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New York State Flower Growers

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Cutting Size and Nutrient Mist Affect Rooting of Chrysanthemums¹

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Softwood and herbaceous cuttings of many species increase considerably in dry weight and stem length during propagation (2,10). Such growth during and following propagation is greatly increased and rooting improved when cuttings are propagated under nutrient mist, that is, intermittent mist to which a soluble fertilizer material has been added (4,11). This suggests that cutting size and nutrition are factors to be considered in the successful propagation of plants. Schrader (7) found that root development in tomato cuttings (*Lycopersicon esculentum*) of high carbohydrate-low N content was in relation to the size (volume) of the cutting. Calma and Rickey (1) reported that in coleus (*Coleus blumei*), the largest number of roots and the greatest percentage of rooting were in cuttings with the greatest leaf area. The following experiments evaluated the effect of cutting size and nutrient mist on growth, both dry weight and linear stem elongation, and rooting of chrysanthemum cuttings.

Materials and Methods

Five hundred cuttings of *Chrysanthemum morifolium* 'Giant No. 4 Indianapolis White' from uniform stock plants grown in a greenhouse, were weighed and graded into groups with a fresh weight of 1, 1.5, 2, 2.5, and 5 grams (g) each and with similar leaf numbers and leaf size in each group. Three of the weight groups were further divided into 2 sections, one composed of cuttings which had long small diameter stems (tall cuttings), and the other section composed of cuttings which had short large diameter stems (short cuttings).

Before propagation, ten cuttings of each group (5 tall and 5 short from 3 of the groups) were dried for 24 hours at 70°C and weighed (dry weight). The remaining cuttings were placed into wooden flats (50 cm x 32 cm x 8 cm), 25 cuttings per container in a medium of vermiculite-perlite (1:1 by volume) under intermittent mist of either tap water (water mist) or tap water to which a complete, soluble fertilizer (Ra-Pid-Gro, analysis 23-19-17) was added (nutrient mist) at the rate of 6 oz/100 gal of water,

as described by Wott and Tukey (10). A mist cycle of 10 sec of mist every 10 min from 7 am to 7 pm was controlled by a time clock through a solenoid valve.

After 14 days, the cuttings were removed, and the rooting medium was washed from the roots. Oven dry weight, linear stem length, and the number and length of each root were determined. The experiment was conducted three times during February to April. The Student's "T" test was used to resolve any significant differences between treatments (8).

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Reorganization of N. Y. S. Flower Growers, Inc.

John Brookins—Orchard Park and
T. Paul Newman—Olean

PART II

With the presently accelerating pace of business, economic, and legislative activity in New York State and the nation, your Board of Directors recognizes that the flower industry of New York State needs to be represented by a strong unified voice.

They recognize that greater effort must be expended in the area of industry and public affairs to assure a favorable economic and social climate for the New York State flower industry.

Other areas which are also recognized as needing expanding strong support are: product promotion and consumer education, flower industry educational programs at all levels, and flower industry research.

It is quite apparent that the attainment of these goals can only be accomplished through the concerted efforts of capable leadership representing all segments of the flower industry.

In order to establish a framework within which this unified effort can become a reality, the Board of Directors proposes expansion of the active member category to include firms engaged in the business of producing, processing, wholesaling, and/or retailing floricultural crops and/or supplies in New York State.

With this proposed change, it is quite logical that the name of the organization be amended to reflect the continuing growth and expanding importance of the membership.

Your Key To The Future New York State Flower Industries, Inc.

In the August issue of the *Bulletin*, we will discuss other major changes proposed for our organization.

¹ Contribution NYO-2598-41 of Atomic Energy Commission Contract AT(30-1)-2598, taken from the Ph.D. thesis of J. A. Wott.

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Rooting of Chrysanthemums
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RESULTS

The results of the first propagation in February under intermittent water mist are presented in Fig 1 which shows

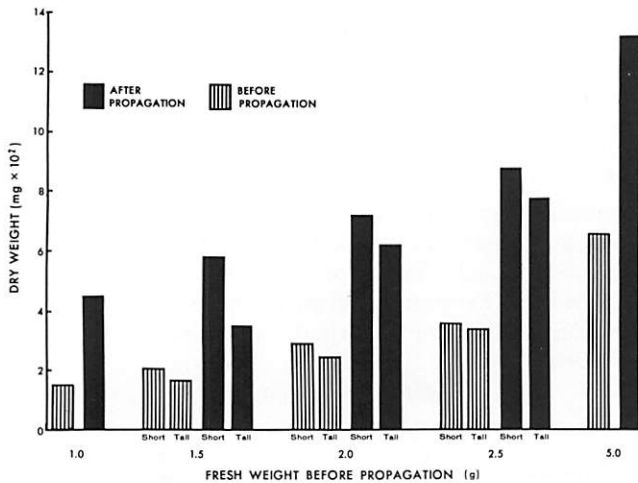


Fig. 1. Influence of cutting size on the dry weight of *Chrysanthemum morifolium* cuttings.

the change in dry weight of the cuttings during propagation. Before propagation, the fresh weight of the cuttings was directly proportional to the dry weight, which varied from 150 mg dry wt / cutting for the 1-g fresh wt cuttings to 660 mg for the 5-g fresh wt cuttings. Within each fresh weight group, short cuttings had a consistently greater dry weight than did tall cuttings, although the differences were small. For example, short cuttings with a fresh weight of 1.5 g weighed 210 mg dry wt / cuttings, as compared with 170 mg for tall cuttings.

During propagation all of the cuttings increased considerably in dry weight, which had been noted in previous experiments (2,11). Dry weight production was related to both the weight and the size of cuttings prior to propagation. Cuttings of the smallest fresh weight group (1 g) tripled in dry weight during propagation from 150 to 450 mg/cutting, and cuttings of the largest fresh weight group (5 g) doubled from 660 mg to 1320 mg/cutting. The other fresh weight groups increased similarly.

Short cuttings of each fresh weight group produced more dry weight during propagation and reached a greater final dry weight after propagation than did tall cuttings. For example, short cuttings weighing 1.5 g fresh weight increased by 2 1/2 times to a total of 580 mg dry weight/cutting, whereas tall cuttings only doubled in dry weight to a total of 350 mg/cutting.

Tall cuttings, although with less dry weight, remained taller after propagation than did the short cuttings of the same fresh weight (Table 1). For example, tall cuttings weighing 1.5g fresh weight initially, were 8.4 cm (3 5/16 in) tall after propagation, whereas short cuttings were only 6.7 cm (2 5/8 in) tall.

Cutting size was related to the number and length of roots produced during rooting under intermittent water mist, as shown in Table 1. As the fresh weight of the cuttings before propagation increased, the total number of roots

Table 1. Influence of cutting size on the number and length of roots of *Chrysanthemum morifolium* cuttings propagated under intermittent water mist.

Fresh Weight (g/cutting)	Root Number		Root Length (in)					
	Total Cutting	Per Cutting	.5	.5-1	1-1.5	1.5-2	2-3	3-4
1	352	8.8	188	119	47	12	—	—
1.5 short	308	7.7	172	50	28	4	—	—
1.5 tall	252*	6.3*	201*	13*	3*	—	—	—
2 short	384	9.6	144	104	74	44	1	—
2 tall	324*	8.1*	204*	79	26*	13*	3*	—
2.5 short	524	13.1	164	155	125	85	23	1
2.5 tall	412*	10.3*	232*	92*	62*	24*	9*	2*
5	544	13.6	168	126	112	94	56	2

* Significant difference at 5% level between short and tall cuttings of each fresh wt. group.

produced also increased. Thus, the short 1.5-g cuttings had 308 roots (7.7 roots/cutting) whereas the short 2.5-g cuttings had 524 roots (13.1 roots/cutting), an increase of 5.4 roots/cutting. In addition, short cuttings of each fresh weight group produced a greater total number of roots than did the tall cuttings. For example, the short 1.5-g cuttings had 308 roots (7.7 roots/cutting) compared with 252 roots (6.3 roots/cutting) for the tall cuttings (Figure 2).

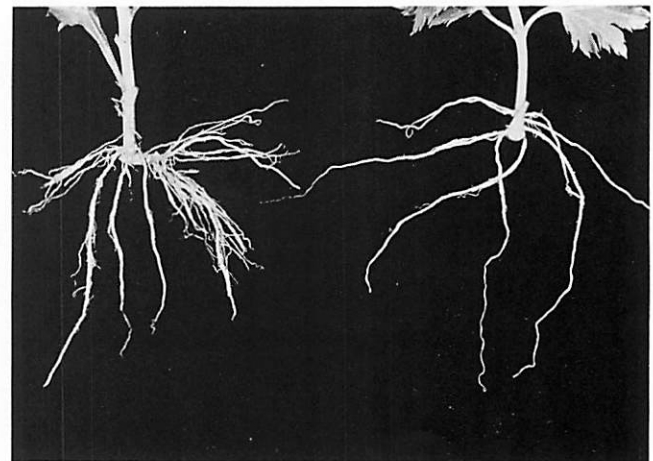


Fig. 2. Influence of nutrient mist during propagation on the root quality of *Chrysanthemum morifolium* 'Giant #4 Indianapolis White' cuttings. Cuttings propagated under nutrient mist (left) had more lateral rootlets than did the water mist cuttings (right).

Cuttings with larger fresh weights (2-5g) produced more roots of greater length than did cuttings with smaller fresh weights (1-1.5g). For example, in Table 2, the 2.5-g short cuttings had 109 roots from 33 cuttings which were 1.5-4 in long, whereas the 1.5-g short cuttings had only 4 roots from 2 cuttings of this length. Further, short cuttings of each fresh weight group produced a greater number of longer roots than did tall cuttings of the same group. Conversely, tall cuttings had more roots of short length (.5 in).

A similar experiment in April compared the influence of nutrient and water mist on propagation of chrysanthemum cuttings, the results of which are shown in Table 2. As

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Rooting of *Chrysanthemums* (continued from page 2)

Table 2. Influence of cutting size and nutrient mist^a during propagation on dry weight, linear stem length, and root number of *Chrysanthemum morifolium* cuttings.

Fresh Weight	Dry Weight							
	Before Rooting		After Rooting		Linear Stem Length		Root Number	
	(g/cutting)	(mg/cutting)	Water	Nutrient	Water	Nutrient	Water	Nutrient
1		88	437	464	2.1	2.6 ^c	16.3	19.6 ^c
1.5 short		130	608	682 ^c	2.3	3.1 ^c	20.6	22.8 ^c
1.5 tall		123	565	574 ^b	2.9 ^b	3.5 ^c	18.9	21.2 ^c
2.0 short		161	736	838 ^c	2.8	3.4 ^c	22.3	25.1 ^c
2.0 tall		160	652 ^b	720 ^{bc}	3.3 ^b	3.8 ^c	21.2	24.5 ^c
2.5 short		202	852	932	3.2	3.9 ^c	25.3	27.9 ^c
2.5 tall		200	788	890 ^c	4.0 ^b	4.3 ^b	24.4	27.4 ^c
5.0		330	1232	1308	4.5	5.0 ^c	29.2	31.1

^a 6 oz 23-19-17/100 gal. water

Significant difference at 5% level between ^bshort and tall cuttings of each fresh wt. group and ^cwater and nutrient mist.

in the first experiment under water mist alone, before rooting the fresh weight of cuttings was directly proportional to the dry weight. Short and tall cuttings of each fresh weight group had approximately the same dry weight. During propagation, cuttings under both mist systems increased approximately 4 to 5-fold in dry weight depending upon the fresh weight before propagation. When propagated under nutrient mist, cuttings of each fresh weight group increased more in dry weight and in stem length than did cuttings propagated under water mist. Thus, nutrient mist cuttings averaged 67 mg/cutting heavier and .5 in taller than did water mist cuttings, an average of 10-15% more growth. Short cuttings of each fresh weight group made greater gains in dry weight (both absolute and percentage basis) under nutrient mist than did tall cuttings, although initially both sets of cuttings were of similar weight.

The number of roots produced per cutting was related to the fresh weight and size of the cutting prior to propagation, and to nutrition during propagation. Cuttings with a fresh weight of 5 g produced approximately 30 roots/cutting, which was almost twice as many roots as were produced by cuttings weighing 1 g fresh weight. Short cuttings of each fresh weight group produced more roots than did the tall cuttings, although the differences were small. Cuttings propagated under nutrient mist had more roots than did cuttings propagated under water mist, averaging 2-3 additional roots/cutting in all weight groups. Similar to the results in Table 1, cuttings with a greater fresh weight (2-5 g) had more roots of greater length (1.5-3 in) than did cuttings with smaller fresh weights (1-1.5 g), and root length was increased under nutrient mist (10).

DISCUSSION

Cuttings with a greater fresh weight and dry weight prior to propagation produced greater increases in dry weight, a greater number of roots, and roots of greater length during propagation than did cuttings of less initial dry weight. Inasmuch as most of the dry weight increase

was apparently in the form of carbohydrates (2), these results agree with those of Kraus and Kraybill (3), and Stoltz (9), who noted that rooting of tomato and chrysanthemum cuttings respectively was associated with high levels of carbohydrates within the cuttings.

Nutrient mist increased dry matter production and rooting in all cuttings, as compared with water mist, although nutrient mist was more effective with short cuttings than with tall cuttings of the same fresh weight. This is not surprising in view of Reid's (5,6) suggestion that cuttings with high carbohydrate content are better able to make efficient use of nutrient reserves during growth, which would explain the positive interaction between dry weight increase, nutrient mist, and increased rooting observed in these experiments.

The larger root production of short cuttings as compared with tall cuttings of the same fresh weight group (Table 1) may also be due to the level of mineral nutrient reserves within the cuttings. For example, short cuttings produced more roots under both water and nutrient mist than did tall cuttings. However, tall cuttings under nutrient mist produced more roots than did short cuttings under water mist, suggesting that perhaps root initiation and development in tall cuttings was inhibited by insufficient nutrition, and when nutrients were supplied, rooting was enhanced. Similarly, the rootability of the short cuttings was also enhanced by addition of nutrient mist.

Thus, for increased rooting and dry matter production by chrysanthemum cuttings, the use of short, heavy cuttings propagated under nutrient mist would be advantageous. However, tall cuttings, despite their smaller increase in dry weight and rooting, did remain significantly taller at the end of the propagation period than did the short cuttings.

SUMMARY

Chrysanthemum morifolium 'Giant No. 4 Indianapolis White' cuttings were graded either as short or tall cuttings with 5 fresh-weight groups. As the weight of the cuttings

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Short Takes

JIM BOODLEY

Cyclamen

We have had some questions regarding an article printed in NEW YORK STATE FLOWER GROWERS *bulletin* #260 titled "The Seven-Month Cyclamen". This article was reprinted from *The Grower*, January 21, 1967, an English publication. The question growers have been asking—should we follow these recommendations or should we stay with the older proven method? Our efforts at trying to duplicate the results and produce cyclamen were unsuccessful. Although we followed the directions as they were given we were unable to germinate the seed with any great amount of success. Either our cyclamen seed is different from that used in Europe or we unknowingly changed the conditions somewhat from those recommended.

We would be interested in hearing from any commercial flower growers who may have tried the seven-month cyclamen and the results they obtained.

Cornell Recommendations for Poinsettias

The current issue of Cornell Recommendations for Poinsettias does not contain any information about the use of B-9, the growth retardant for poinsettias. Cyclocel is the material listed. Growers have asked us why don't we recommend B-9.

Our experience with B-9 as a foliar spray to keep poinsettias down may be summed up in a few words—the material has not provided consistent results. At one time the retardation in height has occurred and that other times it has not.

If you have used B-9 as the retardant on poinsettias successfully then by no means do we suggest you change. If you have not used this material and wish to do so then we recommend your efforts be made on a trial basis. Be certain to keep accurate records of the dosages applied, the dates of application, and the varieties treated. The response of varieties to B-9 sprays does differ considerably.

Rooting of Chrysanthemums

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before propagation was increased, the number of roots and the dry weight per cutting produced during propagation was increased. Short cuttings had a greater dry weight initially and produced more roots per cutting than did tall cuttings of the same fresh weight group, although tall cuttings remained taller after rooting. Nutrient mist during propagation increased the root number and dry matter production of all cuttings.

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News And Views From Our Industry

by Carl F. Gortzig

University Night at New York Florists' Club

On April 14, Professors John G. Seeley and Robert W. Langhans participated in the University Night program of the New York Florists' Club at the Hotel New Yorker, New York City. They joined researchers and educators from other universities in the Northeast in reviewing current floriculture research. An exhibit was presented describing two major research projects now in progress at Cornell, i.e. one-crop carnation culture and the floriculture employee-management project. The Florists' Club provides financial support for both. In the case of the latter project, it is jointly sponsored by the Club and the Kenneth Post Foundation.

Cornell Junior Wins Shinoda Scholarship

Robert Stack, a junior in the Department of Floriculture and Ornamental Horticulture at Cornell from Ithaca is one of two students in the nation to be awarded a \$1,000 scholarship by the Board of Trustees of the Joseph Shinoda Memorial Scholarship Foundation. The award is for the academic year beginning September 1969. Congratulations, Bob!

Long Island Flower Growers' Association Elects

Congratulations are in order to the new officers of the Long Island Flower Growers Association who were elected at the Association's annual election meeting and ladies' night held June 25. The new officers are:

Al Celano, Dauernheim, Inc.—*President*

Otto Keil, Jr., Otto Keil Greenhouses—*Vice President*

Ernest Olsen, Homeside Florist—*Secretary*

Sam Merlo, Merlo's Greenhouses—*Treasurer*

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More on Labor Legislation*

Kenneth R. Morefield
SAF Labor Consultant

In his final report to the Congress, outgoing Labor Secretary Wirtz recommended that the minimum wage be increased to \$2.00 per hour; that overtime be required for hours worked in excess of 8 per day or 40 per week; that all exemptions be eliminated. Bills have already been introduced to increase the minimum wage to \$2.00 per hour.

Mr. George Shultz, President Nixon's Secretary of Labor, has expressed himself as being against an increase "at this time." He has also indicated that he favored a lower minimum wage for new members of the labor force. Such an approach could cause many problems for industry.

FEDERAL WAGE AND HOUR LAW

You will have employees subject to the Wage-Hour Law if any of the following factors are present in your business:

1. Your annual volume is as much as \$250,000.
2. More than 25% of your sales are at wholesale.
3. You employed as many as 500 man-days of agriculture labor during any calendar quarter of 1968.
4. You operate two or more establishments and have a central office, warehouse or stock room.

Within the past year, SAF members have been investigated by the Wage-Hour Division and have been faced with demands for back wages of \$7,000—\$25,000—\$3,500—\$1,600—\$15,000. In every case, the member could have eliminated the back wage liability with prior planning. SAF reminds its members that the services of Kenneth Morefield, SAF Labor Consultant are available to members who wish to have a wage-hour analysis made of their establishment. If you would like to have him visit your establishment and review your status under the law, write to SAF. Such visits are made on a fee basis, but you may find that you can save many times the fee. In addition, you will guard against being faced with any unknown back-wage liability.

New trends are noticeable in the investigation procedures of the Wage-Hour Division. The investigators are not advising employers of exemptions to which they are entitled. Unless the employer takes an affirmative position and asserts the exemptions, investigators are remaining silent and not pointing out the entire language of the law. This practice is resulting in inflated demands for back wages which are not legally due.

You are urged to make certain of the manner in which the law and its various exemptions apply and so advise the investigator if you are subjected to an investigation.

In a recent investigation of an SAF member, the investigator did not advise the employer of the fact that he had a seasonal overtime exemption for employees engaged in landscaping and demanded that employees be paid time

and one-half for overtime after 40 hours per week although the employees were exempt for a period of 14 weeks. In another case, back wages were demanded for a truck driver who was exempt from overtime because of the fact that he was engaged in hauling goods moving in interstate commerce. In both instances, the investigators agreed that the exemptions applied, but stated that they requested payment for overtime because the employers did not "claim" the exemptions.

NEW INDUSTRY EXEMPTION

The Administrator of the Wage-Hour Division has declared that the field-grown cut and potted flower industry is seasonal within the meaning of the Wage-Hour Law and is entitled to a partial overtime exemption. The industry is described as follows:

"For the purpose of the proposal, the field-grown cut and potted flower industry was defined as follows: The original assembly of field-grown cut and potted flowers from the growers, including the sorting, grading, handling, packing, and shipping, and transporting to carriers or to market, and any other operations necessary or incidental thereto."

If you are within the exemption, you may pay employees engaged in exempt activities overtime for hours worked in excess of 10 per day or 50 per week for a total of 10 weeks during the calendar year and for hours worked in excess of 10 per day or 48 per week for a total of 10 weeks during the calendar year. The weeks may be selected by the employer at any time prior to the time employees are paid for their week's work. The weeks selected for exemption do not have to be taken concurrently nor consecutively, but may be any total of 20 weeks so long as the exemption is applicable. The failure to pay overtime for hours worked in excess of 10 per day or 48 or 50 per week, as the case may be, results in loss of the exemption for such employees for such weeks. In addition, certain notices must be posted regarding the exemptions, if claimed by the employer. If you are eligible for these exemptions and desire any additional information, contact SAF headquarters.

SAF will continue to monitor labor legislation affecting the industry and will take whatever steps are available to protect the industry.

News and Views

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New York State Flower Growers Board of Directors Meet at Oyster Bay, Long Island

The July meeting of the Board of Directors was held at the State University of New York Conference Center at Oyster Bay on July 14. Gisbert Auwaerter of Bayport Flower Houses, Bayport made arrangements for the group to meet at Planting Fields, the former William Coe estate. This horticultural showplace provided an appropriate setting for the Board's deliberations. President Forbach opened the session by introducing directors, officers and

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*Reprinted from the 'Labor Bulletin' of the Society of American Florists, April, 1969.

News and Views

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guests. He extended a special note of welcome to Al Celano, newly elected President of the Long Island Flower Growers Association.

The agenda was a full one and indicated high activity among the various committees. Hugh Burrell, Amsterdam, Paul Newman, Olean, George Kobylarz, Newark Valley, and Don Phelps, Rochester each reported on a different phase of the New York State Flower Industries Convention planning. Al Celano reported that the Long Island Flower Growers Association wished to join with the three upstate F.T.D. units, the upstate Teleflora unit and the New York State Flower Growers Inc. in financially underwriting the November convention; Hugh Burrell expressed the Convention Committee's appreciation of the Long Islanders' support. (See details on the Convention this page.) John Brookins reported considerable activity on the part of the Nominating Committee as it prepares for the annual election to be held in November. Paul Newman, Chairman of the Constitution Revision Committee provided the group with the final draft of the revised document. He announced that it will be printed in its entirety in the October issue of the *Bulletin*. Ed Clauss of Elmira reported excellent progress on the groups' New York State Fair exhibit and announced Fair dates as August 26 through Labor Day (September 1). Dr. John Seeley of Cornell reviewed with the Board the present budget situation at the College indicating that the extremely tight State budget will impose serious restrictions on research and extension expenditures for 1969-70. He expressed appreciation for the floriculture industry's financial support of the College's program. President Forbach adjourned the meeting at 3:00 p.m. The directors and guests were then treated to a tour of the Planting Fields Arboretum and Greenhouses by Gordon Jones, Arboretum Director.

Rose Manual

The *Rose Manual*, prepared in conjunction with the joint Cornell-Penn State-Roses, Inc. Rose School held in Philadelphia in March, is due from the printers any day. This 330-page illustrated publication is a comprehensive compilation of proven grower practice and the latest research on commercial greenhouse rose production. Included are sections on rose breeding and varieties, cultural practices, insect and disease control, economics, marketing, and business management. While the publication was edited by Dr. John Mastalerz of Penn State and Dr. Robert W. Langhans of Cornell, chapters have been prepared by scientists from universities throughout the nation.

Orders for the *Rose Manual* are being accepted now. Address your request along with your check or money order for \$4.00 per copy to Dr. Robert W. Langhans, Department of Floriculture, Cornell University, Ithaca, New York 14850. Your copy of the manual will be sent to you as soon as the supply arrives from the printer.

N. Y. S. Flower Industries Convention Takes Shape Syracuse - November 2-3

Convention Chairman Hugh Burrell of Amsterdam, New York reports that the New York State Flower Industries Convention Program Committee is putting the final touches on the agenda for the two-day event and will announce the program soon. Included will be discussions and workshops of interest to all segments of the flower industry—growers, wholesalers, retailers.

The Convention, to be held at the Hotel Syracuse, Syracuse, New York, November 2 and 3, is the first of its kind for New York. It represents the combined efforts of grower, retailer and wholesaler organizations in the state to provide under one roof an opportunity for all industry segments to join together in considering current trade matters and management technology. The new format brings together the former Fall sessions of F.T.D. and Teleflora groups in upstate New York with the annual Cornell Florists' Short Course. New York City and Long Island florist groups are cooperating to make the event state-wide in scope.

Program Chairman Paul Newman, Olean, and his subcommittee chairmen, Carmen Cosentino, Anburn—retailers, Gorge Kobylarz, Newark Valley—growers, and William Kasting, Jr., Buffalo—wholesalers, will offer a program which will include a retail design school, workshops on production programs for specific crops for both retail and wholesale groups, and a series of sessions dealing with business management. A special program for wholesale florists will also be offered. Joint sessions for all industry segments will feature nationally known speakers and panels of industry businessmen. A mammoth trade fair will feature retail and production needs and an extensive new varieties exhibit.

The Convention Committee extends a cordial welcome to florists throughout the nation to join them in Syracuse on November 2 and 3. Program details will be announced shortly.

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YOUR EDITOR,
BOB LANGHANS