

# Cut Mum Production

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## The Greenhouses

I'd like to discuss chrysanthemums — a favourite subject of mine and one which, it seems, I've been talking about for quite a few years now. Specifically, I'd like to tell you a little about cut mum production at Westbrook Greenhouses in Grimsby, Ontario. I'm very happy to do this, but may I first inject a word of caution. As most, if not all of you, have discovered from past experiences, one grower can seldom duplicate the procedures of another and get the same results. One of the reasons I remind you of this is because of the soil base we have at Westbrook. The mum houses are located on deep, sandy loam, once used for growing peaches and other tender fruit. It really can't be considered at all typical of the soil base encountered in most other areas of the country.

The mum program at Westbrook occupies a total of 15 houses, each 3,750 sq. ft. in size for a total of over 56,000 sq. ft. producing 11,250 stems per week. Obviously it is an important crop to us. Unfortunately, as is true with most cut crops, we actually grow in only 61% of the ground area of each house. We are going to have to greatly improve on this or, I'm afraid, our days in the cut mum business are numbered. Four of the five beds in each house are in standards (or commercials, if you prefer to call them that), with the fifth bed in an assortment

of spiders, novelties, and daisies. Since all of Westbrook's spray mum requirements are grown by several contract growers in the area, I'll just discuss our handling of standards. However, most of what I have to say is also applicable to spray mums.

Our mum program has its beginning in the stock growing area in Beamsville, where we not only produce the cuttings for Westbrook's standard mum program but also for a weekly pot program at our Plant II range in Beamsville, and pots, standards and sprays grown at our two associate operations in upstate New York. Approximately 30 varieties are involved in the stock program at all times. Supplemental High Intensity Discharge lamps are used from September through April, providing approximately 350 foot candles. The duration of lighting varies with the time of year and how hard-pressed we are for cuttings. Most of the time we do a pretty good job of meeting our weekly demand, except when we err and have to call on our good friends to help us out. Nucleus mum stock is purchased regularly from Yoder Brothers as varieties change with the seasons and as new varieties are introduced. All cuttings for supplementary holiday flowerings are purchased from Yoder Brothers. We only attempt to produce cuttings to meet our fairly constant weekly demand.

All 15 greenhouses in the program are quonset, gutter connected, and covered with double inflated poly which is replaced every two years. For 9 to 10 months of the year, I feel we produce a top-quality standard. For the remaining 2 or 3 mid-winter months we are never completely satisfied with the quality. However, I doubt very much that there is a grower among you who is totally satisfied with his quality at that time of the year, whether he is growing under glass or plastic. We know

that our light loss during mid-winter months under double-poly is an important factor. But by providing the best possible starting climate, growing temperatures, humidity, and nutrition, we believe we can do much to overcome the light disadvantage. With 12 months' heating costs of 62.5¢/sq. ft. for the mum area for the year ending October 31, 1980, we feel we have to accept a somewhat lower quality standard during that 10 to 12 week mid-winter period as a trade off for the much higher heating costs we would have if we were growing under glass. Let me assure you, there is no thought of replacing existing plastic structures with glass.

The 15 houses all have independent heating, lighting, ventilating, and shading controls, and are programmed to provide one house of 11,250 stems in flower per week throughout the year. As total crop time is reduced in the spring, we are able to schedule two of the houses with supplementary spray mums for Mother's Day flowering, yet still maintain our weekly volume of standards. This keeps the houses working at full speed. It is better than bringing in a heavy surplus of standards which the market cannot absorb as easily as it can absorb sprays at that time of the year. Scheduling full houses to flower at one time and being able to give each crop optimum temperatures through each stage of development certainly helps a great deal toward producing top quality.

### Varieties

Our variety picture is very simple since there is only a small number of varieties which we have found to perform satisfactorily under our particular conditions. From Mother's Day to late August it is the Nob Hills and Promenade; from late August to early October, the Nob Hills, Promenade and Wildfire; from mid-October to early December, the May Shoesmiths, Promenade and Blaze; from Mid-December to early May, the Mefos and Promenade.

During our first fall using the May Shoesmith varieties, we were very satisfied. In particular, we liked the uniformity of size and cut-out with a smaller percentage of culls than with the Mefos. We are considering discontinuing the Mefos around mid-March and using the May Shoesmiths from mid-March thru to early May, when we begin the Nob Hills. However, this period is not so critical since we know the Mefos do perform extremely well then also, and it is pretty hard to beat a good crop of Mefos.

Once a crop has been cut out, the wire mesh is raised and suspended overhead, the support frames for the wire mesh are pulled, and the Gro-hose watering tubes are gathered up. Then with a rotary lawn mower or large tractor-mounted rotary mower, all stems and leaves are chopped and returned to the soil. At this time of year we do not add peat moss. However, beginning in the spring, we usually add peat.

### Feeding Program

We make extensive use of soil and foliar analyses and attempt to add as much of the necessary amendments to each house prior to planting as possible. In this way our feeding program can be kept relatively simple. In our light, sandy soil, we find the maintenance of an acceptable pH in the 6.2 to 6.5 range quite difficult and have been adding Dolomitic Lime at the rate of 10 lbs./100 sq. ft. for some time. Phosphorous levels are maintained quite easily by the addition of 0-20-0 Superphosphate at a rate of 2½ - 5 lbs. per 100 sq. ft. as required. Our foliar tests consistently show low magnesium levels - a bit hard to understand in view of the Magnesium being added in the Dolomitic Lime. However, we are adding Magnesium Sulphate (Epsom Salts) at a rate of 1½ lbs./100 sq. ft. with each planting, until we get an indication that Magnesium levels are in an acceptable range.

Since our feeding program is largely with Ammonium and Potassium Nitrate in summer and Calcium and Potassium Nitrate in winter, and since Plant Product's 12-0-44 Potassium Nitrate is well fortified with trace elements, we find that our trace element requirements are pretty well taken care of. However, we do make a practice of a once a year application of Fritted Trace Elements at a rate of 3 oz./100 sq. ft.

Once all amendments have been distributed as uniformly as possible over the house, the soil is worked thoroughly with a roto-tiller and the entire house is then steamed. We always try to plant the day following steaming, when the soil is still slightly warm. At this stage, we've taken pretty good care of the crop's requirements as far as pH, phosphorous, calcium, magnesium, and trace elements are concerned. Now, nitrogen and potassium levels will be our major concern through the life of the crop.

Feeding is done with a 1:200 double inlet Smith Injector, and we try to keep the program as simple as possible. From about March 1 to mid-September, plants are watered in and fed with 200 ppm of 20-20-20 until the end of long days, i.e. about 14-21 days. From then on the crop is fed with a combination of ammonium and potassium nitrate to provide around 225 ppm each of nitrogen and potassium. When the bud sheath is cracking and colour just beginning to show, the crop receives one or two feedings with potassium nitrate only, providing approximately 125 ppm of nitrogen and 450 ppm of potassium. From then on to finish, only clear water is used, at a fairly heavy rate in order to lower salt levels in preparation for planting the next crop.

The winter feeding program begins about mid-September. That may seem early but it really isn't. By that time, light intensities have decreased as has watering frequency, so we move up to 300 ppm of 20-20-20 right from the day cuttings are planted through the long day treatment (approx. 21-28 days.) Then we switch to a combination of calcium and

potassium nitrate to provide approximately 400 ppm of nitrogen and 325 ppm of potassium. These levels may seem high, but when you remember that we have only about 50 days from "lights out" to disbud, and that our feeding/watering frequency is only every 10-14 days, we can only get 4-5 feedings on a crop. If we happen to have a prolonged period of dull, overcast weather and the media is drying out even more slowly, our watering frequency may even exceed 14 days. When this happens, we feed at up to 500 ppm nitrogen. Let me emphasize, again, we are talking about what we have found we are able to do on Westbrook's sandy loam soil that drains freely and does not retain nutrients the way a heavier, clay loam would. Also remember that we are talking about the feeding of crops grown under double poly. Light intensity, humidity, and the watering/feeding frequency for the same crop grown under glass will be another ball game.

### Lighting

The winter of 1979-80, with the Mefo varieties flowering from about December 1 through to mid-March, we returned to a practice that was common years ago when the Mefo varieties were first introduced. This practice is known as interrupted lighting to increase flower petalage. Working with full houses on one schedule with independent light/shading controls, this is fairly easy for us to do without adversely affecting adjacent plantings. However, it does become much more difficult in houses containing several plantings at different stages of growth. For anyone who is interested, you simply determine your "lights out" date on a regular schedule, count back 12 days from that date, then give 9 "short days" followed by 12 days with "lights on," then short days to finish. Total crop time is in no way altered. We are satisfied that we have significantly improved the quality of our Mefos.

### Production

We plant 10 cuttings across on a 48" bed, using 6" x 6" wire mesh. We position two cuttings in each of the outside slots but only one cutting in each of the six inside slots. This gives the inside rows a better chance with a full 6" x 6" spacing, while the double outside rows have the benefit of better light and can afford to be spaced a little closer. The same spacing is used year-round. We did try going to only 8 plants across for mid-winter flowerings, thus giving a full 6" x 6" spacing to all cuttings, but this represented a 20% drop in the number of stems from each bench. Any benefit we achieved was not sufficient to off-set that loss. The one bed of spray varieties is grown on the same spacing as the standards during November through March flowerings. Then it is closed up to 12 plants across, or 4" x 6" spacing, for the balance of the year.

From planting date through the first 14-21 days, water and fertilizer is applied through overhead spray lines. From then until finish, all watering and feeding is through the Gro-

hose lines. During the first 10-14 days after "lights out," and especially with winter crops, water is withheld somewhat to run the crop slightly on the dry side, promoting faster bud initiation. From then on, water is applied as required, applying at least one-half gallon per square foot at each watering.

Flowering full houses on a single schedule certainly eases the attempt to provide optimum temperatures for each phase of the crop's growth. Fall and mid-winter control, particularly in plastic houses, is the most difficult. The most common error is in running temperatures (both day and night) too high relative to the daylight intensities at the time, causing plants to burn up carbohydrate reserves faster than they can be produced. Hollow stems are believed to be one result of such a condition. We attempt to hold cloudy day temperatures in fall and winter at, or very near, minimum night temperatures. From October through early spring, supplementary CO<sub>2</sub> is provided at 1,000 - 1,500 ppm.

I'd like to make just a couple of comments on the handling of the Nob Hill varieties during the summer. From the time we begin flowering these varieties at Mother's Day through to early September, we suspend a cover of Remay shade cloth about 5 feet above the crop, providing about 50% light reduction from the time the buds are breaking to finish. This eliminates sun scald and in turn greatly reduces the risk of botrytis infection in the petals. One other thing we are very careful to do throughout the period of handling the Nob Hill varieties is to spray them with B-9 at 1,250 ppm just a few days prior to disbudding. This eliminates the neck stretch so commonly seen in these varieties and brings the flower head right down to the first leaf. It also greatly strengthens the stem just below the flower. The variety Blaze in the fall flowering program benefits from a B-9 treatment in the same way.

Our insect and disease control program is strictly one of prevention, trying never to allow an insect infestation or disease problem get a start. Perhaps the best indication of just how well it works is the fact that we have never had a problem with leaf-miner, the scourge of so many greenhouse mum operations today. The program involves a consistent weekly spray, year-round, with a wide spectrum of materials. We alternate these materials to prevent a build-up of resistance. Among the materials and combinations used are the following: a combination of Benlate and Pentac for botrytis and spider control; a once a month application of Ambush along with either Pentac or Orthene for control of leaf-miner, spider, aphids, white flies, worms and caterpillars; a spray of Kelthane once only in the life of a crop for extra spider protection; a spray of Diazinon alone and once in the life of a crop for such insects as aphids, scale and mealy bugs; in the summer months, for leaf-miner; and we've found Rovral applied once or twice just at the finish of the Nob Hills in summer gives excellent protection against botrytis.

We've tried several different methods of packaging and handling standards and have

settled on the simple pom sleeve as the best, with three or four standards, depending on their size. They are sleeved as soon as they are cut out of the bed and are placed into containers with water and preservative immediately. They are allowed to condition overnight before being packed for shipping and are never refrigerated. Approximately 60% of our production is sold directly to retailers serviced by our daily truck runs in southern Ontario, with the balance being shipped to wholesalers.

As I said, I've been mixed up with mums in one way or another for quite a few years now and hope to be for many more. Certainly it is just as exciting a subject today as it was the day I began, and as long as our industry is fortunate enough to have the tremendous research and breeding programs of firms like Yoder Brothers and Pan-American Plant Co., it will never become a boring subject. Just when you think you've got a variety sorted out — you know its response, its best season for growing, its strengths and weaknesses — along comes a new and exciting variety that offers you the solution to all those problems with the old variety, and away we go again.

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