at relatively low temperatures. Night temperatures at 50–60° F are recommended. The temperature during the day can be somewhat higher, from 58–75° F, depending on light levels. Keeping both day and night temperatures low under short day conditions encourages lateral branching and limits increases in length and plant height.

Carnations are considered high light plants. To benefit from elevated light levels, the temperature needs to remain moderate, and shading is often required during periods with natural high light. Dwarf carnations appear to have less critical demands than other carnations for enhanced light. Potted dwarf carnations are reported to develop well at 750 to 1,000 foot-candles under long day conditions.

For use as bedding plants or potted plants, it is essential that carnations are compact and well-branched. The newly-developed, seed-propagated carnations can be expected to respond the same way as cut carnations to day length. Growing conditions with initial short days for adequate branching, followed by long days for flower formation, can be expected to result in compact, well-branched, high-quality plants and abundant flowering.



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GROWING PROCEDURES

The dwarf carnation cultivar 'Monarch' was developed by Goldsmith Seeds Inc. The height of this cultivar is expected to be 6–8 inches with a production time of 20–24 weeks for 4-inch pots.

Monarch is available with flowers in several colors. 'Monarch Purple' and 'Monarch Yellow' were chosen to determine the effects of day length on flowering and development of seed propagated dwarf carnation.

The seed was lightly covered with vermiculite and germinated at 68° F. Three weeks after seeding, the seedlings were transplanted into 4-inch pots filled with Premier Pro-Mix BX (Premier Brands Inc., Red Hill, Pa.). The plants were placed in a greenhouse maintained at 60° F under either short days of nine hours or long days of 16 hours. A blackout cloth was pulled over the plants at 5 p.m. and removed at 8 a.m. to provide light for nine hours to the plants under short days.

High pressure sodium lamps were used both as supplemental lighting and to extend the day length to 16 hours for the long day plants. The light intensity was adjusted such that the total amount of light each day was similar for plants grown under short and long days. The daily amount was 10 $mol \cdot day^{-1} m^{-2}$. A light level of 10 $mol \cdot day^{-1} m^{-2}$ corresponds to approximately 850 foot-candles continuously for 16 hours or 1,550 foot-candles during a 9 hour day. In addition to growing plants continuously under short or long days, plants were moved after 10 or 17 days from the initial to the second day length and left until flowering.

Plants were watered using fertilizer solutions of 50 parts per million (ppm) nitrogen from the emergence of seed leaves and with 100 ppm nitrogen from the time of transplant, using Peters 15-16-17 (The Scotts Company, Marysville, Ohio). The appearance of visible flower buds, color (first purple or yellow in the flower buds) and first flower (petals open to a horizontal position) were recorded, and the lateral breaks or branches on each plant were counted at flowering.

RESULTS

The number of days from start of treatment (21 days from seeding) to visible bud, color and first flower is illustrated in Figure 1. Plants continuously under long days flowered first. In Monarch Purple, 90 days were required to the appearance of flower buds, and the first flower opened 39 days later. The corresponding days of development in Monarch Yellow were 86 days to visible bud and 32 additional days to flower. Continuous short days in comparison to long days resulted in two weeks slower development for Monarch Purple and delayed flowering by 10 days in Monarch Yellow. Ten short days following transplant only delayed flowering a couple of days in Monarch Yellow, while flowering in Monarch Purple was unaffected. Increasing the short days to two initial weeks slowed flowering by one week in Monarch Yellow and 4–5 days in Monarch Purple.

The number of days between flower bud and color, and from color to first flower was not affected by day length either in Monarch Purple or Monarch Yellow. The average time ➧

between visible flower buds to color was 33 days for Monarch Purple and 28 days for Monarch Yellow. From the advent of color, flowering took 5–6 days in both cultivars.

There was a big difference between short and long day conditions in the number of branches or breaks on the plant (Fig. 2). Short days resulted in more branches and flowers. Compared to long days, the number of branches tripled from 14 to 43 in Monarch Purple and doubled from 20 to 41 in Monarch Yellow with short days.

Monarch Purple grown with either 10 or 17 long or short initial days had the same number of lateral branches (14 or 15 branches) as Monarch Purple grown at long days throughout. Ten initial long days, followed by short days, reduced the number from 41 to 35 branches in Monarch Yellow. Initial exposure to 10 or 17 short days or 17 long days produced 27 or 28 lateral branches in Monarch Yellow.

RESEARCH SUMMARY

In summary, more branches developed with short days, while flowering was faster under long days. On average, Monarch Purple required 150 days and Monarch Yellow 139 days from seeding to first open flower with long days. Under short days, flower development was delayed 15 days in Monarch Purple and 10 days in Monarch Yellow. The number of branches was similar for both cultivars at short days. Monarch Purple averaged 43 branches per plant and Monarch Yellow, 41. Under long-day growing conditions, Monarch Purple had 14 and Monarch Yellow 20 branches at flowering.

The potential to boost lateral branching under long days with a limited number of initial short days is dependent on cultivar. In this study, initial short days resulted in significantly more branches in Monarch Yellow, while there was no effect on branching for Monarch Purple. For cultivars where initial short days result in more branching, flowering is expected to be delayed. The slower plant development needs to be evaluated in relation to the higher plant quality for those cultivars responding with increased lateral branching following one or two weeks of initial short days. GPN

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