

hundred fruits in 1921 and about 1,000 fruits in 1923. However, this same tree died during the cold winter of 1923-24.

The best stock for this lemon has not been determined. Some have reported good results when worked on sour-orange stock, and others unfavorable. It has also been worked on *Poncirus trifoliata*, grapefruit, and mandarin, with opinions varying regarding the relative value of these as stocks. However, since it roots readily from cuttings it perhaps may be safest, until otherwise demonstrated, to grow it on its own roots.

This seems to be a fruit of special value for home use in areas where it can be grown in the open, and it also may have value as a commercial fruit in locations too cool for other varieties to succeed.

ROLAND MCKEE.

CHRYSANTHEMUMS for the Northern United States

The charm and beauty which the hardy chrysanthemums add to the landscape of the South during late fall could, it is believed, be extended to the northern garden if early-flowering sorts with sufficient hardiness to withstand the rigorous winters of the region can be developed. There are many sorts the roots of which are hardy but because they flower so late contribute little to the floral display of autumn at the North, save in the exceptional season. If these hardy forms can be induced to bloom earlier in the season and at the same time provide flowers of desirable form and color, the approach of winter may be delayed so far as the garden is concerned; for the early frosts which are so destructive to most of the annuals are, as a rule, much less harmful to the hardy chrysanthemums.

The variety of form, the diversity of color, and the wide range in the time of blooming observed in the seedlings of hardy "mums" led to the conviction that this plant might be induced to make a contribution to northern gardens as well as southern gardens.

Some Bloomed Early

Accordingly, a collection of the earliest blooming sorts to be found in both English and American gardens was brought together for observation and test and to it was added a number of department-grown seedlings considered too early for satisfactory greenhouse culture. The first year a few sorts bloomed as early as the middle of August, but the great majority maintained their ancestral characteristics and refrained from blooming until the first days of November, too late to make any marked contribution to the fall garden, even in the latitude of Washington. The early-blooming plants were carefully marked and were left in the open to take the consequences of the winter. Several survived, and in 1916 seed was gathered from 10 of the earliest flowering, winter hardy sorts. From the seedlings grown from this selection and the original collection, seed was again saved from the 10 earliest bloomers in 1918 and this was repeated again in 1919. By 1922 the collection of selected, winter hardy, early-blooming parent plants had grown to 75. From these parents 13,000

seedlings were grown in 1923 and 125 of them were selected for further trial. In 1924, over 10,000 seedlings were grown from specially selected plants and of these 100 were considered early enough to be parent plants. Through further trial and elimination it is planned to reduce the list of selections to a group of 12 or 15 sorts that will bloom and give a satisfactory range of color and form for use during the first half of September and a like collection which will produce the bulk of their bloom during the last two weeks of September.

Task Beset With Difficulties

This task has been beset with many difficulties. The July and August flowering varieties are manifestly too early for garden or commercial use but as parents for early-flowering strains they are proving invaluable. Seedling chrysanthemums like other hybrid forms present every possible expression of form and color. In this respect the plant is interesting to work with. In fact a field of seedling chrysanthemums presents a most attractive mosaic when the plants are spaced $1\frac{1}{2}$ by 3 feet and each plant develops to occupy the space allotted it. Besides adding an attractive feature to the trial grounds each fall the work has resulted in the development of early-blooming sorts including a wide range of form and color.

As soon as satisfactory forms of these chrysanthemums are selected the next task will be to multiply them. This will be done to such an extent as to make them available, through the trade, to the gardeners of the North who wish to prolong the floral display of the autumn.

FURMAN LLOYD MULFORD.

C E L E R Y The black-heart disease of celery is found in
Disease and its most prevalent and destructive forms in
Its Control Florida and California, two of the largest celery-
 growing districts in the United States, in both of
 which artificial irrigation is used extensively. The irrigation is important, as it will appear later that proper irrigation is the only satisfactory method for the control of the disease. The disease, most destructive in Florida because of the heavy rainfall during March and April following several months of drought, has been known since the early commercial culture of celery. Since, until recently, there were no methods for the control of black heart, the growers have lost heavily from it every year.

The disease attacks principally the tender growing heart of the plant, producing a blackening of the tissues, and hence the common name "black heart." As the disease develops, the entire heart is killed by a typical dry rot, which is often followed by a slimy soft rot, caused by secondary organisms of the *Bacillus carotovorus* group. The malady is nonparasitic in nature and is not to be confused with the common heart rot found mainly in the northeastern United States. The black heart causes a yellowing of the entire leafy portion of the plant, with a loss of the green color, followed by a browning and death of the tissues involved. The diseased plants are worthless and many fields in Florida have been observed in which all the plants were affected.