

Flower Bulb Growing and Forcing

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Although commercial bulb growing has been attempted at various times in most parts of the world, major production has become centered in certain temperate countries with comparatively mild climates. Generally, these countries lie in the north temperate zone, between lat. 30° and 55°. In these areas, extremes of winter and summer are tempered by winds from oceans or other large bodies of water. In the United States, Washington State leads in the production of bulbous iris, tulips, and daffodils. Available precipitation records indicate that the Skagit Valley, located in the northwestern part of the state, more closely fulfills the natural curing requirements of the main bulb types than does any other major growing area. Skagit Valley also has an abundance of Puget silt loam and Puget clay loam soils. Drainage is a major factor in bulb production and is a critical factor when selecting fields. Crop rotation with large acreage agronomic crops like green peas and grains to break the disease cycle is very important and possible in Skagit Valley. Research support from WSU stations in Puyallup and Mount Vernon cannot be over emphasized. Through the Washington State Bulb Commission growers assess themselves based on production to support continuing programs with Dr. Andy Anderson, Dr. Gary Chastagner, Dr. Kassim Al-Khatib, to name a few. Sounds almost too good to be true doesn't it? Why are there not more growers? The fact remains that the industry is very specialized; costly mechanization allowing growers to remain competitive has eliminated many smaller farms. An industry supporting 200 growers in the 1930s has dropped to less than 20 today.

As a grower of fall flower bulbs, our primary goals at Washington Bulb Co. are to produce essentially disease- and insect-free bulbs true to type that will flower successfully.

Disease-free planting stock is planted in 8-in. rows on 40-in. centers starting in late August and hopefully finishing before Halloween. Bulbs are planted between 3000 lb and 7 tons per acre, depending on type, variety, and length of time they will remain in the field. Planting stock is separated by size after digging. These daughter bulbs are a result of the naturally occurring asexual reproduction system of flower bulbs. Growing these daughter bulbs to a flowering size is primary to the entire system.

Fertilizer is placed below and a few inches outside the row at planting times. Approximately 500 to 1000 pounds of a 10-20-20 analysis is used depending on soil analysis and grower feeling. Soil pH is maintained between 6 and 6.5.

The bulbs are planted in raised rows to facilitate drainage with approximately 6 in. of soil cover. After planting, prior to emergence, systemic and soil residual herbicides are applied. Surface drainage ditches are installed and basically bulbs are tucked in for the winter. During winter months, bulbs form roots and shoots. Iris emerges first in early December, followed by daffodils in late January or early February, with tulips emerging right behind.

As Spring arrives, growth of the above ground part of the plant increases and the natural flowering cycle is upon us. For daffodils, this is the middle of February,

followed by tulips in April and iris in May. Selective harvesting of field flowers is a large part of our flower production. Since photosynthesizing plant parts are harvested, a balance must be maintained between this harvest and bulb production. As Spring continues, a close watch is maintained for foliar diseases and timely fungicide applications are made.

Cultivation for weed control and moisture retention is an ongoing chore. Great care is taken to cultivate only when foliage is dry. This is just one of several considerations to reduce pesticide usage.

Prior to topping and or flower senescence, off types and virus-infected plants are removed. The rouging process is labor intensive and expensive but ensures varieties are clean and true to type. Mechanical "topping," especially in tulips, encourages the plant to concentrate its energies on the below-ground parts and asexual reproduction. It also helps in *Botrytis* control by removing floral parts before they fall among the leaves. The "grand period of growth" for the bulb starts after bloom. Good cultural practices continue and sometimes foliar fertilizers are applied. Increasing temperature, decreasing moisture, and natural genetic traits trigger dormancy as summer arrives for tulips, and a few weeks later for daffodils and iris.

By the end of May, choppers, skimmers, digging machines, trucks, washers, sand machines, and a host of other specialized equipment is readied and mobilized to harvest the bulb crop.

Mechanization in recent years has eliminated hand digging but the work force still reaches 350 people during peak harvest. Bulbs are dug by machine, put in bulk trucks, and brought to the plant for washing, drying, curing, sorting, and grading. Planting stock is stored in well-ventilated areas and treated as necessary to maintain quality. Special disease-control systems are sometimes used. One example is hot-water treatment.

The end result of a bulb is a successful flower somewhere whether in the seed store trade, to a forcing customer, or to our own greenhouses which brings us to the forcing part of our presentation.

At Washington Bulb Co., forcing flowers has become a very important part of our business. We have about 8 acres of greenhouses with more planned in the near future. We force iris and Asiatic lilies year around while also forcing tulips from December until May and daffodils from December until February.

Flower forcing has enabled us to keep more employees busy all year while also bringing about a more even year-round cash flow. We have become more vertically integrated and diversified which helps to spread our risks and ultimately increase profitability.