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Fig. 1.—A crop of early-flowering chrysanthemums showing method of growing in wide beds, and the system of watering from overhead oscillating spray lines. The variety here is Sweetheart, which commences flowering at the end of July

# Commercial Chrysanthemum Growing

A Description of Overseas Methods

By J. CRIPPS, B.Sc. (Hort.), Horticultural Adviser

**T**HE chrysanthemum is England's most important commercial flower crop and is extensively produced in Europe and the United States. Climatic conditions in these areas are rather different from those in Western Australia, but a description of English and American practices may be of interest to local growers and could bring to light useful information. Furthermore recent research has led to the introduction of new ideas and fundamental information on the physiology of the chrysanthemum plant is being accumulated.

Every chrysanthemum grower the world over is well aware that only skilful cultivation gives profitable crops of this flower. In England great care is taken in the selection of stocks for propagation, especially since the discovery of a virus which causes distortion of the flowers, but the old idea

that stem cuttings are inferior to basal cuttings has been discarded. On the other hand the new hormones introduced to speed the rooting of cuttings have not become popular since they do not appear to be necessary for this plant. Having rooted his cuttings, the English grower pots them



into three-inch pots or soil blocks but from here methods vary according to the variety grown and its season of flowering.

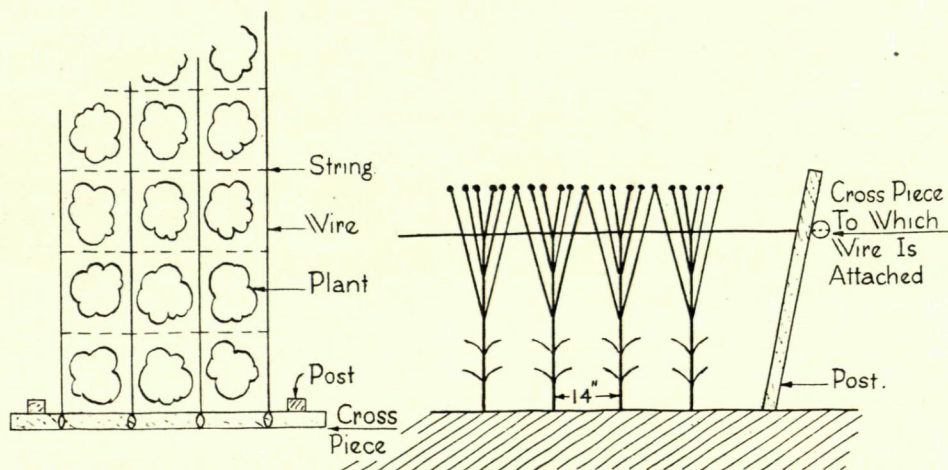
### OUTDOOR CULTIVATION

Early varieties which flower from mid-July to mid-September are planted out of doors, but the season may be extended by one month by growing later-flowering varieties and protecting the plants against frost and inclement weather with hessian stretched on wood and wire frameworks.

The preparation of the land consists of deep ploughing and the incorporation of up to 50 tons to the acre of dung and a variable quantity of lime, but no artificial

The squares are raised by sliding up the crosspiece as the plants grow. Recently pig-wire has been utilised instead of wire and strings, since it consists of ready-made squares, and thus reduces labour costs.

Top-dressings of fertilisers may be applied during the growth of the plants, and watering is by means of oscillating spray lines, i.e. pipes with nozzles every 15in. which rotate through an angle of 90° and give a more even distribution of water than sprinklers. The plants are stopped once at about 15in. high and the resulting side shoots disbudded, eventually producing six to eight flowers each.



fertilisers are considered necessary since English soils are not normally deficient in phosphate as are many areas here. The quantity of lime applied varies according to the soil which should ideally be neutral (pH7) for this crop.

Planting commences early in May and the young plants are set out in beds or strips consisting of three rows 14in. apart, the plants being a similar distance apart in the rows. A path 2ft. 8in. wide is allowed between the beds.

Stakes are driven in at each corner of every bed and a cross-piece attached between those at the end of the bed. Wire is then stretched along the bed on the outside and between the rows, and string is attached to the wires and across the bed forming squares through which the plants grow and by which they are supported.

The introduction of parathion has aided pest control, for it kills all pests including the chrysanthemum nematode and leaf miner. Malathion may prove a less poisonous substitute.

### GLASSHOUSE GROWING

Cultivation under glass is of less interest to Western Australian growers but 800 acres of chrysanthemums are grown under glass in England, and if a complete picture is to be presented this type of production must receive a mention. Glasshouse-grown flowers are in the shops from October to mid-January, that is throughout autumn and early winter, thus completing a six month season. The chrysanthemum crop usually follows tomatoes under glass and the plants may be grown in 10in. pots until moved into the glasshouse. This





Fig. 2.—A late crop of outdoor chrysanthemums in England, showing method of supporting plants by wires and strings, also the hessian protection against frost, wind and rain

(Figs. 1 and 2 are published by courtesy of Mr. John B. Stevenson, a chrysanthemum grower of Hillingdon, Middlesex, England)

method is expensive, but generally produces the best quality blooms. They may also be grown in beds in the open and transplanted, but this system is rapidly becoming less popular due to the poor quality blooms resulting.

A recently-introduced piece of equipment, the mobile glasshouse, has obviated the need for transplanting, for the crop can be grown in beds and the glasshouse moved over it when autumn frosts threaten.

Watering of plants under glass is usually carried out by means of a hose, but trickle irrigation, an old idea at last perfected, is replacing the hose and thus reducing both the monotony of glasshouse work, and the wages bill. This method of watering, which utilises a series of small-diameter hoses fitted with drip-feed nozzles at frequent intervals, has encouraged liquid

feeding, always the best and most natural way of supplying nutrients, and has incidentally further lessened labour costs.

The two most important developments overseas, however, are the use of late-struck cuttings and artificial illumination to delay flower bud formation. The use of late-struck cuttings shortens the growing period, thus reducing the number of weeks during which attention has to be given to the crop, also the purchase of 10in pots becomes unnecessary and production costs are therefore reduced on two counts.

### LATE-STRUCK CUTTINGS

Two systems are in use. In the first the original growths from the stools are pinched back and the ensuing shoots produced provide the propagating material. In the second method a small number of





Fig. 3.—Chrysanthemums packed for market, showing method used in England. They are packed in returnable wooden boxes with the individual blooms supported by cushions and held in position by a dowel fixed across the centre of the box

(Photo by courtesy of the Controller of Her Majesty's Stationery Office)

cuttings are taken at the normal time (February), struck, planted out 6in. apart in April, stopped the following month and the resulting side-shoots used as cuttings. Cuttings struck in early June, planted mid-August 9in. apart each way under glass are stopped when established and only allowed to produce three flowers in December. Cuttings struck even later, i.e. in July, planted 6in. apart are not stopped and therefore produce only one flower, also in December. This one-flower, one-plant method of growing chrysanthemums is very popular in North America—so popular in fact that it is becoming almost standard practice.

Plants originating from late-struck cuttings are normally grown more rapidly and the flowers are formed at a reduced height as compared with those on plants grown in pots. Suitable English varieties for propagation by means of late-struck cuttings are Balcombe Perfection, Shirley Late Red, Favourite, Friendly Rival, Agnes Ford and American Beauty.

#### DELAYED FLOWER FORMATION

Artificial illumination to delay the flowering of chrysanthemums was first introduced in North America where photoperiodism, or day length necessary for



flower formation, has been studied extensively, but before it is described briefly a few words of explanation may be helpful. The flowering of the majority of plants is controlled by temperature or day length or a combination of both. For instance, a particular plant may initiate flower buds when the temperature rises above a certain point, that is, when the weather becomes warm in spring or when the number of hours of daylight exceeds the minimum required for flower production, that is when the days lengthen or shorten, as the case may be.

In the case of the chrysanthemum, day length, is the dominant factor and late chrysanthemums initiate flower buds when the day length decreases to 14½ hours from the summer maximum of 16 experienced in Europe and North America, or to be more correct, when they are subjected to more than 9½ hours of darkness, provided that the temperature is at or above 60° F. Flower formation, a separate process takes place at the same temperature when the hours of darkness are further increased to 10½. Experiments revealed that almost total darkness is needed to produce these effects and that a comparatively low intensity illumination is all that is necessary to delay flower formation artificially.

Ordinary 40-watt electric light bulbs attached to a cable at 4ft. intervals and suspended 2ft. 6in above the apex of the plants and switched on automatically for two hours half way through the night, effectively break the period of darkness; the chrysanthemums being deluded into thinking that they have experienced two short nights and that summer is still present.

The process is not too expensive for commercial use, costing about threepence per plant, including cost of electricity and depreciation of equipment. Providing the temperature does not fall below 60° F. both during, and for one month after, the treatment, flowering is delayed for three weeks and could probably be delayed longer but at greater cost.

Using glasshouses and this method of controlling flowering, chrysanthemum blooms are produced from the end of July to the end of January in England (equivalent to January to July here) and all the year round in America.

If this method of delaying flowering were to be used here to produce late chrysanthemums they could be protected from the winter frosts, gales and rain by means of hessian stretched on a wood and wire framework.

Few if any experiments have been conducted with chrysanthemums in Western Australia and in the absence of experience under our conditions no concise recommendations can be given. Growers would be well advised to apply any new treatments to a small number of plants only and to extend their use if they are found to be successful.

### WILD DOGS PLENTIFUL.

Vermin inspectors report large-scale migrations of dogs into the settled areas, and a noteworthy feature of the invasion has been the increased sizes of litters. The average is usually about five pups to a litter, but three litters destroyed recently contained eight pups, and litters of nine and ten have been reported.

Large litters have been reported from the Kimberleys, the North-West, the Eastern Goldfields and the Nullarbor Plains. Pastoralists have become increasingly active in destroying dogs, and co-operative groups for this purpose have been formed north of Meekatharra, at Port Hedland and in the Upper Gascoyne areas. The destruction of 125 wild dogs by Agricultural Protection Board doggers operating to the south and west of Lake Barlee was a surprise to local Vermin Boards.

Other doggers operating in the agricultural areas distributed over 223,000 baits and obtained 178 of the 359 wild dogs destroyed there. They obtained 15 scalps in these areas during August.

An extensive aerial baiting campaign against wild dogs will be conducted from October 19 to November 8 during which 695,000 baits will be dropped in flights totalling almost 11,000 miles. Baits will be dropped over a large area including Wiluna, Meekatharra, Mt. Vernon, Wittenoom, Akydos, Nullagine, Wiluna, Laverton and Southern Cross.

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