

CHRYSANTHEMUMS - U.S.A.

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(This talk was presented at the February meeting by Mr. J. Miller, Cloy Miller's brother).

In the last several years Florida growers have produced an increasing number of bunches of pompons in the period from January through May without the use of black cloth and have shipped them into the northern cities. There are at the present time approximately 100 acres of pompons being produced in that state.

Regularly scheduled weekly plantings are made from September through February, of varieties durable enough to withstand outdoor conditions of moisture, wind and sun.

California growers have extended their season earlier into the spring so that now, with the use of some protection that maintains a few degrees higher temperature, they are able to start shipping in June certain varieties of daisies followed by standards, particularly Good News and Detroit News, and a few other varieties that are good shippers.

Growers in Texas and other bordering states are now producing mums, pompons and pot-plant chrysanthemums throughout the year either in greenhouses or screenhouses.

From Nova Scotia to Southern California and from western Canada to Florida the chrysanthemum in one form or another is now being made available to the buying public on a 52-week basis.

All of this indicates the tremendous range of adaptability of the chrysanthemum. Chrysan-

themums are produced, with some little difficulty, to be sure, in the parts of the country where the highest temperatures prevail, and they are produced in the middle of the winter in western Canada where sub-zero temperatures are common.

It might be of interest to review a few of the developments which have taken place in the industry over the period of the last few years and to make an attempt to set a few stakes as a base for a little projection into the years ahead of us.

Rose growers in California, because of their favorable climate, have been able to compete successfully with growers in the eastern part of the country and have brought about some trend toward diversification on the part of the greenhouse rose specialist. Some of the houses which were used for rose production before are now chrysanthemum houses.

Carnation growers in California have improved their quality of flower sufficiently until they have become strong competition for the specialized growers in Colorado. There is evidence of some trend on the part of Colorado growers to diversify and chrysanthemums have been one of the first crops to be considered.

Because of California competition also, growers in our southern tier of states are shifting from roses into chrysanthemums. Though this crop is somewhat difficult to grow in the mid-summer extreme temperatures, it does lend itself better to the generally prevailing higher temperatures than most other cut-flower crops.

As a result of all these developments, plus that of the year-round programs in northern greenhouses, the total production of cut flower chrysanthemums has been greatly increased, but the supply is being fairly well stabilized throughout the year. Periods when chrysanthemums are in short supply are practically non-existent in most areas in the U.S. and Canada.

This situation has also contributed to a considerable extent to the development of pot-plant chrysanthemum production on a much larger scale than before. In some instances pot-plant chrysanthemums are replacing at least part of the cut-flower crop produced previously. Pot mums are in weekly supply in the North, the South, the East and the West.

Thus there has been and still is in process a reshuffling of the production picture on a national, regional and individual production unit basis. The net result is that we are today producing more chrysanthemums and selling them to more people more often than ever before.

Our first reaction after taking such a look around the country and seeing all these developments first hand--and especially after listening to the newcomers in Florida and the veteran operators in California--was one of fear and anxiety. It was impossible to keep from being almost convinced that the northern greenhouse would soon be a liability instead of an asset.

However, after a second and a third look, and after a little more careful study of the operations in these outdoor growing areas, I am being forced to come to certain well founded conclusions relative to the manner in which existing greenhouse production will likely be influenced in the future.

One important observation is that fact that all this expansion in southern production is not in cheap or low-quality merchandise. The crops are not being produced by cheap labor or extremely low overhead. Florida growers this year added steam boilers to their list of essential equipment. It has become necessary to sterilize soil for the control of nematodes and verticillium wilt. It is necessary to keep plants completely covered with insecticides and fungicides much of the time to control thrip and ray blight in the flowers. There appears to be a gradual trend on the part of the operators to add more and more overhead so as to make their crops more dependable and of constantly higher quality.

Four years ago I was with a small group of 'mum growers in San Francisco when discussion turned naturally to the future in chrysanthemums. At that time the crop in the Bay area consisted entirely of cloth house crops. I was quite certain then that it would be necessary for them to continue to extend their flowering season each year and I predicted that eventually they would be looking to continued production to replace their seasonal cropping.

Today a number of growers are building plastic houses, some with, some without heat. The few growers who had plastic houses last year are building greenhouses this year. While at first greenhouses were being built without boilers to heat them, now everyone is heating their greenhouses.

In Texas and bordering states to the north greenhouses are equipped for cooling in the summer. If this proves as successful as it now promises to be, I think we can look for more greenhouses in that section of the country. If so, the situation in Texas may gradually change from one in which they now produce only 20 percent of the flowers consumed in the state to one in which they may produce a larger proportion than is being imported.

Thus the growers in each section are solving their own particular problems and moving gradually toward complete year-round mum programs, stabilizing their production and improving their quality.

What adjustments have northern greenhouse growers been making while all this has been going on? They are growing more standards and less pompons, more pot plants and less cut flowers, but more of them are producing chrysanthemums of all types on a continuous production basis.

A lower percentage of the production under glass is shipped to distant markets. More of it is sold within a radius of several hundred miles. More intense effort is directed toward developing and holding the local market. Transportation charges are sparring with climatic advantages in their influence on regional distribution of flower-production units.

As a result of these trends growers have found that it pays to know their markets better, more study is made of the specific market demand and more detailed planning is done before planting a crop. It is not possible today to remain in business on the basis of growing crops that one prefers to grow, hoping that there will be a demand at the time the crop matures. It is necessary, instead, to know specifically what to produce when, and why, before any plans are made to produce the crop. I think that it can be said truthfully that if you have made no changes this year over last year, no specific improvements in your production program, your relative position in the competitive picture is considerably weaker than it was. Parity has no meaning to producers of flowers.

We would like to conclude that this general chrysanthemum production picture adds up to a real challenge for the energetic and capable florist wherever he may be presently located, while it may present real problems for the unprepared and those inclined to want to make it the easy way. It will require greater effort in the future on the part of the producer, in planning and in good management, for him to maintain his relative position with his competition or to improve it. He will find it more and more necessary to have available at all times a well regulated supply of top-quality flowers produced according to a detailed plan.

The successful chrysanthemum grower today thinks and plans in terms of weekly crops; that is, in his book there are 52 successive crops individually planned and tailored for his own particular situation and for each week of flowering.

He may grow all of these in a year-round program, or he may select certain ones and skip the others, but whichever he does, he realizes that he is dealing with parts of a general and complete program consisting of 52 individual parts, a possible total of 52 units of production for 52 periods of sale.

It is the possibility of making changes in proportion of varietal colors, types and forms from week to week and adjusting to market demand, if necessary, that makes the chrysanthemum so important in the flower production of the future. This range of variation in flower types and colors is presently being expanded and promises to continue to expand for a long time to come. Breeding of chrysanthemums to date has just now had a good beginning.

It might be of some interest to point out here in passing that one of the major problems with such crops as the rose or the carnation is the difficulty encountered in cropping to a flexible or fluctuating demand. Varying the proportions of colors, forms and types of flowers to seasonal changes in demand is difficult except with the chrysanthemum. A look into the future potentialities with the chrysanthemum reveals a great deal of territory yet to be explored. Each year should bring some new additions which will expand this range.

Some of us remember the time when all chrysanthemums were planted in May and June and flowered in their natural season only. That was the time when the earliest variety to flower and the one that could be held late into January by bringing the temperature in the greenhouse to 40° or below were the varieties that were the most profitable.

Controlled flowering of chrysanthemums according to established and well publicized time tables, with varieties classified into response groups has become quite common among many florists. There are, however, several phases of the 'mum program that have not been as well worked out or at least perhaps not as well understood as the program in general.

These are the winter-cut flower crops, winter and spring pot plants and what we have so far referred to as short disbuds. Kip refers to them as short stemmers and recently an article appeared in the publication "Greenhouse Gossip" in which such flowers were referred to as home size flowers.

The winter portion of the cut-flower crop is the most difficult. Since it is the most difficult, it is also more subject to competition from Florida-grown pompons.

In the past few years many winter crops of pompons in the greenhouse have failed to come

up. to standard in either yield or quality. This has been due partly to some misinformation about temperature requirements and partly to the inflexible nature of most of our greenhouse equipment.

We have always known that chrysanthemums finished at temperatures of about 50° were of the best quality. When we started to flower them out of season we learned that the range of minimum temperatures required for bud initiation was around the 60° mark. Thus in order to have flowers at all we had to maintain a minimum night temperature of 60° to 62°, and since we had a series of crops in the same house we had to finish the crop at those same temperatures.

This resulted in the gradual elimination of varieties that require temperatures in the lower 50's for quality flower development and left the list of varieties suitable for a straight 60° to 62° a relatively small list.

Furthermore, a number of growers who for one reason or another were advised that in order to be very sure not to have any difficulty with bud initiation, night temperatures should be maintained at 65°, found that in varieties of the 13- and 14-week group, buds would not develop at all. Instead crown bud after crown bud would form until the plants were about ready to go through the glass. We need, therefore, to maintain a minimum temperature of 60° in the coldest part of the house for complete and uniform bud initiation in all varieties, and we need to be able to lower the temperature after buds are initiated for one of two reasons, either to permit the flowering buds to go on and develop or to improve the quality of the flower, or both.

The important facts to remember are these: (1) The minimum night temperature must be 60° for bud initiation, and (2) The minimum night temperature must not be above 60°--preferably below--and progressing gradually toward 50° or slightly below at cutting time.

The best February crop that we have seen this year was a pinched crop planted in August, grown at 60° until buds were well visible and then the temperature reduced at the rate of 3 to 4 degrees per week until 46° to 48° was reached at the finish. This crop brought a premium over Florida pompons shipped in.

It is important to lower temperatures very carefully. It is not possible to drop temperatures abruptly from 60° to 50° without causing either some abnormality in flower form or stall-

of centers in certain varieties. All of this does not necessarily mean that it is necessary immediately to grow each portion of the crop in a separate house. It does mean, however, that if and when competition forces you to improve quality, it may be necessary to find a way to manipulate temperature in such a way as to be able to carry the optimum for each stage of growth and development.

Since the limiting factor in the winter period is natural light, it is of utmost importance to have this crop in the greenhouse with the best exposure for daylight. It is difficult to get maximum yields and quality in houses covered with dirty glass. East-west connected houses with gutter shadows take a heavy toll. Buildings or corridors next to greenhouses except on the north side cut the returns from the winter crop more than one is aware of.

It may be a generation coming, but it is obvious that eventually the winter chrysanthemum crop will be grown in individually separate houses (one house for each timed crop) arranged in a north-south direction and connected with a corridor along the north ends of each house. I do not mean to imply that it is not practical or profitable to grow winter chrysanthemums in the greenhouses presently available, but I am sure that all of these things will have to be taken into consideration as we go into the future.

Southern growers are starting new. With them light is not a limiting factor. The northern grower can compete if he utilizes the available light at the maximum possible efficiency.

If you take a look at the time tables recommended for the various latitudes, you will notice that it requires approximately 50% more time to produce a late winter crop in January, February and March in the north as compared with the time required in Florida.

Another observation made recently in regard to the factors responsible for best results with the winter crop was that soil and its treatment play a major role in determination of end results.

First of all physical structure, the need of having an open and well drained soil mixture, cannot be emphasized too much. I have seen this winter in greenhouses as far north as Canada and as far south as Texas a number of chrysanthemum crops which were grown in tight soils, and a large percentage of them were being overwatered. My observation would lead me to believe that as a result of finally getting growers to realize that plants were never watered enough in the summer time, and perhaps as a result of the newer mechanized methods of watering, we now have to relearn the art of watering in winter, especially if our soils are not of the type that

can take watering by schedule without reducing the oxygen content around the root system to the danger point.

The chrysanthemum plant is much more sensitive to over watering and to soluble salt content in winter than at any other time of year. It is now becoming accepted practice also to steam sterilize the soil just before planting the winter crop.

Some of the growers who get best results with year-round flowering steam their soil twice each year. They omit it before the late spring-summer and early fall crops when growing conditions are otherwise most favorable. A convincing demonstration of the effect of steam sterilization can be had by sterilizing one side of a bench and leaving the other side unsteamed.

More and more peat is being used for organic matter. The best winter crops are produced on soils that have had perma peat added annually for a number of years. This helps greatly in maintaining a good physical structure.

For soluble salt concentration, readings on the solubridge of much over 40 will have some effect on plant growth. Sterilizing and leaching go hand in hand and should be incorporated into the program sometime during late summer.

Raised benches are to be preferred for the winter crop. It is easier to control the type of growth in winter on a raised bench than it is on ground beds. Plants tend to get taller and make a softer type of growth in ground beds.

In summer and fall the ground beds offer some advantages. Temperature control is easier where there are raised benches.

With raised benches, and particularly with heat lines under the bench, it is possible to maintain night temperatures on a single bench by covering the plants on the bench with a cover that reaches to the ground and confines the heat to that particular bench. Thus the remainder of the house can be kept cooler for finishing while the buds are being set on isolated benches at higher temperatures.

This is an advantage, particularly where one bench or two constitute the unit flowered and the adjacent benches represent succeeding units. Being able to control temperatures sharply is an important advantage in the winter; in fact, it is a necessary requisite for consistent success.

With a year-round program it is possible to have fresh flowers at all times in competition with those which may have been shipped long distances, and it is possible to have varieties to supplement those which are being shipped so as to expand the range of types and forms available at all times.

There is some degree of monotony in the product that is grown solely for shipping. The varieties that can be shipped successfully long distances are limited in number. Many of the most beautiful flowers are too fragile for such handling and lend themselves much better to production for the home market. Variety will become increasingly important as we begin to produce for a market demand beyond the "special occasion" market of today.

We have yet to see any of the growers who produce for their own local market and who do a good job with up-to-date methods of production hurt greatly or permanently by competition from shippers.

We need both types of merchandise. There is now and there will be more opportunity in the future to make use of a wider range of variety so as to include the beautiful as well as those varieties that emphasize durability primarily. Present trends in breeding are toward the decorative forms, the anemones and singles. These are more showy, stimulate greater public interest and are better suited to greenhouse culture.

The year-round program is flexible in so far as timing of the crop is concerned. It is possible to grow pinched crops throughout the year, or any individual crop may be grown single stem without pinching, thus cutting off three or four weeks of growing time. This may be an advantage at times when it is important to double up on production for a special holiday period or to avoid flowering in a certain period when a pinched crop would flower. It enables one to accomplish this and at the same time keep the greenhouses occupied at all times. With costs what they are today, it is a must to keep each square foot of every bench producing 52 weeks out of the year.

In addition to making possible the completion of three full crops on a given bench in one year, there are advantages in favor of no-pinch crops for winter and spring flowering. There is more of a tendency to form an open spray on a single stem than on a pinched plant. Standards tend to be a little larger in winter and spring on single stem.

Growers who started out with no-pinch crops generally prefer to stay with this method. It

is the simplest approach. The main disadvantage is the increase in number of plants needed. Spacing for single-stem growing varies generally from about 4 x 5" for crops flowering May through October to 4 x 6" the rest of the year.

The schedules generally found in the 'mum manuals are designed to produce mums and pom-poms with standard 28- or 30-inch stems when cut. If in actual practice the average variety does not attain sufficient height to permit cutting the desired length of stem, then the period of long-day treatment needs to be increased for that respective period of flowering.

If, on the other hand, plants get too tall, chances are that the number of long-day weeks can be reduced for that particular crop. A question that is frequently asked is how tall should plants be when they are ready to shade or to turn off the lights.

Our answer has always been "follow the schedule", indicating thereby that it is safer to go according to the time table than it is to go by plant height, since the height varies from winter to summer and summer to winter. As a general rule, however, the average height of the plant doubles after shading in case of the crops flowered in late spring and early fall. They will more than double in the June, July and August crop, while the plant will have to be more than half its final height before start of short days in case of the winter and early spring crop.

When adjusting long-day periods, do not add or take off more than one week. It is very easy to make too radical a change at one time. It is safer to make a small adjustment, then repeat, after a check indicates that more is needed the next year.

As stated before, the minimum temperature for dependable bud set is 60° at night. There are some varieties which will set their buds at a 55° minimum night temperature and a very few that can be successfully flowered at 50° to 52°.

These minimum night temperatures are most critical for the crops flowering in March, April, May and June. Bud set for these crops takes place during the cold winter months when oftentimes the tendency is to run temperatures a little lower than the required mark. This is also the time when those varieties which require specific stock plant temperatures are most affected because of the cumulative nature of low-temperature effect. The work of Mark Cathey at Cornell indicates that, in case of specific varieties, temperature of stock plants does have influence on subsequent flowering response at certain times of the year. However, with most varieties this response is a direct result of the temperatures maintained in the flowering house.

In the year-round crop of standards, the term standards has almost become synonymous with Indianapolis. Indianapolis varieties in many cases are the main varieties used except in July and August and January and February.

However, with good control of humidity and careful protection from the severe rays of the sun, they are even being grown in summer. By good temperature control, plus some interrupted lighting procedure, they are also being used for the January, February crop. Only with some degree of difficulty, however, are they brought to a high degree of perfection in these periods.

Interrupted lighting has by no means been completely worked out for all applications, but for the mid-winter crop of standards a larger flower with added petalage results from this type of added lighting. Right at this time we favor the use of 11 short days followed by 10 or 11 long days for Mefo and Yellow Mefo and no more than nine or 10 short days followed by 11 or 12 long days for Indianapolis varieties. We think there should be some correlation between the response group and the number of initial short days. We use this type of interruption with lights only and not when we have to shade a crop. It is of doubtful value in summer and it is also more difficult.

In addition to so called interrupted lighting, continued lighting of short duration per night until maturity is also being practiced to some extent. Thus as soon as buds are visible or almost ready for disbudding, lights of no more than 5-foot candle intensity may be on for one-half hour per night to slow down the development of the bud to allow for greater size of flower. The secret in getting good results in winter is to slow down the growth processes in accordance with the limits of daylight available and yet stay within the limits necessary for normal flowering as described earlier.

So much for the winter cut flower crops. The spring and fall crops are the easiest, the highest quality and the most profitable usually. In mid-summer we have several more extremes to deal with.

Bud development can be interfered with in the summer crop because of excessively high temperatures. You may have seen some crops this past summer that did not flower uniformly or

perhaps not at all, because of the long period of high temperatures certain areas have been experiencing. Temperatures of 85° to 90° or over affect the development of the chrysanthemum adversely in one way or another.

It is important to minimize the effect of exaggerated high temperatures in the summer by delaying the application of black cloth shade in the afternoon until the sun has started to recede, or about 6:30 to 7:00 p.m. Shading from 6:30 p.m. to 7:30 a.m. will provide a total of 13 hours of darkness which is sufficient for proper bud set if other conditions are optimum. Furthermore, not only does earlier shading trap excessive heat under the cover and tend thereby to delay bud set or development but also the light intensity at that time of day is such that the intensity under the cloth is above the minimum for effective darkness. It is very important, therefore, to follow the hours for shading during the summer time that will provide no more than the required minimum number of hours of darkness and yet maintain as low a temperature under the cloth as possible.

Many of the greenhouses in the South, as you know, are using some form of air conditioning with apparent success.

If a way can be found to control temperature in the greenhouse in the summer time at reasonable cost, it will certainly greatly simplify summer production of chrysanthemums.

In the meantime, everything should be done to increase natural ventilation to the point where temperatures inside the greenhouse are no higher than outdoor temperatures. This requires larger openings, or more ventilators than the conventional greenhouse now has, so as to facilitate very rapid air exchange.

It is necessary to select suitable varieties for flowering in periods of excessive temperatures. There are not too many varieties available which are entirely satisfactory for these extreme temperatures. However, such varieties as Vesta, White and Cream Halo, Whitetop, Illini Igloo, Aztec, Goldfinch, Madonna, Crescendo, Sunup, Reward, Orange Beauregard and Good News are among the most tolerant. This past summer Pink Chief was reported to have been the best white 'mum to flower in the heat in the South. Further progress is in the making in terms of breeding high-temperature tolerant varieties.