

The Effects of Climate on Fruit Form

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The effect of climate on the form of many fruits is frequently not understood or appreciated by horticulturists or growers. Normally a small range in size and shape is observed among fruits from adjacent trees or even from a single tree of a given variety or clone. This natural variation may result from such factors as amount of crop, degree of pollination or nutritional condition of the plant. The direct effect upon fruit form and size of the many factors which collectively are called climate is manifest only when comparisons can be made of fruits of given varieties grown under two or more climatic conditions. This effect is pronounced in some fruit varieties and types and not in others.

Thus certain varieties can be recognized or identified with a considerable degree of accuracy regardless of where they have been grown, whereas other varieties become completely unrecognizable and defy identification when grown under some unusual climatic conditions. Unless one is completely familiar with the range in variation of fruit forms and quality as affected by climatic conditions, he can be misled or completely confounded in an attempt to identify or describe fruits

which are grown under unusual climatic conditions.

The remarkable degree to which some subtropical fruit varieties are affected by climatic differences in California justifies a brief account of the phenomenon. Several species and varieties of subtropical fruits are grown in California in each of the four great zones which differ climatically in total amount of heat during the growing season and in the average relative humidity in the atmosphere. Briefly these zones are, in order of descending total amount of heat during the growing season: (1) the low elevation desert (Coachella and Imperial valleys), (2) the great interior San Joaquin Valley, (3) the southern interior valleys, and (4) the southern coastal plain. In these great zones the average relative humidity in the atmosphere during the growing season is generally inversely proportional to the

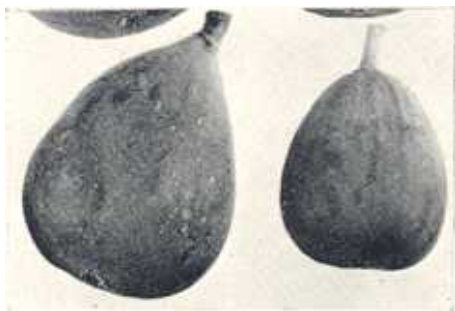


FIGURE 1. *Brown Turkey Fig*. The fruit at left was grown near Los Angeles (coastal area); on right is the same variety grown 70 miles inland at Riverside.

amount of heat. Hence the coastal climate is cool and moist, while the others are warmer to extremely hot. The hotter zones, likewise, are more arid. These climatic conditions have profound effects on the form of some fruits.

Fig

The fig grown in the more humid cool coastal area of southern California near Los Angeles is a large fruit, with a long neck and generally of lighter color than comparable fruit of the same variety grown even within a distance of seventy miles inland at Riverside, where the climate during the growing season is warmer and more arid. Fig fruits from this inland area are smaller, practically without a neck, have a relatively longer stem, a darker skin color, and mature considerably earlier. The casual observer perhaps would determine fruits of a given variety from these two areas as being of two different varieties.

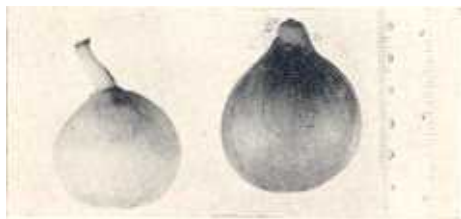


FIGURE 2. *Kadota Fig*. Left, as grown at Riverside (inland); right, from the Los Angeles area.

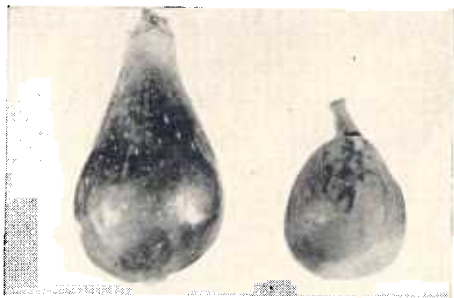


FIGURE 3. *Mission Fig*. This variety shows a marked contrast between the long-necked coastal grown fruit and that from inland.

Persimmon

Some varieties of the oriental persimmon (*Diospyros kaki*), when grown in the relatively humid and cool areas near the coast, tend to have a lesser length-diameter ratio than comparable fruit grown in the warmer arid section. The fruit form of Hachiya, the most important commercial variety in California, is especially affected by the climatic environment. The length-width ratio of Hachiya fruits from the coast in one instance was determined to be 1.063, whereas fruit of the same variety from the inland areas had a ratio of 1.150 and hence were relatively longer. A few other varieties such as Fugi, Hyakume and Tribble exhibit the same tendency to become more elongated when grown under warm, arid conditions. There appears to be little or no effect of climate on the form of another group of oblate-shaped persimmon varieties, such as Honan Red.

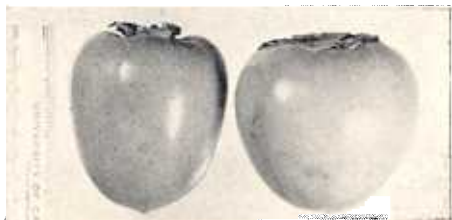


FIGURE 4. *Hachiya Persimmon*. Left, inland; right, coastal.

Citrus

Nearly all citrus fruits from the hot, arid interior areas tend to be longer and more highly colored than comparable varieties grown along the coast. The most important orange variety, Valencia, for example, is slightly ovate to ellipsoidal at Riverside and round or somewhat oblate in Orange County along the coast. The Shamouti or Palestine Jaffa orange, occasionally found in variety collections, exhibits a long oval form under coastal conditions. The long axis of the fruit is extended greatly when grown in the Coachella Valley, where temperatures during the growing season are extremely high and the humidity very low.

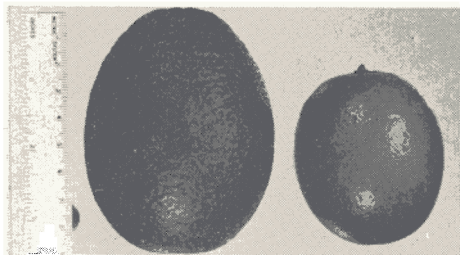


FIGURE 5. *Shamouti Orange*. Left, inland; right, coastal.

The Marsh grapefruit, cultivated in many areas in California, is a small oblate fruit, tending to become round when grown in the coastal plain,

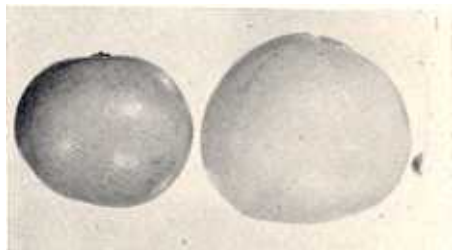


FIGURE 6. *Marsh Grapefruit*. Left, coastal; right, inland.

whereas the same variety from the Coachella Valley is a distinctly larger fruit, somewhat pyriform and frequently developing a slight neck.

The pronounced effects of climate are not restricted to the fig, persimmon and citrus, but are observed frequently in such fruits as the avocado and others. Internal characters such as flavor, sugar-acid ratio, and thickness of skin also reflect the influence of the climatic conditions under which the fruit has developed. Such effects must be given careful consideration by the pomologist and horticulturist because of the obvious relation to accurate varietal descriptions and to problems of identification. Many pomological descriptions now in the literature frequently are completely inadequate or inaccurate for materials which are grown under unusual or extreme climatic conditions.

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