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HARDY CHRYSANTHEMUMS FOR IDAHO

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Hardy Chrysanthemums for Idaho

by William H. Snyder

Hardy garden chrysanthemums will give Idaho gardeners the best answer to the problem of maintaining a sequence of flower color at a time when garden annuals and most perennials have completed bloom.

Gardeners who grow garden chrysanthemums find that many of the varieties either bloom too late in the fall or lack winter hardiness. Some which bloom early enough are so tender they will not live through an average winter. Still others grow year after year but never bloom before cold weather.

The program to evaluate hardy garden chrysanthemums for Idaho conditions was started in 1957 with two primary objectives in mind: 1) to ascertain the color range and floral characteristics of varieties suitable for growing in the area; 2) to determine the winter hardiness of such varieties. Since the project was started, nearly 500 varieties obtained from commercial hybridizers and growers and from the various experimental stations within the United States have been tested at Moscow.

Many of the varieties tested were typical of older and unadapted sorts. They bloomed late or were not winter hardy. Nearly two-thirds of the varieties appear to be sufficiently well adapted to grow thriftily, to bloom early enough to provide garden color before frost and to be winter hardy.

Information concerning bloom dates, flower color, plant size, general performance and winter hardiness is listed in the tables in this bulletin.

THE CHRYSANTHEMUM SEASON

Observations of chrysanthemums at Moscow lead to the general recommendation that varieties be chosen which will bloom between September 1 and October 10. A few varieties of excellent color and growth have bloomed as early as mid-July. Under local climatic conditions, however, the flowers of these earliest varieties have consistently shown a distinct petal "burning," evidenced as a drying, browning and withering of the petals, and a general weak coloration of the flowers. The later-developing flowers of these varieties

and others which come into bloom after September 1 show none of these symptoms which are thought to be induced by the summer heat, high light intensity or a combination of these factors. There was no observable difference among early-blooming varieties in their response to petal "burning." Neither does the "burning" seem to be related to soil moisture, because all varieties were amply watered throughout the growing season.

October 10 is the latest date, on the average, that chrysanthemums can be expected to bloom satisfactorily in the Moscow area. If the variety does not come into full bloom before this date, it has little value for home garden use. Closed or partially opened flower buds on the plant are more cold and frost tolerant than full-blown flowers, however. Thus, the period of bloom may be extended during a warm autumn spell which follows cold weather, even though the earliest flowers on the plant have been damaged by frost. Some varieties are more resistant to early frost than others. Damage is less obvious on dark-colored flowers than on yellow, pink or white ones.

The location of mum plantings has much to do with prolonging the season of color. Plantings at the horticultural test site have been damaged by frost as much as a month earlier than the same varieties located on the campus proper. The latter plants were at an elevation 85 feet higher and were protected by tall trees and buildings. Apparently because of the same temperature influences, the identical varieties located at the higher elevation bloomed as much as two weeks ahead of plantings at the test site. These facts indicate the marked influence of microclimate on the growth and bloom of these plants and the necessity to choose carefully the location which accommodates them best. Good atmospheric drainage is of utmost importance in growing chrysanthemums.

PROPAGATING GARDEN MUMS

Yearly resetting of chrysanthemums is necessary to sustain healthy growth of plants and timely production of full-sized, colorful flowers. The following are advantages which result from annual renewal of the plants:

1. **Re-set plants do not grow as large and rank as those left undivided (1).** Growth is checked by the division process. The lower, medium-height and more compact types are ideal for garden display. While the character for height and form is genetically fixed, the practices of yearly division and pinching of shoots several times before mid-July result in shorter, denser and generally more desirable plants. Plants which are grown from cuttings or divisions and set in open from mid-April through the end of May do not have as long a time to grow before forming flower buds as the plants which are left in the ground without resetting. Cutting propagation is preferred to division of field clumps because the latter often fail to branch properly and they lose their lower leaves.

2. Flowers cut from newly established plants are larger, of firmer substance and longer lasting than those from old plants (2).

3. Greater plant vigor is maintained. Reestablishing the mum planting each year allows the gardener to improve the soil by adding organic matter and fertilizers. Flower production soon becomes scant and of poor quality on old clumps where the matting of underground stems (rhizomes) leads to competition for nutrients and impoverishment of the soil. If complete reestablishment from cuttings can not be done each spring, it is beneficial to loosen the clumps in the ground by cutting around them with a spade.

Types of cuttings

Reestablishment involves use of two types of vegetative cuttings. The first, a "dutch cutting," is a 3- to 6-inch length of the rooted rhizome which is broken or cut off the old clump after digging (Figure 1). This is a quick, practical method of propagation for the home gardener who has no facilities to root stem cuttings. Numerous dutch cuttings may be cut from an old clump. The usual method is to reset these directly in the newly prepared bed early in the spring.

The second and more common method of propagation is by stem cuttings. These may best be made in the spring from established plants or from stock plants wintered indoors in flats or pots.

Making cuttings

Varieties not fully winter hardy but valuable for garden display should be dug in the late fall, potted and held in a cool basement, root cellar or coldframe over the winter. In early March bring the plants into a warm, sunny area and force growth by more copious watering and biweekly applications of fertilizer.

Cuttings are made from actively developing shoots when they are about 3 inches long. Take the shoots from stems which are



Figure 1. These are "dutch cuttings," a length of rooted rhizome which is cut off the old clump after digging.

succulent and which "snap" clean when bent. Cuttings made from fibrous, woody stems are not desirable because root production is usually sparse and resulting plants are inferior. The quickest and heaviest rooting occurs in a clean, coarse sand which is kept moist at all times, but not saturated.

After taking the stem from the stock plant with a clean cut just beneath a leaf node, remove the foliage from the bottom half of the cutting. Since chrysanthemums root with relative ease, treating the base of the cutting with a low concentration of any commercial root-inducing agent is ample. Then place the cutting in sand. Insert the base of the cutting into clean sand to a depth of 1½ inches and tamp the sand lightly but firmly about the cutting.

Propagation studies with these plants indicate that some varieties do not root as quickly nor as heavily as others but sufficient root development should occur within 2 to 4 weeks. When roots are ½-inch long, pot the cuttings in light, sandy soil. Set them outside when the weather is warm and settled. After mid-May or the first of June, cuttings that are fully rooted may be planted directly outdoors provided they are protected from winds and from low night temperatures for a week or two. These cuttings will provide plants of shorter, more compact growth, but the blooms will be equal in size and quality to those of earlier propagated plants.



Figure 2. Stock plant of chrysanthemums in March after lighting to prevent bud formation. Plants like these provide excellent material for cuttings to be made indoors during late winter.



Figure 3. Use a sharp knife or razor blade to make tip cuttings 3" to 4" long.

Figure 4. Remove only enough leaves from the base of the cutting so that it may be inserted about 1" deep in the sand propagation pot.



Figure 5. An easily constructed propagation pot. Use a 6 or 8 inch clay pot; fill with clean, sharp sand. Bent wires support polyethylene bag placed over the cuttings to prevent moisture loss from the leaves during rooting.



Figure 6. Insert prepared cuttings into the sand about 1" deep using a dibble stick. Firm lightly.





Figure 7. Place the polyethylene bag over the cuttings. Fit the bottom of the bag tightly around the pot to retain moisture in the atmosphere surrounding the cuttings.



Figure 8. An occasional watering may be necessary during the 2 or 3 week rooting period. Open the bottom of the enclosure occasionally if too much moisture accumulates under the bag. Too moist an atmosphere causes leaves to rot and this impedes rooting.

Lighting stock plants

The chrysanthemum is called a short-day plant. This means that it will set flower buds when exposed to 12 hours or less of daylight, on the average.

To propagate from stock plants indoors, give the plants supplemental light from a fluorescent tube or an incandescent bulb during the period cuttings are being taken. This will maintain the stocks in a prime, vegetative condition suitable for making cuttings. If light is not supplemented, especially during the early period of forcing in February or March, the natural day length may still be short enough to induce flower bud formation. Stems on which flower buds have been formed do not make good cutting material.

A rule of thumb which is helpful to remember is that flower buds will not form if periods of uninterrupted darkness are no longer than 7 hours. Light for the stock plants should be supplemented near the middle of the night to break the total dark period into 2 parts, neither longer than about 7 hours (2).

A single low wattage lamp suspended 4 feet above the stock plants and controlled by an automatic, timed light switch is adequate to prevent flower bud formation. One should figure about $1\frac{1}{2}$ watts of light for each square foot of plant surface lighted.

Forcing cuttings outdoors: the cloche house

Work at the University of Idaho provides a method for forcing field-established chrysanthemums into growth late in the winter so cuttings may be taken. This procedure is interesting for the home gardener and may be practical for the commercial florist and nurseryman as well. In 1958 several rectangular cloche houses measuring 4 feet long, 3 feet wide and 2 feet high were constructed of 1 x 1-inch lumber and covered with 6 mil clear polyethylene plastic. Ventilation was provided so that temperatures beneath the cover on bright, sunny days would not be excessive. These units were placed over dormant chrysanthemum clumps at the test site in early March and left in place through mid-April. Daily temperatures recorded within the cloche showed an average increase of from 10 to 15 degrees over the air temperature in the open. There was a slight, progressive, cumulative increase from day to day in soil temperature during the period.

After three weeks, growth of plants beneath the cloche was considerably advanced over those in the open. The stems of plants growing under the cover were longer, greater in diameter and more fleshy and the length of internodes on the stem was greater. The leaves of these plants were larger and more succulent, but their green color was not as intense as that of the plants in the open, apparently due to the increased respiration rate brought about by higher temperatures under the cloche.

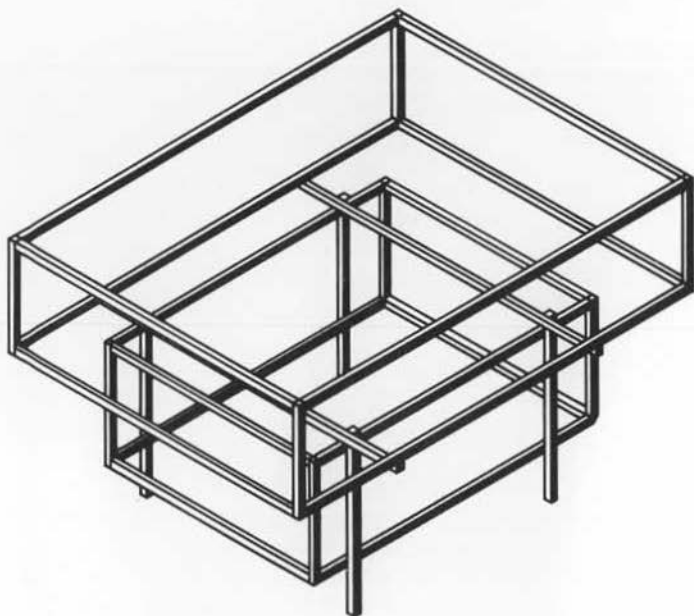


Figure 9. Diagrammatic outline of cloche house used to field-force stock plants for cuttings. The frame is constructed with 1-inch lumber and covered with clear polyethylene plastic. Storm window material which has mesh imbedded between layers of cellophane also works well. Dimensions of the cloche house may be altered to suit your needs. Most important elements are trapping heat and allowing for ventilation. The inner, lower frame is 2 x 3 x 1½ feet in this drawing. Only the sides are covered with plastic. Vertical stakes attached to this frame are pushed into the ground and soil is mounded around the base and against the plastic to prevent wind damage. The upper unit—3 x 4 x 1 here—is supported on horizontal crosspieces. Top and sides are covered with plastic. This unit extends 6 inches wider than the lower frame to allow for ventilation.

Cuttings were made without hormone treatment from both groups of plants five weeks after the experiment was begun. The average length of stems on plants growing in the open was 2 inches: those on the cloche-grown plants was 8 inches. Cuttings taken from the cloche-house plants rooted more quickly and heavily than those from open-grown plants. The rooted cuttings were potted and would have made fine, salable material anytime after May 1. This method of field propagation has been used by several of the larger commercial propagators in the United States. However, the method is not now generally used for large-scale production because of the possibility of carrying disease and insects from field-grown plants into the propagation greenhouse.

Considering such a method of propagation for the home gardener, the benefit derived from a cloche house like the one used here may be obtained from large hotcaps or similar devices set over field clumps to entrap the heat of the sun.

GARDEN CULTURE OF CHRYSANTHEMUMS

Selecting the ideal site

One of the greatest problems for the grower of garden chrysanthemums is over-wintering the plants. Good cultural techniques tested at the University will help assure good plant survival. Many good varieties which are not inherently hardy can often be brought through a severe winter simply by proper site selection and good culture.

Chrysanthemums will thrive and winter over only on a well-drained soil. Addition of organic matter or sand may improve surface drainage, but the real problem may involve poor subsoil drainage. An east or south, gently sloping site helps remove surface water and is generally drier and warmer.

Deep plowing before planting may loosen the subsoil so that accumulating water can move downward, away from the shallow "root mat" of the mum plants.

Failure of the soil to drain well is not so much a problem in southern Idaho. But in the north, heavy loss of plants has been observed after an average winter. These losses may be caused by saturation and water logging of the heavy soils and the resultant killing of tender roots on the subsurface rhizomes. Even though established clumps of chrysanthemums appear in good condition in March or April, they often languish and die because the damaged roots cannot supply moisture and nutrients to the plant when warmer weather favors active growth.

Soils and fertilization

Like most garden perennials, chrysanthemums are easy to grow. Average garden soil which will produce good vegetables will grow fine chrysanthemums. Chrysanthemums always grow best on soils which have high organic matter and are just below the neutral point on the pH scale. Application of well-decayed barnyard manure, peat moss or other sources of humus to the soil each fall or early spring is a good practice. Although low in actual nutrient content, organic matter increases tilth, water percolation and the general physical character in a way that non-organic materials cannot do.

In Idaho, if any nutrient is lacking in the soil, it is likely to be nitrogen. Usually, phosphorus and potassium are ample to sustain good vegetative growth and a fine set of flowers. The keeping quality of flowers cut from plants growing on poor soils is not as good as those cut from well fertilized plants (3).

If a soil test shows the soil is low in nitrogen, apply ammonium sulfate at the rate of 1 pound per 100 square feet. If the soil tests low for nitrogen, phosphorus and potassium, then apply a

balanced, complete fertilizer such as a 5-10-5 at the rate of 3½ pounds per square foot. These are best applied when the garden is prepared in the spring. They should be thoroughly incorporated into the soil with the organic matter to a depth of 6 inches. A second application of fertilizer not later than mid-July is recommended, but do not apply nitrogen fertilizer later than this. It is likely to stall the formation and development of flower buds.

Plant pinching

Pinching means removing the terminal growing point from each shoot on the clump. Pinching causes the lateral buds to develop as side branches, resulting in bushier, lower, more compact plants. Pinching also results in more flowers of somewhat reduced size, which is desirable for mass garden display. For home gardeners who want low, compact plants, selection of short varieties and the practice of pinching are recommended.

If plants have been set out in late April or early May, they can be pinched once a month later. Occasionally a second pinch can be made if plants are thrifty and growing well. In north Idaho, however, plants should never be pinched later than early to mid-July.

Irrigation and mulching

Chrysanthemums are gross feeders and heavy users of water. Generous application of organic matter will help to insure a favorable soil and moisture environment. It is especially important not to let young, newly set plants dry out. After the plants are established and growing well, they require less frequent watering.

Heavy irrigation is self-defeating in a way, because plants so handled become leggy, rank and weak. Plants which have been properly pinched to induce branchiness become tall and rank from excessive application of water.

There has been a desirable response to light summer mulches on mums in these trials. This is because the shallow root system may dry out quickly. Mulches of crushed bark, sawdust or clean straw conserve soil moisture and impede weed seed germination in the garden.

Staking and tying

No attempt has been made in the Idaho mum trials to support plants with stakes. Although the test site was subject to occasional gusts of wind in the summer and autumn, few of the varieties required support. Several heavily flowered varieties did break down from the weight of the flowers.

Mum plants grown in public parks and display grounds are usually staked and tied. The method is useful when support is nec-

essary. Wooden or metal rods or bamboo stakes $\frac{3}{8}$ inch in diameter and 4 to 5 feet long are driven into the soil at the center of each clump. Soft cotton string is tied to the stake, held horizontally and looped around a stem, then tied again to the stake before supporting another major branch. Each branch has its own supporting loop from the stake. It is not satisfactory to bunch stems together and tie in to the stake with a single string. In place of string, $\frac{1}{2}$ -inch strips of cotton cloth may be used or paper-wire twists are useful. Green colored tying material is valuable because it is not conspicuous.

Disease and insect control*

Idaho garden mum growers are commonly troubled by infestations of thrips and spittle bugs. Both of these are easily controlled by using malathion 25% wettable powder, 1 level tablespoon in 1 gallon of water, or Cygon, 1 tablespoon in 2 gallons of water. Occasional aphid infestations can also be controlled by using these chemicals at the prescribed rate.

No foliage diseases have been encountered as a result of overhead irrigation.

TUB GROWING

Chrysanthemums are among the finest and most showy plants for display in tubs and boxes on the patio or for temporary indoor display in the fall.

One method of handling is to plant rooted cuttings in the containers in which they will be grown and flowered. The soil for these containers should be loose, friable, loamy and fertile. Careful watering is essential. The plants should be well budded and showing color before they are moved indoors.

Another method is to grow chrysanthemum clumps in the garden until late summer. Then lift these with a generous ball of earth and transplant them into large pots, tubs or boxes. This manner of handling is highly successful. The transplanted clumps need enough water to prevent drying out. Excessive drying will cause the leaves to yellow and drop and undeveloped flower buds to stall.

After flowering, tubbed plants may be removed from the containers and set back in the ground. They may be grown indoors as stock for the next year's cuttings or left in the container and set outdoors over winter on the north side of the house or in another location where they will not become too dry. Hard freezing does not hurt the rhizomes if there is an ample volume of well-drained, moist soil.

*These recommendations are based upon current information. In all use of pesticide materials, gardeners should carefully follow instructions on the labels. Read and follow the label completely each time a material is used.

PREPARING FOR WINTER

Greatest winter damage to mums is injury to the roots caused by frost heaving. Much of this heaving occurs in late winter. Rain and snow and alternate freezing and thawing of the soil exert a prying action on the tender roots.

The following are cultural practices which have proven beneficial in wintering chrysanthemums at the test site:

1. **The bushy tops may be left on plants over the winter.** These shade the crowns from the warmth of the sun and help to drift snow among the plants. Natural snow mulch is hard to improve upon. Dead tops harbor none of the insect pests and may be cut off at the ground in early spring clean up.

2. **Apply a mulch of coarse hay, weed-free straw, oak leaves, pine needles or coarsely crushed bark.** Any material which does not pack down and become soggy, thus excluding air from the soil and roots, is recommended.

Do not apply any mulch until late in February and March. Putting on the mulch early in the fall prevents the plants from "hardening off", the process whereby they become resistant to cold. "Hardening off" cannot occur except when the plants are given full light and subjected to the increasingly cold temperatures of approaching winter.

3. **Prized varieties which notably lack winter hardiness** (Golden Sunset, Gold Button, Michigan, Aglow, Caprice, Flamboyant, New Marjorie Mills, Charm Spoon, Time, Lady's Choice, Mrs. Dupont, Mischief, Cecelia, Limelight, Silver Ball) can be dug with a ball of earth and stored over winter in a cold frame. Place the plants on the ground and cover with 6 or 8 inches of coarse straw, then with tar paper or polyethylene to shed water. Rhizome clumps can be stored in a basement window well several layers deep, each layer separated by 6 inches of straw and finally a 6-8-inch layer of straw over the top.

Some wintering success has been noted when fall-dug clumps were set on the surface of the ground in a shaded area where the air temperature is constantly cold. This method deserves wider trial and may be of interest to the gardener who has an extra clump or two with which to experiment. One Idaho gardener who grows mums on heavy wet soil discarded the less desirable varieties over the backyard fence one fall, leaving the better roots in the ground. The next spring, the discards were all alive and those left in the ground had winter killed. Examples such as this and cultural practices which have been found to favor drainage substantiate the chrysanthemum's need for a well-drained growing medium.

CLASSIFYING FLOWER TYPES

The National Chrysanthemum Society system has been used to classify flower types (1). Every chrysanthemum flower consists of disk flowers, which are the generally showy yellow "center" of the flower, and the ray flowers, commonly called petals. In some flower types, the disk is conspicuous. In others it is partially or totally concealed by the overlapping ray petals. Nine of the 15 N.C.S. types are represented in the University of Idaho mum collection. They are:

Section 1. Disk conspicuous



Class 1. Single
Daisy-type mums.



Class 2. Semidouble
These varieties have many rows of ray petals with the disk apparent in fully opened bloom.

Class 3. Regular Anemone
These are similar to the singles with a greatly enlarged central disk and regularly arranged ray petals.



Section II. Ray petals incurved with disk apparent or concealed

Class 5. Pompon

Small globular blooms. Ray florets are short, broad and typically incurved to form a globular bloom. Smaller blooms are often flattened and button like.



- a) Small—1½ inch or less diameter
- b) Intermediate—1½ inch to 2½ inch diameter
- c) Large—2½ inch to 4 inch diameter

Fully 1/3 of the varieties evaluated are of this flower type. Flower sizes are given in the variety lists.

Class 6. Regular or Chinese Incurve

The disk is hidden as in class 5. Strap petals longer than class 5 but broader in proportion to their length, incurved and overlapping smoothly and regularly. Bloom is globular when fully developed.

- a) Small—4 inch to 6 inch diameter
- b) Large—6 inch and greater diameter

Only 3 percent of the varieties grown were of this type. Flower sizes are given in the variety lists.



Section III. Ray petals reflexed

Class 8. Reflexed or Decorative

All the characteristics of Class 5 except that the ray petals are reflexed (turned out), not incurved.

Subdivisions for size are the same as for Class 5.

About half of all the varieties tested are of this flower type.



Class 9. Decorative or Aster-Flowered Reflexes

The varieties are similar to those in Class 8 except that the ray petals are longer and narrower in proportion to their length. Blooms are generally flatter than those in Class 8. Flower width may be 2 or 3 times the depth, but the disk is not revealed.

Classes 8 and 9 are easily confused because there is no clear line of demarcation, the differences being slight.



Class 12. Spoon—single

These are similar to the single flowers in class 1 except that the ray florets are tubular with a flattened spoonlike tip.

Only 6 percent of the varieties tested were of this type.





Class 12A. Semidouble and Double Spoon

Same characteristics as Class 12, except greater number of rows of petals and the disk may or may not be apparent. One percent of the varieties had this type of flower.



Class 13. Quill

Ray petals are long and tubular with the tips often spoonlike, but they may be closed to the tip and slightly curved.

About 2 percent of varieties tested fall into this category.

FLOWER COLOR CATEGORIES

Most chrysanthemum lists group the flowers into rather general, all-inclusive color categories. Part of the effort of this project was directed to a more critical evaluation and description. The use of color "standards" did not prove too useful because pure color hues and tints or tones and shades of these do not match to "standard" color chips. Many of the newer, popular varieties represent blends of two hues and some of these are considerably grayed or muted.

The primary grouping of all varieties in Table 1 is based on color. In place of the usual "pink" classification, for example, varieties are more finely graded into lavender and "true-pink" groups. In place of the general "yellow" color class, categories such as golden-yellow, lemon-yellow, orange-yellow and canary-yellow have been devised.

In addition to the more specific color headings provided in this work, individual color notations are given for each variety, thus making it easier for the critical gardener, the professional horticulturist and landscape architect to select exactly the color of plant which they wish to use in a particular landscape effect.

GROWTH HABITS

Details are given concerning the form or shape of plants. Considerable variation of form occurs. Low growing varieties are generally rounded and compact. Medium height plants are more variable. Some are erect and not broad spreading, slightly rounded or flat-topped.

Tall varieties are generally quite ascending and narrow crowned, often round or flat topped. These varieties are the best ones for cutting. Stems are generally tough and wiry and longer than those of the medium and low varieties.

Leaf color is correlated, to a degree, with flower color. Plants which produce light colored flowers generally have lighter green leaves than the deep-red flowered varieties.

VARIETY SELECTION

Referring to the general performance rating, varieties given a number "1" or "2" are best for home garden use. Varieties designated "3" are not recommended.

A hardiness rating of 1, "fully hardy", indicates that the variety can be expected to survive winters without special precautions being taken. Those with a rating of 2, "moderately hardy", should be given winter protection and probably will not survive without it. Varieties in category 3, "lacking hardiness," might be grown successfully if every effort is made to give them winter protection and if they are handled according to recommendations set forth in the section, **Preparing for Winter**. Many of the finest varieties have not been fully hardy in these trials but these are often worth the effort required to get them through the winter.

Table 1. Hardiness and general characteristics of garden chrysanthemums at University of Idaho test site, Moscow, Idaho.

Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
Golden yellow						
Golden Cushion	10/10	2	2	2	2½	low, compact cushion
Sunburst	10/12		3	2	4	med., round bushy
Golden Wonder	10/15	8	1	1	2	med., bushy
Golden Sunset	10/15	8	3	1	3½	med., round bushy, copper
Hilite	10/15	8	1	1	3½	tall, compact bushy
Honey Comb	10/15	5	2	2	1½	med., round bushy, red gold
Pomponette	10/15	5	2	2	2½	med., round bushy, red gold
Treasure	10/15	5	1		2	tall, bushy, red center
Early Gold	9/14	5	2	2	1½	low, compact, round cushion
Gold Button	9/14	5	3	1	1	med., compact round, reddish center
Butterscotch	9/30	8	3	2	3½	tall, round, opens bronze
Delight	9/30	5	2	1	2½	tall, round bushy
Golden Age	9/25	8	3		3	med., round
Newton	9/30	13	3	2	3½	tall, round bushy
Polaris	10/5	1	1	2	2½	golden buff
Defiance	10/10	8	2	2	2	tall, round bushy
Lemon yellow						
September Sunshine	9/10	1	2	1	1½	med., round compact, bright
Tranquility	9/15	8	2	1	2½	med., round open, light
Sundance	9/16	8	1	2	3½	tall, round
Yellow Blanket	9/25	5	2	2	1	med., round, bright
Charles Nye	9/30	5	2	2	3	tall, round bushy, deep
Pathfinder	9/30	8	2	2	2½	med., strong compact
September Gold	9/30	8	2	1		low, cushion
Yellow Avalanche	9/30	8	2	1	3½	med., bushy, light
Yellow Chris. Columbus	9/30	8	2	1	2½	med., round bushy, bright

Chiquita	10/1	5	2	1	1	med., round bushy, deep
Spode	10/8	5	2	2	2½	med., round bushy
Yellow Supreme	10/15	5	2	1	1½	med., compact cushion, bright
Yellow						
Glendale	9/21	5	2	3	1½	low, mound cushion, bright
Bantam Yellow	9/25	5	2	2	3	tall, round cushion
Moonlight	9/25	5	2	1	2½	tall, round bushy, bright
Yellow Avalanche	10/1	8	2	2	2	med., round bushy, light
Roulette	10/10	8	3	2	3½	med., round bushy, bright
Sweepstake	10/10	5	1	1	1½	tall, round bushy
Michigan	10/15	8	3	1	2½	tall, upright open
Sunstone	10/15	12A	2	1	3	tall, bushy, light
Sulphur	10/20	12A	1	2	3	tall, bushy, light
Orange yellow						
Aglow	9/15	5	3	1	2½	med., unusual orange yellow
Muriel Rice	10/10	8	3	2	3½	med., round bushy, buttercup to orange
Canary yellow						
Genista	9/15	8	2	2	2	med., round
Wychwood	9/16	5	2	1	2	med., round
Marie	9/16	8	8		2½	low, round
Yellow (misc. color values)						
Lee Powell	9/25	9	2	1	3½	tall, round, Chinese yellow
Reverence	9/5	8	2	2	2	med., round, chamois
Golden Hours	9/16	5	2	1	2½	tall, open round, chrome

1. National Chrysanthemum Society Classification. See pages 15 to 19.

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4. Height scale: low—12 inches or less; medium—13 to 20 inches; tall—21 inches or more.



Figure 10. Four yellow-hued chrysanthemums: Left—Reverence (top) and Companion. Right—Gold Button and Early Gold.

Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
Bronze						
Mojave Gold	9/26	8	3		2½	low, golden bronze
Early Bronze	9/30	5	2		1½	med., bushy, orange
Harbinger	9/30	8	1	1	2½	tall, golden
Orsona	9/30	5	2	1	2½	med., bushy, reddish
Amber Bright	10/1	5	2		4½	tall, upright open
Tecumseh	10/8	8	3	1	2	med., compact cushion, buff
Cardinal	10/10	12		2	3½	tall, compact, red, yellow center
Early Kathleen	10/10	8	2	2	2	tall, bushy, copper bronze
September Bronze	10/10	5		1	1½	med., compact mound, gold
Flamboyant	8/25	8	3	1	2	med., open, orange
George Luxton	9/12	8	1	1	2	med., bushy, light
Football Bronze	9/15	7	3	2	2	med., open bushy, buff
Bronze Queen	9/20	5	2	1	2½	low, cushion, copper
Sunapee	9/23	5		2	2	med.-tall, bushy, light
Champion Cushion	9/25	8	1	1	2½	med., round bushy, dark
Companion	9/25	8		2	3	tall, bushy, golden
Elite Cushion	9/25	8		1	2	med., compact, salmon
Holiday	9/25	8	2	2	3	med., bushy, golden
Plainsman	9/25	8	2	1	2	med., orange bronze
Toronto	10/10	5	2	1	2½	tall, bushy, luminous
Amber Bright	10/15	6	3	2	4½	tall, bushy, orange
Bronze Giant	10/15	8	3	3	3½	tall, bushy

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4. Height scale: low—12 inches or less; medium—13 to 20 inches; tall—21 inches or more.

Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
Bronze (Cont.)						
Bronze Wonder	10/15	5	1	1	2	med., compact bushy, golden
Crowning Glory	10/15				2½	tall, bushy, coral
Kathleen Lehman	10/15	8	1	1	2½	tall, bushy, golden
Marionette	10/15		2	1	2	med., red
Tangerine	10/15	5	2	2	2½	tall, bushy, rust
Mona	10/20	5		1	2½	tall, bushy, rust
Orange						
W. P. Snyder	10/10	5	1	1	2½	med., bushy, apricot
Red						
Troubadour	10/15			2	2	tall, bushy, rose crimson
Early Crimson	10/20	8	1	1	2½	med., crimson
September Cheer	10/5	1	1	2	2	med., bushy, cherry
Aristocrat	10/10	8	3	3	2½	med., bushy, wine
Dark Knight	10/10	9	3	2	3	tall, bushy, ruby to maroon
Gladiator	10/10	8		2	2½	tall, open bushy, orange
Red Gold	10/10	5		3	2	med., open spreading, red and gold
Scarlet Crimson	10/10	8	2	2	2½	bushy, bright with yellow center
Radiance	10/15	8	2	1	2	med., compact bushy, dark
Rajah	10/15	1	3	2		tall, bronze
Sam Williston	10/15	8	1	1	2½	med., bushy, deep with yellow center
Tribute	10/15	8	2	2	2½	med., compact cushion, bright
Apache	9/15	9	1	1	2½	med., bushy, red and gold
Autumn Beauty	9/15	8	1	1	2½	tall, chestnut red

September Cheer	9/15	1	2	1	1 $\frac{3}{4}$	med., cushion, cherry
New Marjorie Mills	9/22	5	3	1	3	med., bushy, ruby
Commander Cushion	9/25	8	2	2	2	med., compact
Glow Worm	9/30	2	1	1	2	med., compact bushy, dark to orange
Rouge Cushion	9/30	1	1	2	2	med., bushy, yellow center
Courageous	10/1	8	2	2		tall, upright, dark ruby
Dark Red Gold	10/1	5	3	2	2 $\frac{1}{2}$	tall, bushy, dark red and gold
Red Cloud	10/1		2	1	2 $\frac{1}{2}$	med., bushy compact
Burgundy	10/5	5	2	1	2	med., bushy upright, wine, slightly yellow tip
Lavender						
Blanche Litwiller	9/9	5	1		2	med., compact, bushy, pink
Cecil Beed	9/14	8	1	1	2	med., bushy, deep
Madame Cadillac	9/20	5	2	2	2 $\frac{1}{2}$	low, compact bushy, raspberry wine
Fascination	9/23	8	1		3	tall, upright
Nye's Favorite	9/28	2	2	2	1 $\frac{1}{2}$	med., round compact
Stylish	9/28		3	2	3 $\frac{1}{2}$	med., bushy, "old rose"
Orchid Helen	9/30	8	2		2 $\frac{1}{2}$	tall, round bushy, orchid
Rosita	9/30	5	1	2	1 $\frac{1}{2}$	tall, broad round, rose
Charm Spoon	10/10	12A	3	1	3	tall, round bushy, deep rose, yellow center
Gammy	10/10	5	2	1	2	med., compact mound, rose
Gladness	10/10	5	2	2	2	med., open round, China rose
Old Lavender	10/10	9	2		3	tall, round bushy, bright

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Figure 11. Four colorful varieties: Left—Edna (top) and Flamboyant. Right—Twinkle and Amelia.

Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
Lavender (cont.)						
Orchid Spoon	10/10	12A	2	1	3	tall, round bushy, orchid
Reflection	10/10	9	2	1	3	med., round bushy, rosy
Wenonah	10/10	5	2	1	2	med., round bushy, soft
Spellbound	10/12	5	3	2	2½	med., round bushy
Autumn Song	10/15	9	2	2	2½	tall, round bushy, wine rose
Dr. Longley	10/15	8	2	1	2½	compact
Tiffany Rose	10/15	1	2	2	3	tall, round bushy, deep rose, yellow center
Masquerade	10/20	5	2	1	2	tall, compact mound, rose
Successor	10/20	9	2	1	2½	med., round bushy, silvery red
Pink						
Violet	8/10	8	2	2	2½	med., bushy, amaranth
Coquette	9/1	8	2	1	2	med., bushy, rosy
Tuneful	9/10	5	2	2	3	tall, upright, rose with darker center
Salmon Precose	9/14		2	2	2½	med., compact, salmon
Tensleep	9/15	8	2	3	2½	med., round, reddish with yellow center
Captain John	9/20	8	3	3	2½	med., broad cushion, lavender
Edna	9/20	5	1	1	1¼	med., compact cushion, lavender, ruby center
Tapestry	9/20	8	2	1	2½	med., round bushy, rose
Pink Quill	9/21	13	2	1	3½	med., round compact, shell

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Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
Pink (cont.)						
Evelyn Devaney	9/25		3	1	3½	med., round, coral
Lady's Choice	9/25	9	3	1	3	tall, round, ivory salmon
Rosa	9/25	8	1	1	1½	low, compact, rose with yellow center
Amelia	9/30	1	2	1	1¾	low, round compact, lavender
Lovliness	9/30	12A	2	1	3	med., round open, carmine
Minnpink	10/1	8	2	1	1½	med., compact cushion, rose
Mayflower	10/3	5	2	2	2½	tall, round bushy, luminous
Mrs. Dupont	10/5	5	3	1	3	low, round, unusual buff
Admiration	10/10	9	2	2	3	med., round compact, salmon fawn
Champagne	10/10	8	2	2	2½	med., round, ivory and shell
Evangeline	10/10	8	3	1	4	tall, round, flesh
Artist's Delight	10/15	8	2	1	3	med., round, coral
Heather Bloom	10/15	8	2	2	3	med., round bushy, heather
Major Cushion	10/15	8	3	2	2	med., round compact, pink and salmon
Petrisian Pink	10/15	8	1	1	2½	med., round, light
Courtier	10/20	5	2	1	3½	very tall, round bushy, lavender
Lavender Lady	10/20	5	2	2	3½	tall, open bushy, lavender
Patricia Lehman	10/20	9	2	1	3½	tall, round, shell
Purple						
Purple Heart	9/9	8	2	2	2½	med., round bushy, deep with silver reverse
Chippewa	9/30	8	1	1	2	tall, open round bushy, bright
Purple	9/30	5	2	1	1½	med., round bushy
Helen Bogue	10/1	8	1	1	3½	med., round bushy, rose

Purple (cont.)

Mischief	10/1	1	3	1	1	med., round bushy, yellow center
Cecelia	10/10	8	3	1	2½	tall, compact mound
Purple Spoon	10/10	12A	2	3	3	med., round bushy, soft, yellow center
Twinkle	10/10	5	2		2½	med., very compact, rose
Purple Cushion	10/15	2	2	2	2	med., compact, yellow center
Purple Waters	10/15	8	2	1	2½	tall, round bushy
Lorenzo	10/20	13	1	2	3	tall, open bushy, dianthus
Mary Harrison	10/20		2	2	4	med., round bushy, bright yellow center
White						
Avalanche	10/12	8	2	2	3½	med., round, cream
Benora	10/15	8	2	2	2	med., compact cushion, yellow
Gardenia	10/15	8	3	3	2	med., round, orange cast
Gloria	10/15	5	2	2	3	med., round, yellow center
Limelight	10/15	8	3	1	3	tall, round, lemon center
Shalimar	10/15	8	3	3	2½	tall, round, cream
White Spoon	10/15	12	3		4	tall, open upright
Polar Ice	10/18	8	2		2	med., compact bushy
Silver Ball	10/20	5	3	1	2½	tall, round

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Variety	Approx. bloom date	N.C.S. class ¹	Hardiness ²	General performance ³	Flower size (inches)	Notes: Height, ⁴ form and color variations
White (cont.)						
Silver Plate	10/20	8	3		2½	tall, round pink tinged
White Bounty	10/20	5	2	3	1½	med., round, cream
Osage	9/5	8	2	3	2½	low, round bushy cushion
Judy	9/9	8	1	2	2½	med., round bushy, cream center
D. D. Ahrens	9/10	8	2	2	2	med., bushy
Dean Kay	9/10	8	1	2	2	med., round spreading, suffused with rose pink
Paper White	9/10	8	2	1	1½	med., compact upright
Christopher Columbus	9/15	8	2	1	2½	tall, round bushy, cream
Granny Lehman	9/20	8	1	2	2	med., round bushy
White Rice	9/20	5	2	1	2	med., round bushy, lemon center
Marshmallow	9/25	2	1	2	2½	med., round bushy
Ostosa	9/25	5	1	2	2½	med., open bushy, paper
Quick Silver	9/25	8	2	2	3	tall, compact bushy, cream
Theresa Stone	9/25	5	3	1	2½	med., round, creamy ivory
White Cloud	9/25	8	1	1	3	tall, round
White Tower	9/25	5	3	2	2	tall, round, ivory

Calcite	9/30	8		2	2½	med., compact cushion, cream
Candlelight	9/30	8	2	2	2	med., round, ivory, yellow center
White Sail	9/30	8	2	1	2½	tall, round, cream center
Crystal Maid	10/7	5		3	2½	med., round, cream
Lyric	10/10	1	2	2	2	med., round, yellow center
Maestro	10/10	5	2	2	2½	med., compact, cream, yellow center
North Star	10/10	1	1	1	2	tall, round
Pepita	10/10	5	3	2	1	med., round, cream center

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⁴ Height scale: low—12 inches or less; medium—13 to 20 inches; tall—21 inches or more.

YEAR AROUND GARDEN MUM SCHEDULE

January

Mulch chrysanthemums in the garden if you haven't already done so.

Check indoor stock plants every 2 weeks. Be sure they are moist but not over-watered.

Check your artificial lighting system to be sure it's in working order.

Send for and look over catalogs of hardy garden mum specialists to select new and recommended varieties. Order early.

February

Bring stock plants for forcing into light and 60 degree temperature later this month. Water generously, fertilize and light at night to have a constant supply of good cuttings all spring. Root these in clean sand and put in rich, friable soil.

March

Build cloche houses or buy large hot caps to be set over outdoor clumps in mid- to late-March.

Continue lighting stock plants for cutting during March. If you find a saturated soil condition in the garden, it may be a poor location in which to grow mums. Determine whether or not you can improve the surface or sub-drainage and if not, look for a better, higher or sandier location for the next mum planting.

April

Cut off tops of last year's mum plants. Burn the refuse. Remove mulch from plants and burn or put it on the compost pile.

When the soil is no longer slick and gummy, prepare the site by deep spading and incorporate plenty of organic matter and inorganic fertilizers as a supplement.

Check the cloche house every 3 or 4 days and take cuttings for indoor rooting. Keep notes and records on your procedure. They will help to establish a good regimen another year.

Stop lighting indoor cutting-stock plants. The days are now long enough that plants will not set flower buds.

May

Apply fertilizer to new, established plants. Take it easy; don't put on too much this early.

First-pinch well developed, vigorous plants. They will be ready for this late in the month.

Irrigate if it becomes dry in the garden.

June

Remove cloche frames from outdoor stock plants if you haven't already. These plants grow well and bloom in the fall.

Apply fertilizer to well-established plants. Keep plants well watered, especially when summer heat begins.

Second-pinch late in June if you want compact, bushy plants for outdoor garden display. Tall varieties may be grown without the second pinch if you want longer stemmed flowers for arranging indoors.

July

Watch water application carefully this month. Do not fertilize plants after early July and do not pinch after mid-July. Late feeding and pinching stall flower bud formation. Apply a 2-inch mulch of straw or sawdust around the clumps to conserve moisture. This also makes a good walking surface and prevents soil compaction.

Stake and tie tall varieties.

Check for insects from now through the rest of the season and apply recommended measures.

August

Some earliest varieties will now be in bloom. Erect cheesecloth on frames over fully exposed plants for better flower color during hot summer weather. This can be removed about September 1.

Irrigate as needed.

Stake and tie tall varieties if they appear weak-stemmed.

Dig and pot partially budded clumps for continuing indoor bloom this fall.

September

This is the month you have been waiting for. If you have done a good job of choosing varieties, most will be in full bloom late in the month.

Watch the water. The weather may be quite dry. Continue to irrigate until mid-month.

Protect a few clumps from frost with plastic sheets or large cardboard boxes set over the plants. Be sure to remove these each morning. Remember that even if the first flowers are frosted, later developing buds will open fully during the subsequent warm fall weather.

If plants are heavily frosted, hose them off with a fine mist from the garden hose before the sun reaches them. If properly timed and well done, this application of water will slowly remove ice crystals from within the plant cells. Then the customary blackening and death will not occur.

For indoor color and arrangement, cut stems as long as possible. Crush the stem bases using the handle of the knife or shears as a mallet. Then immediately plunge the stems into deep containers of tepid water and let cool. Then arrange.

Now, sit back and admire the results of your season's labor.

October

Continue your admiration, but give up on late varieties which haven't started to bloom by October 10. Look over the variety lists again and put your trust in early ones.

Bring several bushels of prepared soil into the basement for potting April-rooted cuttings.

November

Dig and pot prized varieties for indoor cutting propagation. Put them in the basement with very little light and dry them until only slightly moist—or

Dig whole clumps and put in cold frame or window well—or

Dig some clumps with plenty of earth and set on top of the ground beneath shrubs or on the north side of a building. Throw a few leaves or straw around them for protection.

December

Apply winter mulch to clumps in the garden. If you are in an area where snow piles up and stays on the ground, you may need no mulch at all. Erecting snow fence or laying cut conifer branches among the clumps will help collect snow and stabilize the soil temperature.

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Figure 12. The chrysanthemum test plots at the University of Idaho.