DEVELOPMENTS IN CALIFORNIA FLORICULTURE

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Eastern and midwestern florists show considerable apprehensive interest in the outdoor culture of cut flowers in California. This topic has been discussed by visitors and by California growers, but because of the importance of the disease factor, there may be value in reconsidering the problem from the plant pathologist's viewpoint.

It is assumed that interest centers primarily in outdoor culture, for the better greenhouses are operated much as in the east and at similar cost. Culture in fields and under cloth or lath is most extensive in the southern part of the state, and this discussion is, therefore, largely concerned with that area.

The potentialities of the cut-flower industry are not best evaluated by examination of the present situation. For many reasons the present performance is far below that possible, but this gives scant basis for pessimism there or complacency by growers elsewhere. A few facts may be useful in orientation, however. According to the Agricultural Department of the Los Angeles Chamber of Commerce, the wholesale volume of the industry in southern California for 1946 was $12,000,000. The crop was produced by about 400 growers on some 4000 acres of land in a coastal strip 300 miles long in San Diego, Orange, Los Angeles, Ventura, and Santa Barbara counties. Of this total, about 50 acres were under glass and produced a million dollar crop. About 95 per cent of the total crop is sold through the Los Angeles market, half for local use and half for out-of-state shipment, principally to the southern cities -- Dallas, Houston, Fort Worth, and New Orleans -- and to Chicago, New York City, Denver, St. Louis and Detroit. About 30 per cent of the shipments are by air. Some of the factors which bear on our analysis of the situation should be individually considered.

Climate

Climate is probably the most important asset of the California cut-flower industry, but it is only partially exploited at present. There is a considerable variation in climate with distance from the ocean as well as in the numerous valleys, and with increasing elevation in the nearby mountains. In the coastal strip there are nearly frost-free areas as well as some of the consistently coolest low-altitude localities in the state; however, in this region there is insufficient winter chilling for some flowers. Peonies, tulips, and lilacs are grown at higher elevations for this reason. Sunlight intensity and duration also vary in the several areas because of the incidence of fog and cloudy weather (high fog). In general, intensity is much higher there during the winter months than it is in eastern states. If properly exploited, this variation in climate permits spreading the production period of a crop, but it imposes an additional factor to confuse the newcomer and uninformed grower.

The region is classed as semi-arid and practically all of the rain comes between November and March. Irrigation is therefore necessary, and the water is brought from distant streams by aqueduct or ditch, or obtained by pumping from wells. Because of the dryness of the air, evaporation is high and large quantities of water must be used. The aridity essentially eliminates foliage diseases that are spread in and favored by moisture, but this natural advantage often is lost by the use of overhead sprinkling.

The moderate winters are not an unmixed blessing, for they encourage more or less continuous development of insect pests, weeds, and many diseases. This imposes serious problems of control, particularly of insect pests.

The subtle psychological effect on the growers of the mild environment is difficult to evaluate, but there is evidence of a tendency to "let the climate do it". Rather than capitalizing fully on this natural advantage by using the best possible culture, too many growers are exerting a minimum effort, producing flowers scarcely up to quality standards of the better eastern growers, and far below them in yield.

Outdoor Culture

California is now a leading agricultural state, with much large-scale but intensive farming that requires large investments of capital. There are extensive acreages of row crops (e.g., strawberries and celery) that are as costly per acre to produce as flowers. Already some growers of these crops are turning to flowers, and may be expected to introduce useful cultural inovations, particularly in mechanization. In any case, the flower-growing industry can be expected to undergo modernization along the lines of the highly technological agriculture of the state, now that the field is no longer dominated by Japanese.

Since the flowers are grown outdoors they are subject to the vagaries of the well-known "unusual" climatic conditions. Flower culture in such an area presents an element of gambling

perhaps greater than with other crops. By comparison with constant-level irrigation and automatic temperature and ventilation control in eastern greenhouses, the difficulties of the outdoor grower become conspicuous. This situation is not hopeless however, and much can be accomplished by selection of proper growing areas and plant varieties, and by successive plantings. For example, one rose breeder is attempting to develop disease-resistant varieties that will produce satisfactory flowers under cloth in southern California.

Factors Causing Instability

The relatively few growers representing the second generation in the flower business, or who have been in it here for more than ten years, stand in striking contrast to the numerous third-generation establishments of the east. Several factors contribute to the present unstable, somewhat migratory nature of the California cut-flower industry, and the frequent shifts a grower may make in planting areas or in crops grown.

Soil-borne diseases have contributed to the transient culture of some crops. For example, the Fusarium which causes wilt of China aster remains in soils for many years, and most growers will not knowingly raise the crop in soil previously used for this plant. Fusarium yellows, bacterial scab, and dry rot have likewise caused the continuous migration of gladiolus plantings. As level land was infested by these organisms and abandoned, it became necessary to use hilly areas and overhead irrigation for asters and gladioli. In low pockets in these hills, where the asters remain wet for many hours after irrigation, a new foliage disease caused by a Stemphylium fungus has appeared. When the Botrytis disease of gladiolus became important, it was impossible to use ditch irrigation on the hills and, because the fungus is favored by moisture, this disease is now the limiting factor to culture of that crop. These examples of "out of the frying pan into the fire" certainly support the idea that to develop soundly the industry must stand and fight rather than retreat. Because of large investments in buildings and greenhouses, eastern growers have been denied such escapism, and have used scientific knowledge to meet their problems. The psychological value of such a course cannot be denied. It is a hopeful sign that California growers are becoming interested in owning rather than renting land, and in keeping it free of disease organisms through soil treatment.

In general, the worst disease problems of California flower crops are those caused by soil-inhabiting parasites or by insect-borne viruses. Foliage diseases are unimportant except with overhead sprinkling. Black spot of rose is a novelty. Septoria leaf spot of chrysanthemum is rare and no fungicidal sprays are needed. Foliar nematode of this crop has recently appeared in the state in a few plantings that had overhead sprinkling. It may be that this nematode will force cultural changes such as ditch irrigation, but it is most unlikely that the disease will become as important as in the rainy humid sections.

Viruses, particularly in those crops which show flower breaking, are an important and complex factor. Last year the plantings of stocks were badly damaged by mosaic that was carried by insects into the field from surrounding weeds and crops. Instead of the usual aphids which breed in large numbers on stock, a different species that feeds but briefly on this plant before dying was found to be transmitting the virus. This shift rendered ineffective the usual nicotine dusting program aimed at keeping down aphid populations within the field. Entomologists had some success in controlling these aphids with new insecticides of high residual effect, and it appears that this problem may be brought under control. Similar troubles are common on sweet pea, ranunculus, iris, and gladiolus in the area.

Growers frequently are astonished by injury from excess soluble salts in the soil, or salinity as it is called in the west. In such semi-arid climates there is insufficient rain to leach out the salts which accumulate when irrigation water evaporates. Fortunately, enough is known about the waters and soils of the area that losses generally can be avoided.

Because of the mild winters, insects are numerous and destructive. Their control in the field is difficult and expensive, but significant progress is being made.

The encroachment of real-estate developments on the available planting area is a more serious problem. The population of Los Angeles County has increased at the average rate of 10,435 per month since 1940, and the state population has increased 36 per cent during the same period. A vigorous building program is under way, and growing areas are giving way to homes. Since the housing shortage is still acute, this process is likely to continue. Fortunately, it is a large state! Already there is a strong movement toward agricultural districts 60 to 170 miles from Los Angeles, particularly in the Oxnard-Ventura, Santa Barbara, Santa Maria, and San Diego-Chula Vista areas. Once the shift has been made to these localities it should be a long time before urban expansion reaches them. This displacement has even played a part in the recent decreased wilt resistance of China aster. The severely infested land which had been used by one of the seed companies for production of wilt-resistent lines was subdivided, and the crop had to be grown elsewhere. Because the asters were then grown on uninfested or poorly infested soil, wilt-susceptible plants survived and sometimes were even selected for better flower or plant type. Many lines thus rapidly lost resistance.

Growers have drifted into and out of cut-flower growing with disturbing frequency, particularly in recent years. The industry is said to have started a little before 1900, and by 1907 Japanese growers had started to shift from berry culture to flowers. They soon dominated the business, and by 1942 represented nearly three-fourths of the growers. The evacuation of the Japanese in that year brought

successive waves of speculators, inexperienced investors, and experienced farmers. Some established flower growers seized the opportunity to expand. For a period even misfits were able to survive on the high-price and low-quality market, but eventually competition forced them out. The Japanese are returning, and are now said to represent 40 per cent of the growers, but it is doubtful whether they ever will regain dominance. During their absence, mechanization was adopted for several crops, and the acreage per grower quadrupled. Also it was found that the more expensive column stocks yielded a substantially better product than the branching types formerly used. The question, "How did the Japanese do this or that?" is heard less frequently. The new growers, and those who have moved to new sections, are finding themselves. A more balanced growing area is almost certain to be the final result, with each crop raised in the place and by those best able to produce the highest quality flowers at the lowest price.

Before southern California can achieve its place in the floricultural world, the general complacency over quality must give way to an appreciation of the substantially higher quality that many eastern growers are obtaining without benefit of a nationally advertised climate. A comparison of outdoor pompon chrysanthemums grown in the two areas is evidence enough of this fact. The good eastern grower has quality in practically every stem, while the California grower picks the quality stems and leaves a third or more of the crop in the field. In competition between this intensive and extensive culture there can be no doubt that the former would win. The lack of emphasis on quality in southern California may result in part from the small volume of competitive greenhouse crops. In the future, the California grower must judge his products by the standards of the best growers of the country, not by the best local crop, if he ships to competitive markets.

It has been said that, because about three fourths of all cut-flowers are used in funeral pieces, the quality of the individual flower is not very important. While there is an element of truth in this, the fact remains that, during gluts and low prices, buyers will purchase the best flowers obtainable at the desired price regardless of intended use, and the rest will be dumped. It is doubtful whether the industry in southern California could long survive if its market had to depend on the erratic shortages of other areas.

The Market

Much has been written about the handicap of distance in the shipment of the perishable flower crop. There seems general agreement that light but valuable flowers are most likely to be shipped long distances by air, and that not many flowers can dependably be shipped across the country in refrigerators.

It is curious that the large market within California has so frequently been un-

noticed. It should be pointed out that the estimated population of the state in 1947 was 9,420,000 and that of Los Angeles County was 3,693,493; the city is fourth in size in this country. The current rate of increase already mentioned indicates that vigorous growth is still a characteristic of the area. A good many flowers can be used in such a market, and it is not improbable that southern California will become a market for some eastern-grown flowers. For example, last winter Florida gladioli were trucked into the area.

Resume

The southern California cut-flower industry is young and still growing. It is characterized by transient cultural operations, temporary and changing growers, a large element of crop risk, and an undeveloped appreciation of the value of top quality. Plant disease has been one important cause of these conditions. The future development of this industry is uncertain, but it would be unwise to discount it on the basis of present performance. Certainly it is a place of abundant opportunity for good growers. The emphasis in research and practice should be on reduced variability in quality and yield, for that factor will determine the future of the industry in southern California.

Competition eventually may cause some east-west shifting of crops until each area exploits its natural advantages to produce the best flowers at the lowest cost. An interested grower should keep informed on developments, be neither apprehensive nor scornful of competition, and try to adapt rapidly to whatever changes may come.