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Seedling Storage

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This report will discuss a practical and easy method to hold seedlings at the proper stage until ready for planting. The seedlings are held at low temperature for periods up to 6 weeks.

The interest and size of the bedding plant industry has increased tremendously in the past decade. The plant breeder has added great quantities of new, interesting and needed varieties. The Cornell peat-lite mix introduced by Boodley and Sheldrake, specifically for the bedding plant industry, has made growing easier. One of the problems still plaguing both the large and small operator is the timing of seedlings, so they will be at the right size at the time *he* is ready for them. Very few operators have their programs organized so the two points are always timed perfectly. Sometimes the seed germinates poorly or damping off takes its toll, sometimes the work load is too great to get all of the seedlings planted in just a few days, sometimes the sun may shine brightly for a week and two groups planted a week apart are now the "right size" at the same time. Growers over the years have devised various ways to overcome this problem. The most common method and the poorest is to wait until there is time and plant anyway, even though the seedlings are three times the proper size, hard, nutrient deficient and spindly. Some growers reduce the size by planting deeper. There are other methods and I'm sure we are all too familiar.

We first saw snapdragon seedlings stored by Mr. Paul Newman of Olean, New York. Whether Mr. Newman was the first to use this technique we don't know, but it did get us thinking and working. It was fortunate snapdragons were the first crop studied, for this is the easiest crop to store. Zinnias, for example, we have not been able to store successfully for more than a few days. There were a number of factors to study before a general recommendation could be made.

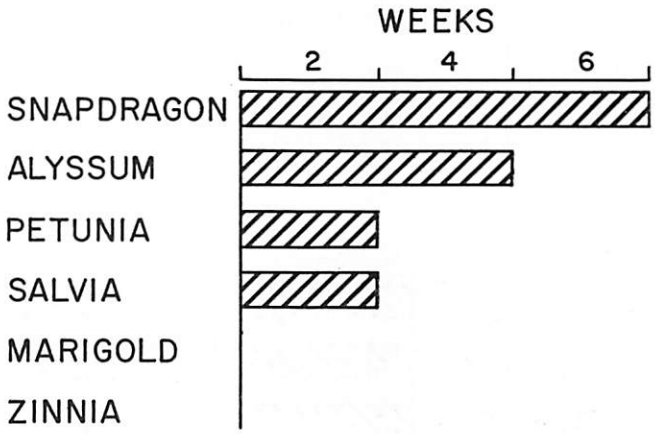
1) temperature
2) light
3) moisture
4) disease
5) variety

Some of these variables are difficult to separate; however, we shall try to report the work on these five aspects.

Temperature and Light

Since snapdragons appeared to keep well at 31°, our first work was at 31°. Snapdragons again kept well, but other types of plants did not. The results are shown in Table 1.

Table 1: The number of weeks various seedlings store successfully at 31°.



We obviously were successful with the snapdragon, but the success with the others (alyssum, petunia, salvia, marigold and zinnia) could be improved. A second experiment was run using two temperatures, 34° and 40°, in combination with light and no light. The results are shown in figure 1. The marigold seedlings stored in the dark were dead at 34° and some injury was apparent in the dark at 40°. Seedlings grown in the light at 34° or 40° were of excellent quality.

FIGURE 1—Marigold seedlings stored for 2 weeks at 34° (lower) and 40° (upper) in light (left) and dark (right). Note unstored pan in upper right hand corner.

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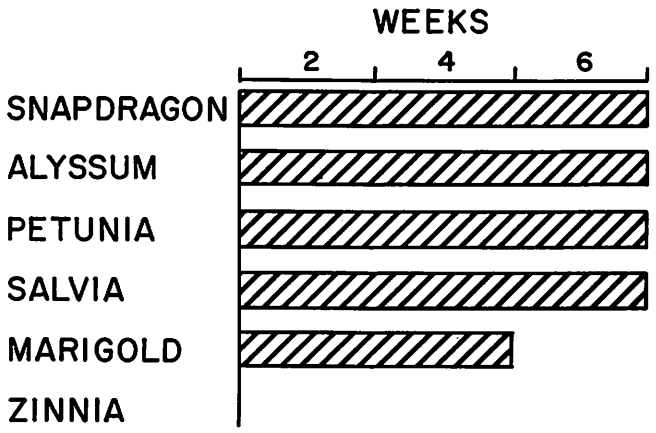
The light was supplied by three 40 watt fluorescent tubes, suspended approximately 12 inches over the seedlings. A foot candle reading indicated approximately 250 foot candles. Originally 18 hours of light was used, and later this was reduced to 14 hours. There was some elongation of the seedlings under 18 hours of light and no elongation under 14 hours of light.

Using a 40° storage temperature and light, the same seedlings as shown in Table 1 (snapdragon, alyssum, petunia, salvia, marigold and zinnia) were again stored. The results are shown in Table 2. The alyssum, petunia, salvia as well as the snapdragon remained in excellent condition for a 6-week period. The marigolds kept for 4 weeks and the zinnias not at all. The improvement in this treatment can be seen by comparing the results shown in Table 1. These seedlings were planted and grew normally to maturity.

Table 2. The number of weeks various seedlings stored successfully at 40° and 18 hours of light.



Moisture

Various methods of controlling moisture were studied. One group of seed pans were placed in the refrigerator and watered when the soil was dry. This method is not suggested, not only because of the extra work, but there was an excess of water added to the atmosphere of the refrigerator which condensed and caused excessive frost on the cooling coils. The seed pans when exposed in the refrigerator dried out very rapidly and had to be watched very carefully. The easiest and most successful method was to water the pan and then place them into a polyethylene bag. The bag prevented water loss from the soil and seedlings, and additional watering was not necessary for the maximum length of time we stored any seed pan.

Disease

When the seedlings were 'over stored' or kept too long a few leaves and seedlings would die. A fungus generally appeared on the dead material. We never had the plant pathologists identify this fungus, but suspect it was Botrytis. Disease never did attack healthy seedlings, but rather those that were damaged. We, therefore, felt disease was not a limiting factor. We will hasten to add, however, a grower must show extreme care in handling his seedlings to prevent contamination for there is no reason why the damping off diseases cannot grow quite well under these conditions.

Variety

We have not tested all of the bedding plants normally grown from seed. The following list of seedlings are those we have tried and also indicated the degree of success:

(2 weeks or more) Successful	Success for Short Periods (2 weeks or less)	Unsuccessful
Alyssum	Ageratum	Coleus
Aster	Balsam	Zinnia
Browallia	Cineraria	
Dianthus	Cosmos	
Geranium	Peppers	
Lobelia	Tomatoe	
Marigolds		
Petunias		
Salvia		
Snapdragons		
Stock		

Conclusion

The value of this work we feel can be seen in figures 2, 3, and 4. These figures show snapdragon seedlings stored up to 6 weeks and comparable seedlings held in the greenhouse. The plants stored for 6 weeks were effectively the same size as when they were put in the refrigrator. The plants kept in the greenhouse for the same 6-week period were 4 to 5 inches tall, spindly and light yellow in color.

Recommendations

We suggest growers try storing seedlings to see where it fits into their program.

Procedure

1. Germinate seed under careful sanitary conditions—at normal germinating temperatures
2. Store when seedlings have reached the "right size"
3. Place seed flats or pans in polyethylene bags, after thoroughly watering
4. Place seed flats or pans in a 35°-40° refrigerator —it is not necessary to slowly reduce the temperature
5. Place the seed flat or pan about 12 inches under fluorescent light
6. Light for 14 hours per day
7. Post-handling:
   a. For short storage periods (1 to 2 weeks) seedlings can be used immediately
   b. For longer storage periods (greater than 2 weeks) seedlings should be removed from the refrigerator and placed in a shaded cool location for about 24 hours before using.

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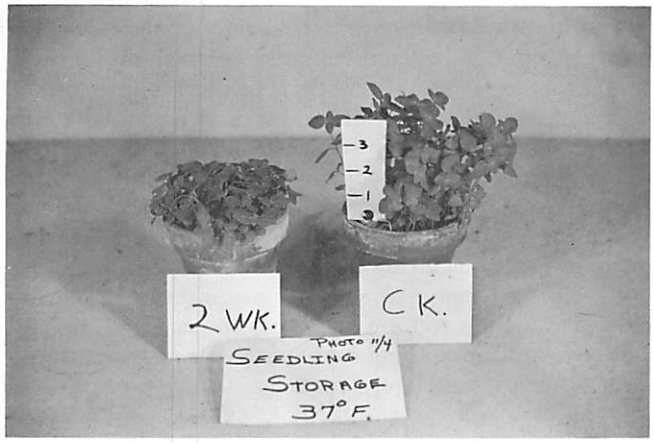


FIGURE 2—Snapdragon seedlings stored for 2 weeks at 36°-37° in the light (left) compared to seedlings held in the greenhouse.

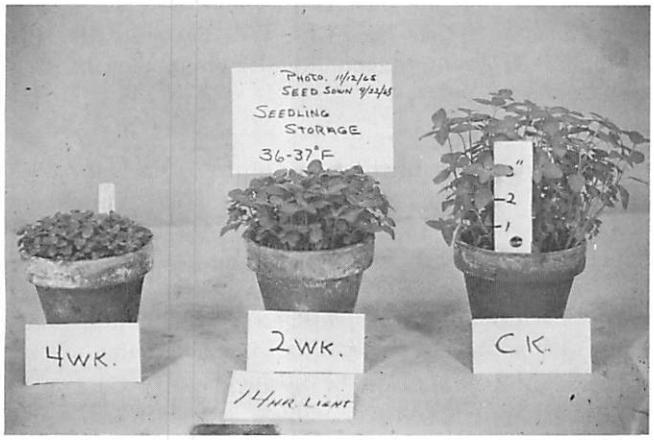


FIGURE 3—Snapdragon seedlings stored for 4 weeks at 36°-37° in the light (left) compared to seedlings stored for 2 weeks (middle) compared to seedlings held in the greenhouse.

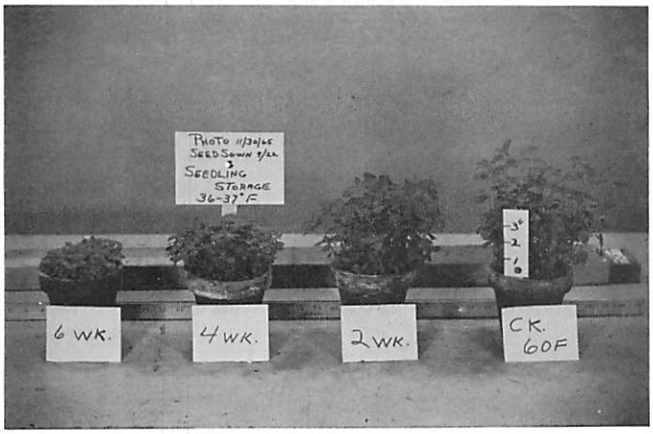
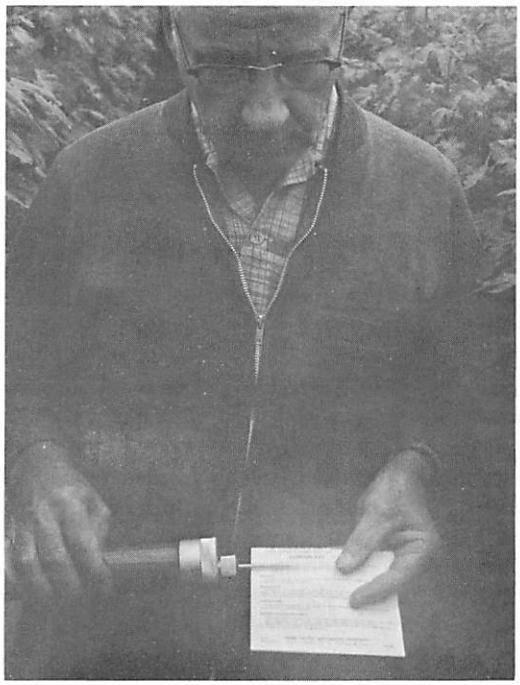


FIGURE 4—Snapdragon seedlings stored for 6 weeks at 36°-37° in the light (left), compared to seedlings stored for 4 weeks at 36°-37° and 2 weeks in the greenhouse, compared to seedlings stored for 2 weeks at 36°-37° and 4 weeks in the greenhouse, compared to seedlings held in the greenhouse for 6 weeks (right).

CO_2 Measurement Equipment*



Wilbur Treichler, Sanborn flower grower, demonstrates the measurement of carbon-dioxide levels in the greenhouse through the use of a gas detector used in mines. A sample collected for the picture showed a level of 1200 parts per million of carbon dioxide in a greenhouse where chrysanthemums are growing. Measurement was taken at 11 am on a sunny day. Mr. Treichler uses gas burners operating continuously in the greenhouse to provide the added carbon dioxide. Normal air contains approximately 300 parts per million of carbon dioxide, insufficient for maximum Chrysanthemum growth. Although measurement of carbon dioxide with this rather simple field instrument may not be as accurate as with expensive and complicated laboratory devices, it serves the purpose in guiding Mr. Treichler in the application of this new technique for flower and vegetable growing.

*Reprinted from Niagara County Farm News

Flowers for Everyday Use

A new selling technique for flowers has been launched by an English flower grower, according to the British trade journal *The Grower*. He is offering pre-packed (in polyethylene) daffodils and tulips direct to garages and public houses for sale to their customers. He got the idea when he saw flowers being sold in atractive pre-packs in Holland. A fixed price throughout the forcing season is planned.

His first customer, a Little London garage proprietor, sees nothing strange in selling flowers at a petrol pump, and soon expects to be selling bunches of flowers to passing lorry drivers. (For us Americans, petrol is gasoline and a lorry is a truck).

JGS

Capitol District Extension Meetings

Two training schools for area greenhouse operators were conducted December 7 and 8 by the N.Y.S. Extension Service. According to Charles Williams, Regional Horticultural Agent in the Capitol District, about 50 persons attended the insect and disease control session which featured remarks by Dr. James Pennell and Dr. A. W. Dimock of Cornell University. The following day approximately 45 area growers turned out to hear Cornell's Dr. James Boodley and Mr. Williams cover pointers on greenhouse fertilization and fertilizer proportioning equipment.

On the morning of December 8, a half-hour television program was presented over WAST, Channel 13, Albany, N. Y. on the subject of holiday flowers. Florists Bob Verstandig and Mrs. Maud Denhem teamed up with Extension Agent, Charles Williams to present an interesting program which showed how to select, care for, and use Christmas greens, flowering plants and cut flowers in the home for the coming holiday season. Area wholesalers and growers provided the flowers used in the lavish floral displays used for this program that was designed to promote the greater use of flowers in the Capitol District.

50 Year Members of New York Florists' Club

The following people have been members of the New York Florists' Club for at least the past 50 years:

Herbert Franklin Abrams, Blue Point, N. Y.
George E. Baldwin, Mamaroneck, N. Y.
Gerard Dreyer, Huntington, N. Y.
Henry H. Dreyer, Beechhurst, N. Y.
I. A. Fight, New York, N. Y.
R. C. Fontaine, St. Petersburg, Florida
Frank Kerpen, Jr., Rockville Centre, N. Y.
Jack R. Kervan, Scarsdale, N. Y.
Leo Klein, Orlando, Florida
Joseph J. Lane, Mamaroneck, N. Y.
Edward A. Manda, West Palm Beach, Florida
Edward J. McCarthy, Brooklyn, N. Y.
James Moraio, Rye, N. Y.
W. H. Siebrecht, Jr., New York, N. Y.

The New York State Flower Growers Association would like to add our congratulations to these individuals and wish them many happy years ahead.

Short Takes

Jim Boodley

A new manual covering "Bedding Plants" is now available to flower growers. The manual covers all phases of Bedding Plant growing from their uses in landscaping to costs of production. The manual is well illustrated throughout the 120 page contents. Available for $2.00 per copy from Dr. John W. Mastalerz, 101 Tyson Building, Department of Horticulture, Penna State Univ., University Park, Pa. 16802. Make checks payable to "Penna Flower Growers."

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The month of March is a troublesome one for flower growers with the daily extremes that occur in the weather. Two or three clear, bright days can be followed by a period of dark cloudy weather. These extremes put severe stresses on growing plants. Watering must be carefully watched so the plants are not overwatered. Warm temperatures also start soil biological activity on the upgrade. If you have used a lot of ammonia or organic sources of nitrogen fertilizer during the winter now is the time reactions will start that cause an increase in nitrates and soluble salts. Again watering properly to get some leaching will be helpful in keeping salts down. A soil test will help to determine if salts are a problem.

* * * * * *

Slugs are an ever present pest in the greenhouse. They especially like the young, tender foliage of seedlings. A metaldehyde dust, spray or meal will help to control them. If you're using one of the semi-automatic watering systems check along the pipe as this may be one of their hiding places. It has been observed that slugs like the damp, dark environment found under the pipe of the perimeter watering systems.

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Flower growers burning propane or natural gas as a source of CO_2 enrichment of the greenhouse atmosphere should also be aware that moisture is a by-product of combustion. For each pound of natural gas burned, there will be 2.3 pounds of water discharged into the greenhouse. Each pound of propane burned will add approximately 3½ pounds of water to the greenhouse atmosphere.

This additional moisture in the air may become a problem especially if botrytis or mildew gets started. Keep a careful check on your plants; and if diseases appear, take appropriate corrective measures, as presented for the crop concerned in Cornell Recommendations for Florist Crops.

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YOUR EDITOR,

Bob Langhans