

Final Report, 1996 Grant

1. Project goals

The goals of the 1996 cycle of this project were to continue investigating the effects of ethylene (Florel formulation) on floricultural crops. Specifically;

To determine the effect of foliar exposure time on the effectiveness of a Florel treatment. Two crops were used as models in the research, impatiens and garden chrysanthemum.

2. Farm update.

Greenhouse production for 1996 increased approximately 3%. Our production area of 55,000sq.ft. was used to capacity with some double cropping 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 four years.

4. Project's procedures and methods.

a). Bedding type impatiens were grown to maturity in five inch pots using standard greenhouse practices. Once in bloom the experiment was 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 eight weeks. The experiment used exposure times of 1, 2, 3, 4, 5, 6, 7, and 8 hours. Additionally, 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 on 15 dates starting the day of treatment and ending eight weeks after treatment.

b). A second experiment was conducted investigating foliar exposure times ranging from 4 to 24 hours after it was determined in the above experiment that an 8 hour exposure time did not equal a full, no wash off, exposure. Flowering data were collected on this experiment over a five week period following treatment.

c). Garden mum plants were grown in nine inch pots using standard practices. A Florel application of 500ppm was made on July 25. Treatments included foliar exposure times of 1, 2, 4, 8, 12, 16, 20, and 24 hours. Again, an untreated control and full treatment (no wash off) were included for reference. Date of flower was recorded and used as a measure of the effectiveness of the ethylene treatments.

5. Findings and accomplishments.

a). This experiment was the subject of my "KFES Newsnotes" issue 97-2 (see attached). As a result of 1995's research cycle it was determined that enough ethylene penetrates impatiens tissue in as little as twenty minutes to cause a significant amount of flower drop. In that experiment it was also shown that two hours of exposure time did not equal a full exposure. This experiment was designed to define the amount of exposure time that equalled a full dose, hence the range of treatments from one to eight hours. Issue 97-2 presents a detailed discussion of this work.

b). After it was determined that eight hours still did not equal a full exposure the final experiment was conducted investigating exposure times up to 24 hours. These data have not yet been written up in a newsletter issue but shall be during this year's cycle. In short it was found that exposure times equal to or greater than 12 hours were similar to a full exposure in terms of impatiens flowering.

c). Results for the garden mum experiment show that as little as one hour of exposure caused a one week delay in flowering compared to untreated control plants. At the other end of the treatment

spectrum 24 hours of exposure caused the same delay (two weeks) as a full exposure. Intermediate treatments flowered between these two extremes.

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.

Now that the minimum exposure time that equals a full effect has been defined growers will be in a position to better control their growth regulator applications. It is now known that more than eight hours are needed to result in a full treatment effect.

Combining last year's work with this year's we have determined that in as little as twenty minutes a Florel treatment will effect plants and that at least twelve hours are needed to equal a full effect.

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.

My next series of experiments will continue to focus on the dose of ethylene that a Florel application provides a plant. Now that exposure time has been better defined I plan to investigate concentration of active ingredient as another variable controlling the treatment dose. Also, growers often ask me if a spreader-sticker should be added to the spray solution. This variable needs to be studied also. Both of these projects are currently underway and should yield data by the end of June.

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 from 550 last year to over 700 growers currently. 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 my newsletter, and continued 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.

12. Slide descriptions.

Slide # 9. Impatiens plants two weeks after Florel treatment. Clockwise from upper left; control, no wash (full exposure), eight hour exposure, and seven hour exposure. Notice that both limited exposure treatments are reflowering before the full exposure treatment indicating that "full exposure" is more than eight hours.

Slide #26. Garden mum plants receiving various Florel treatments showing ethylene's effect on flowering. Picture taken on September 17.