

Final Report, 1995 Grant

FNE95-94

1. Project goals

The goals of the 1995 cycle of this project were to investigate the effects of ethylene (Florel formulation) on floricultural crops. Specifically;

- a. to determine the effect of foliar exposure time on the effectiveness of a Florel treatment.
- b. to determine what, if any, cultivar differences exist in a crop's response to Florel.
- c. to better understand the effect of water quality on the stability of a spray solution of Florel.

2. Farm update.

Greenhouse production for 1995 increased slightly due to the passing of our recent economic recession. Our production area of 55,000sq.ft. was used to capacity for spring production and approximately to 50% capacity for Christmas production (poinsettias).

3. Cooperators.

The project did not include cooperators with the exception of my wife who administered the paperwork and part time assistance from a young lady with a Ph.D. degree in crop physiology who has been working with me for three years.

4. Project's procedures and methods.

a). Bedding type impatiens were grown to maturity in five inch pots using standard greenhouse practices for two foliar exposure experiments. Once in bloom the experiments were initiated by first counting the number of open flowers, treating with a 500ppm solution of Florel, washing the plants off with water after various lengths of time, and monitoring their growth and development for six weeks. The first experiment used exposure times in minutes of 0, 5, 10, 20, 30, 60, and 120. An untreated control as well as a full treatment (no wash off) were included for reference. Initial flower drop was determined one day after treatment and number of open flowers was determined after two, four, and six weeks. The second experiment used exposure times in hours of 0, 1, 2, 3, 4, 5, 6, 7, and 8 again with appropriate controls.

b). Thirteen cultivars of Fuchsia were used in an evaluation study to determine if cultivars respond differently to Florel treatment. The plants were grown in five inch pots, again using standard greenhouse practices. When plants were ready to be pinched treatments were made. Treatments included hand pinching, Florel treatment at 500ppm, and control plants (neither pinched nor treated with Florel). Flower dates, number of branches, and plant height were recorded at the completion of the experiment in late May.

c). Information on the effect of pH on the stability of a Florel solution was acquired from the manufacturer for the purpose of educating growers how to better control the ethylene application.

5. Findings and accomplishments.

a). The foliar exposure work has produced data that will be put to very practical use. The first experiment, run during the spring of 1995, was the subject of newsletter "KFES Newsnotes" issue 95-6 (see attached). It was learned that as little as twenty minutes of exposure time resulted in significant flower drop and that two hours of exposure did not equal the effects of a full exposure (one that was not washed off the plant). This experiment defined how quickly Florel effects the physiology of impatiens.

The second experiment, run in the fall of 1995, provided additional insights that will be useful to growers in their efforts to control plant development. It was found that any exposure time, ranging from 1 to 8 hours, caused significant flower drop one day after treatment (see chart 1). However, by day 17 the one hour exposure treatment had reflowered to the same extent as untreated control plants. Plants receiving a full treatment (no wash off) had no open flowers and intermediate treatments (2

through 8 hour exposures) showed intermediate stages of reflowering. On day 42, six weeks from application, all treatments had reflowered and were similar to control plants. Results of this experiment will be presented in an upcoming issue of my newsletter.

This information will be helpful in providing growers with options that have not been available until now. Impatiens often bloom prematurely. As flowers age the petals fall onto foliage and cause disease problems. This problem is compounded when impatiens are grown in hanging baskets above other crops. It is not feasible to manually disbud them because there are so many flowers on each plant.

The findings of this research will offer growers an option for controlling petal drop in the greenhouse. Using a short exposure time of perhaps one hour should abort any open flowers for about two weeks and allow normal flowering thereafter. If a longer delay in flowering is desired a longer exposure time will be called for. Controlling the application in this way will provide the grower with precision over crop development that has not been possible until now.

A third run of this experiment is currently underway and is examining exposure times in hours of 0, 4, 8, 12, 16, 20, and 24 hours in order to determine the exposure time that is equivalent to "full exposure".

b). Results from the experiment evaluating fuchsia cultivars were presented in my newsletter issue 95-8 (see attached). It was found that Florel treatment delayed flowering compared to hand pinching. If flower delay is undesirable then the Florel application should be made sooner than the hand pinch would be made. Florel treatment increased lateral branching on trailing cultivars; however, upright cultivars branched freely regardless of treatment.

c). Issue 95-1 (see attached) contains a discussion of the chemistry of a Florel spray solution. The table on page two presents information on the relationship between solution pH and stability of the active ingredient, ethephon. Although this issue was written prior to the SARE grant, the information has become an important part of my day long Florel workshop. This form of outreach, presenting scientific information in easy to understand terms, has proven to be very well received by attendees both in the Northeast and other parts of the country.

6. Site information relevant to project.

None.

7. Economic findings.

The economics of using Florel as a chemical pinching agent are compelling. A foliar application of Florel reduces the labor of hand pinching and the associated costs by up to 80%. Two issues of my newsletter in 1994 were devoted to this topic.

A section of each Florel workshop is devoted to the topic of the economics of Florel use. An average size greenhouse range consisting of one acre of covered area has the potential to save \$2000 - 3000 per year through the use of Florel on a long list of the crops in production. The largest portion of this savings is in reduced labor costs. Other portions include lower production costs related to shorter crop time due to more efficient use of photosynthates and higher quality due to increased branching.

As we learn more about plant hormones and how to harness their power over plant growth and development we will continue to manipulate crops to achieve higher quality at lower cost. Learning more about ethylene (Florel) is evidence that this philosophy is sound.

8. New ideas, next step.

The foliar exposure experiments illustrate how research raises new questions for every question answered. The first experiment showed that as little as twenty minutes of exposure time caused some petal drop whereas two hours did not cause a full effect. The treatment times were extended to eight hours in experiment two and will extend even further, up to 24 hours in experiment three.

Different exposure times will eventually be used to obtain different effects. For instance, one hour exposure may abort open flowers but not buds, whereas four hours may abort flowers and buds. Perhaps extended exposures will be used to promote branching as well as any effects caused by shorter exposures.

9. Will you use the practice you investigated.

Ethylene treatment has become a powerful tool in my greenhouse. Researching its effects since 1984 has resulted in consistent success on the crops in my production rotation. In the fall of 1994 the Florel label was expanded to include many of these crops. I am quite proud of the fact that this project made the progress it did due to the support of greenhouse growers around the country as well as the funding awarded in this project. My mailing list of newsletter subscribers has grown to over 550 growers in three years. The majority of these growers are in the Northeast region defined by this project. Their interest in the project shows that the practices being developed are being implemented in commercial production.

10. What do you tell other producers about the project.

When growers inquire about this project I try to convey to them a sense of ethylene's potential in the pre-harvest, production greenhouse environment. Learning to use Florel to replace hand pinching reduces labor and associated costs by as much as 80%. Allowing a plant to branch more freely and achieve its full branching potential also has desirable implications for crop quality and value. And learning how to use Florel to more accurately time crop flowering results in additional control over the crop and its environment.

11. Explain what you did in your outreach program.

Outreach for this project consisted of several day long Florel workshops, publication and distribution of several issues of my newsletter, and transfer of my workshop slide set onto CD-ROM for future use in published material.

The Florel Workshop has evolved into a six hour session dealing with all aspects of the research project that date back to 1984. The program is usually held at either my or another grower's greenhouse in order to avoid costs associated with renting a conference facility. The program runs from 9:00am to 3:00pm and includes an hour break for lunch. Live plant material, slides, and overhead transparencies are used at different times to break up the day.

Registration includes a loose leaf notebook which includes reprints of every trade magazine article on Florel that I have published since 1986 as well as all back issues of my newsletter which was started in 1993. There are currently about 100 pages of information in this notebook. Attendees also receive a one year subscription to the newsletter as well as telephone support when needed. At the end of the year they have the option of subscription renewal.

The workshop registration fee and newsletter renewal fee both contributed, where appropriate, to the matching funds requirement of this grant. This funding process was acknowledged in comments under "Back Page Notes" in issue 95-6 included in this packet.

12. Slide descriptions.

Slide # 8. Impatiens plants from the first foliar exposure experiment ten days after Florel treatment. Control plant (no Florel treatment) is on left, full exposure (no wash off) is on right, and 60 minute exposure time in center. Note the absence of flowers on the plant that received a full exposure compared to control plant and the intermediate flowering of the plant receiving a 60 minute exposure, indicating that more than 60 minutes are necessary for sufficient ethylene to enter the plant.

Slide # 26. Fuchsia cultivar experiment (three benches in foreground) showing plants approximately half way through the experiment. Thirteen cultivars were evaluated for their response to Florel treatment and hand pinching.

Flower number and Foliar Exposure Time

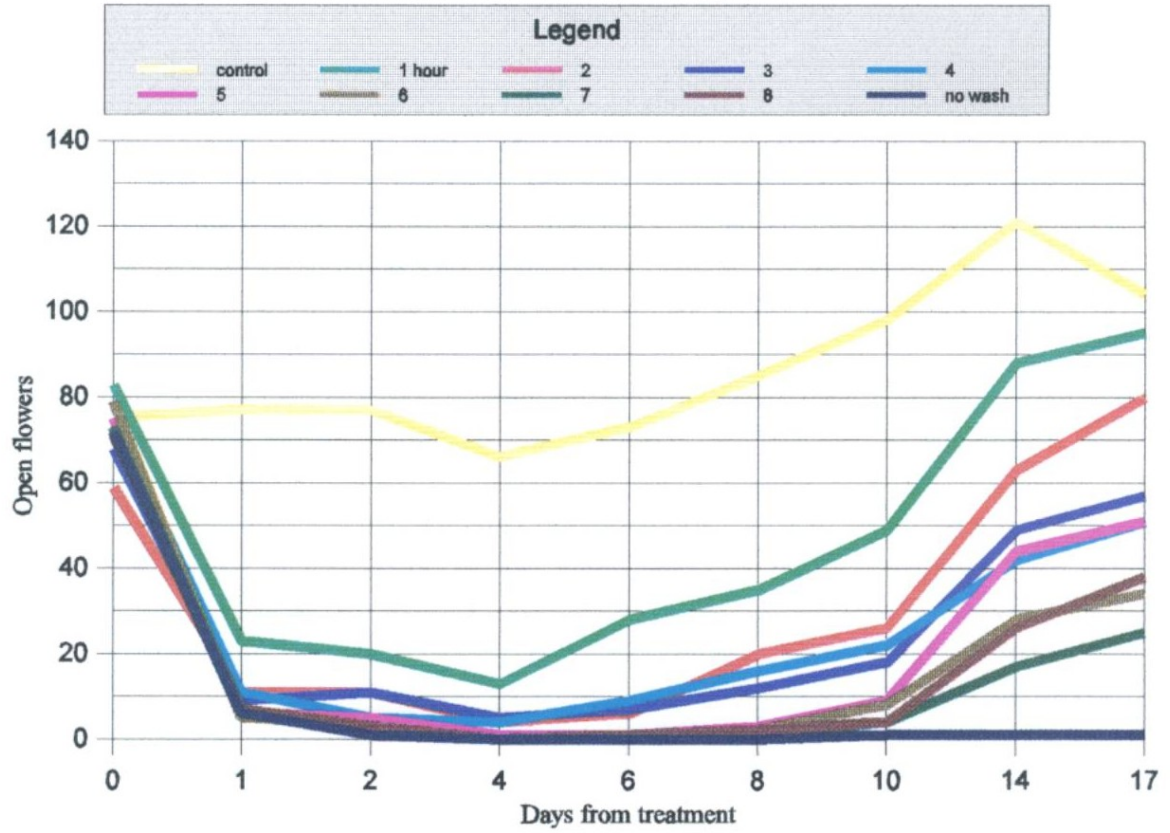


Chart 1. The effect of foliar exposure time on the flowering of impatiens.