Florel
on Summer Production of
Pansy

With the increase in late summer and early autumn pansy and viola production, delaying flowering is more important than ever.

By Erik Runkle and Royal Heins

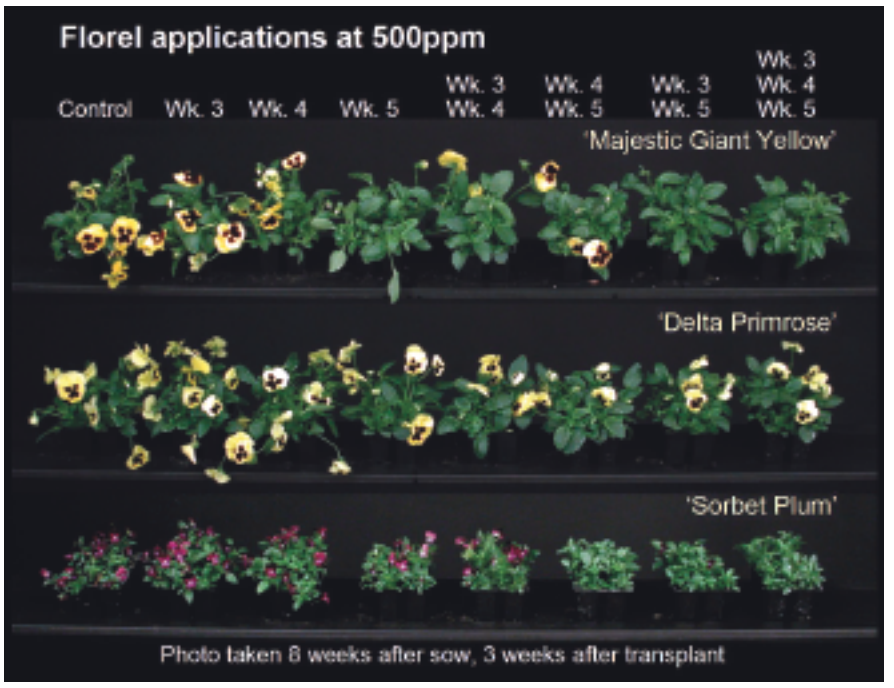

Figure 1. The effect of Florel applications at 500 ppm on production weeks 3, 4 and/or 5 on two pansy cultivars (top and middle) and one viola cultivar (bottom). Photograph was taken three weeks after the last spray treatment (eight weeks from seed sow). (Photos courtesy of Erik Runkle)

As consumers realize their appeal, pansies and violas are increasingly being planted outdoors in late summer and early autumn. Consequently, the production of flowering pansy continues to increase, especially for sales in late summer. To meet production demand, you must grow these cool-season crops during some of the warmest, brightest and longest days of the year.

Pansy is a facultative long-day plant, meaning that plants flower earlier when the day length is long (at least 14 hours). In addition, pansy flowers earlier when the daily light level (or daily light integral) is high. Finally, the rate of plant development increases as temperature increases, until some optimum temperature is reached. These three factors — high temperature, high light intensity and long days — all contribute to early flowering of pansy.

With many spring bedding plants, early flowering can be desirable. However, when plants flower before they have adequately filled the finish container, then a delay in flowering is desired. Early flowering is a problem with pansies and violas produced during mid summer.

Flowering of pansy and viola can be delayed by providing shorter days, cooler temperatures and, to a more limited extent, lower light levels. However, providing short days and lower temperatures is practically impossible in a greenhouse when outdoor temperatures are high, such as mid summer. Reducing the daily light integral too much can adversely affect plant quality. Therefore, providing low light levels to delay flowering is not an acceptable solution.

Another possible strategy to delay flowering of pansy is to delay flower initiation using the plant growth regulator ethephon, commercially sold as Florel (Monterey Chemical) to greenhouse growers. Florel works by releasing ethylene inside the plant; effects on plant growth and development depend on the crop. Two common effects of Florel (ethylene) on floriculture crops are flower bud abortion and a reduction in stem elongation. For example, Florel can stimulate branching and abort flower buds of geraniums and New Guinea impatiens, and act as a growth retardant of vinca vine.

In the summer of 2003, we performed experiments to determine if Florel could be used to delay flowering of pansy and viola when grown under bright, warm and long-day conditions. Another potential benefit of a Florel spray could be an inhibition of stem extension, thereby reducing the use of plant growth retardants.

THE FIRST EXPERIMENT

We obtained 288-cell plug trays of four cultivars of pansy and viola: 'Delta Primrose', 'Sorbet Plum Violet', 'Crystal Bowl Yellow' and 'Majestic Giant Yellow'. The plants were shipped to Michigan State University two weeks after seed sowing and were placed in a glass greenhouse at 68-72° F with a 16-hour photoperiod. In the first study, plants were sprayed with Florel at 300 or 500 ppm on the following production weeks:

- week 3 only
- week 4 only
- week 5 only
- weeks 3 and 4
- weeks 3 and 5
- weeks 4 and 5
- weeks 3, 4 and 5
- no application (control)

The Florel solution was made with deionized water, and a spreader-sticker (Capsil, Scotts Professional Horticulture) was added to ensure good contact with the foliage. The solution was sprayed on plants in the plug trays in the morning (between 8 and 9 a.m.) at a rate of 2 quarts per 100 sq.ft.

One day after the last application was made (day 36 after seed sow), plugs from each tray were transplanted into a 606 bedding flat and grown under the same

environmental conditions as described above. Date of flowering, Florel concentration and application timing treatment was recorded for 18 plants of each cultivar (1,080 plants in total).

THE SECOND EXPERIMENT

We performed a second experiment based on the results of the first experiment, and also to determine the effects that daily light integral had on Florel response and subsequent flowering. 288-cell plug trays of the cultivars Delta Primrose, Sorbet Plum Violet and Majestic Giant Yellow were grown in a glass greenhouse without any shading (high light) or under a 50-percent shade cloth (low light). Plants in the plug trays under both light conditions were sprayed with either 500 or 1,000 ppm of Florel on production weeks 4, 5, or 4 and 5. The spray applications and environmental conditions were similar to that described earlier, except that the greenhouse temperature was slightly warmer (average daily temperature of 72-75° F). Date of transplant and plant data collected were as described in the first experiment.

PLANT RESPONSES TO FLOREL

In the first experiment, we did not observe much of a plant response when Florel was sprayed at 300 ppm, regardless of the spray timing or number of applications. Similarly, Florel sprayed three weeks after seed sow at 500 ppm did not affect time to flower or plant height at flowering. A single Florel spray at 500 ppm caused a 3- to 5-day delay in flowering when applied four or especially five weeks after seed sow. Multiple Florel sprays further delayed flowering of all cultivars studied, particularly when the treatment included an application five weeks after seed sow.

In the second experiment, we again observed that a single application of Florel at 500 ppm delayed flowering (by 7-10 days) when sprayed five weeks after seed sow. Increasing the rate to 1,000 ppm caused a stronger response and generally delayed flowering by an additional three days. Plants grown under the lower light environment had similar responses to plants grown under higher light levels, although the delay in flower caused by Florel was generally stronger.

The photo on page 37 illustrates the effects of Florel concentration and application timing on the growth and development of Sorbet Plum. The greatest delay in flowering was observed when plants were sprayed with Florel weeks 4 and 5 (in the plug stage) at 1,000 ppm. When the photo was taken (week 7 from seed sow), plants treated with Florel were shorter than nontreated (control) plants. However, plant height of Florel-treated plants at flowering was similar to, or greater than, plants that were not sprayed. This might be explained if plants treated with Florel developed more internodes before flowering compared to nontreated plants. However, we did not record the node number at flower.

The effects of Florel on pansy Delta Primrose and Majestic Giant Yellow can be seen on page 37. Similar responses with Florel were observed with these plants as was observed with viola: The greatest delay in flowering occurred when Florel was applied week 5; increasing the

rate from 500 to 1,000 ppm caused a slightly stronger flowering delay, and plants grown under the higher light levels had a slightly reduced response to Florel compared with plants grown under shade. Plants became more leggy under shade, as no additional growth retardants were applied to the plants.

SUMMARY

These experiments indicate that Florel can delay flowering of viola and pansy when sprayed 4-5 weeks after seed sow when the concentration is at least 500 ppm. An earlier application (week 3) or a lower concentration (300 ppm) had little to no effect on flowering in our trials during the summer months. Repeated sprays (weeks 4 and 5) generally caused a slightly longer flowering delay compared to single applications. Also, responses to Florel were generally stronger when plants were grown under lower light levels. Therefore, rates should be adjusted, depending on the ambient light (and temperature) conditions and the magnitude of the desired response.

As with all plant growth regulators, consider conducting your own trials on a small scale before implementing large-scale spray strategies. Finally, for maximal response, remember to apply sprays early in the morning (slow drying is important as uptake only occurs when leaves remain wet) to well-watered plants (to avoid accentuated plant stress). GPN

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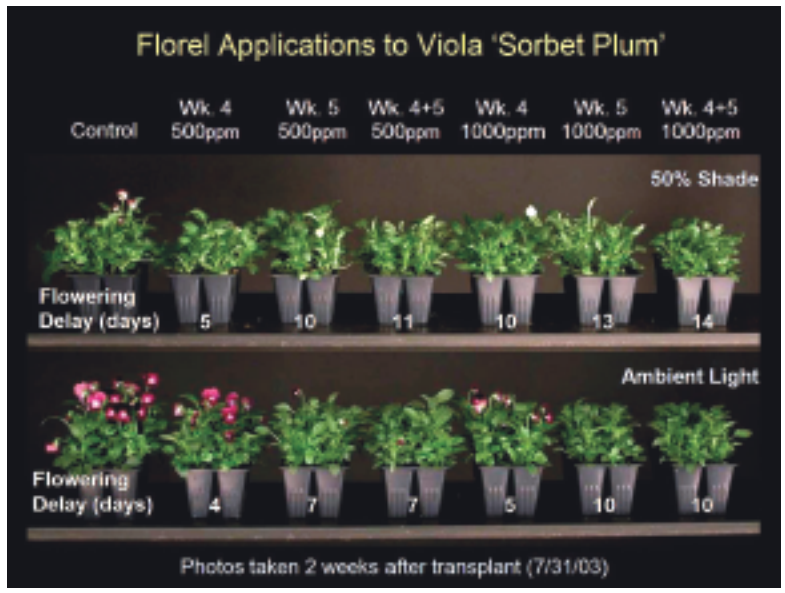
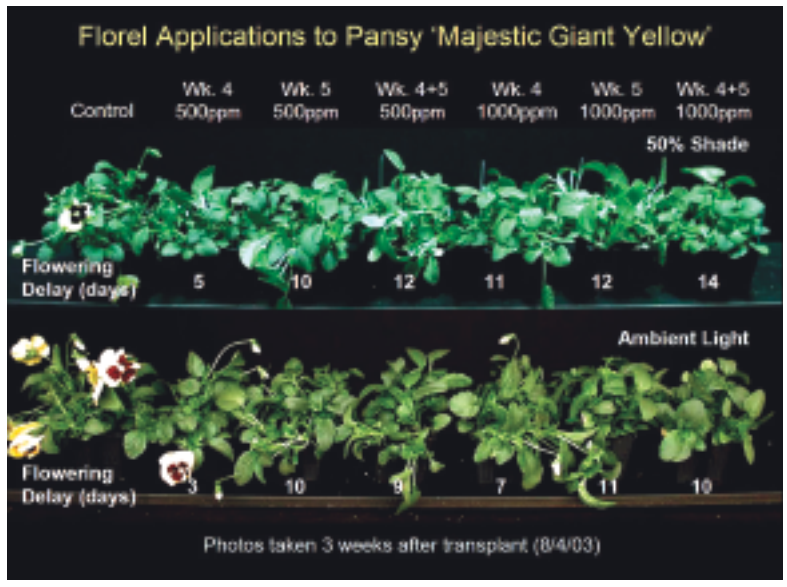
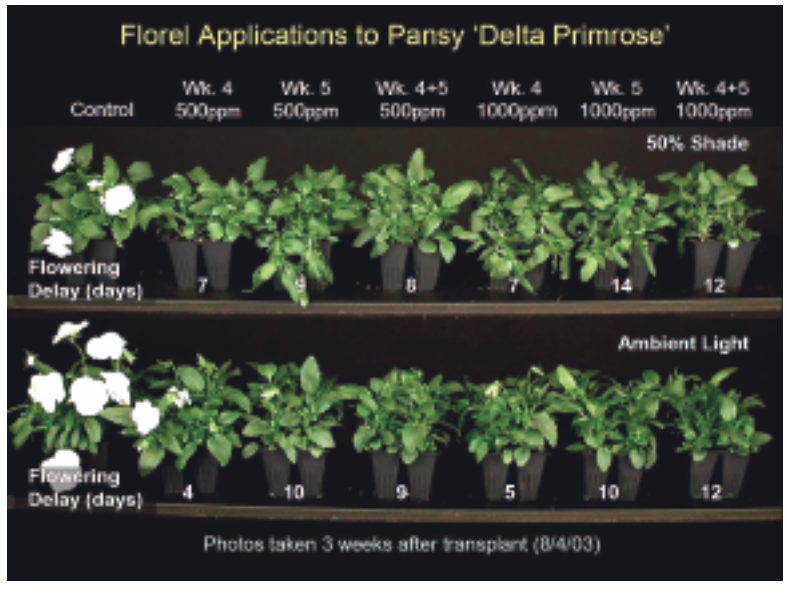
Figures 2, 3 and 4. The effects of one or two Florel applications at 500 or 1,000 ppm on growth and flowering of pansy and viola. Plants were grown in mid-summer under a 50-percent shade cloth (top) or without shade cloth (bottom) at 72-75° F with a 16-hour photoperiod. The delay in flowering is compared with control plants under each light environment, which did not receive a Florel application.







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