



Strawberry *Fragaria × ananassa* Duch.

The bulk of the world's supply

Improvement in the production efficiency and product quality of any agricultural commodity results from the development of superior production environments and the breeding of varieties specifically adapted to these superior environments. Mainly due to such developments at the University of California, lead initially by Harold Thomas and Earl Goldsmith, later by Royce Bringhurst and Victor Voth, and for the last 22 years by Doug Shaw and Kirk Larson,

California has become the dominant producer of both fresh and processed strawberry fruit in the world, providing varieties for greater than 87 percent of the strawberries consumed in North America. Varieties developed by this program produce approximately 60 percent of the strawberry fruit worldwide.

The Process

Improved strawberry varieties result from recurrent breeding, testing, and selection. Each cycle

starts with 100–150 controlled crosses among selected parents for each production location, chosen based on a variety of production and horticultural traits. Initial evaluations are performed on the basis of seedling performance, with primary populations of 8,000–12,000 seedlings established at both UC South Coast and UC Davis field stations.

Approximately 300 genotypes (breeding lines) are retained from each primary seedling population,

with subsequent evaluation of these selections based on plots of runner plants tested with planting treatments that simulate commercial conditions. Selections that are retained after initial screening are then tested using relevant cultural manipulations, and information is obtained about the cultural conditions that will optimize performance for each advanced selection. At present, all advanced selections are tested for a large number of pest tolerances.

Specific Objectives

The University of California program has released 56 strawberry varieties since its beginning in the 1930s. The standards required for success in a California strawberry variety have changed substantially during the past 75 years, due in part from the past success of the breeding program (Table 1).

Target traits for new varieties include improved production

The University of California program has released 56 strawberry varieties since the 1930s.

attributes (yield, production pattern, fruit size, and ease of harvest), superior quality for both fresh and processing markets (fruit appearance, color, shipping quality,



Doug Shaw describes breeding trials at the Watsonville, Calif., research farm.

shelf life, and flavor), and resistance or tolerance to important insects and pathogens. New varieties must

meet minimum standards for all of the above traits and meet the specific needs of the California industry and similar environments worldwide.

The Future

At present, the rate of progress for all measurable traits is approximately double historical averages. Through careful management of genetic resources and proper application of genetic principles, the likelihood of continued progress for this program has been preserved.

Table 1. Improvement of strawberries in the UC breeding program

| CULTIVAR RELEASE DATE | PLANT DIAMETER (CM) | FRUIT YIELD (G/PLANT) | APPEARANCE SCORE (1-5, 5=BEST) | FRUIT SIZE (G/FRUIT) | FRUIT FIRMNESS (N) |
|-----------------------|---------------------|-----------------------|--------------------------------|----------------------|--------------------|
| 1945–1966 | 18.40±0.63 | 595±42 | 2.29±0.06 | 14.9±0.4 | 2.45±0.12 |
| 1993–2004 | 22.86±0.49 | 1,429±61 | 3.38±0.08 | 24.8±0.7 | 4.56±0.12 |