5. **Resistance to powdery mildew** caused by *Sphaerotheca macularis* Wall. ex. Fr., is another objective of the program. Resistance means that spraying for control, in years in which the disease is severe, can be avoided. Totem and most of the advanced selections in the program are resistant.

6. **Diversification of ripening period** is becoming an important objective of the program. This diversification is particularly pertinent to the fresh market where an extension of the ripening season is highly desirable.

### Literature Cited


1. Converse, R. H. 1964. Raspberry mosaic and rate of infection under field conditions. *Pl. Dis. Rep. 48*: pp. 839-842.
2. _____, Hugh A. Daubeny, R. Stace-Smith, Louise M. Russell, E. J. Koch and S. C. Wiggans. 1971. Search for biological races in *Amphorophora agathonict* Hottes on red raspberries. *Can. J. Plant Sci. 51*: pp. 81-85.
3. Daubeny, Hugh A. 1966. Inheritance of immunity in the red raspberry to the North American strain of the aphid, *Amphorophora rubi* Kltb. *Proc. Amer. Hort. Sci. 85*: pp. 346-351.
4. _____. 1971. Self-fertility in red raspberry cultivars and selections. *J. Amer. Soc. Hort. Sci. 96*: pp. 588-591.
5. _____, P. B. Topham and D. L. Jennings. 1968. A comparison of methods for analyzing inheritance data for resistance to red raspberry powdery mildew. *Can. J. Genet. Cytol. 10*: pp. 341-350.
6. _____, R. A. Norton, C. D. Schwartz and B. H. Barritt. 1970. Winterhardiness in strawberries for the Pacific Northwest. *HortScience 5*: pp. 152-153.
7. _____, _____ and B. H. Barritt. 1972. Relative differences in virus tolerance among strawberry cultivars and selectionus in the Pacific Northwest. *Pl. Dis. Rep. 56*: pp. 792-795.
8. _____ and H. S. Pepin. 1975. Assessment of some red raspberry cultivars and selections as parents for resistance to spur blight. *HortScience 10*: pp. 404-405.
9. _____ and _____. 1976. Recent developments in breeding for fruit rot resistance in red raspberry. *Acta Horticulture 60*: pp. 63-72.
10. _____ and _____. 1977. Evaluation of strawberry clones for fruit rot resistance. *J. Amer. Soc. Hort. Sci. 102*: pp. 431-435.
11. McElroy, F. D. 1977. Effect of two nematode species on establishment, growth and yield of raspberry. *Pl. Dis. Rep. 61*: pp. 277-279.
12. Pepin, H. S. 1976. Raspberry decline. *Proc. Lower Mainland Hortic. Improv. Assoc. 18*: pp. 24-26.
13. Ricketson, C. L., A. Hikichi and C. B. Kelly. 1974. Raspberries and blackberries in Ontario. Ontario Ministry of Agric. Pub. 473.
14. Scott, D. H., J. L. Maas and A. D. Draper. 1975. Screening strawberries for resistance to *Phytophthora fragaria* with single versus a composite of races of the fungus. *Pl. Dis. Rep. 59*: pp. 207-209.
15. Williamson, B. and A. J. Hargreaves. 1976. Cane diseases of raspberry. *Scot. Hort. Res. Inst. Annu. Rep.* 1975: pp. 57-58.


# Evaluation of 'Golden Delicious' Strains

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From time to time it appears appropriate to report on the search for a new russet-free 'Golden'. The true 'Golden Delicious' (non-spur, virus free), in my opinion, is still in top position as the over-all *best* of the yellow apple varieties grown in the Pacific Northwest. However, as most growers and marketers know, it is *not* a perfect apple. Both spur and standard 'Golden Delicious' have several faults which are the basis for the search of a "superior 'Golden' type."

Since russet is not a problem of 'Golden Delicious' in our northwest apple districts, we focus our attention on the new yellow apple varieties. Most of these are new seedling dis-

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coveries. Occasionally a mutant of standard 'Golden Delicious' occurs, and we watch these with keen interest. Today I know of only one mutant of true 'Golden' that appears to be slightly better than its parent, and that is *'Smoothee'*. Most spur type mutants of 'Golden Delicious' have *faults* such as late maturity or storage disorders. We are looking for something as good as true 'Golden' but without its susceptibility to bruising, alternate bearing, scab, mildew, and storage disorders.

During the past twenty-five years it has been my privilege to observe many of the new apple varieties. It takes years for a new apple to reveal all of its characteristics. Some of the undesirable ones are slower to reveal themselves.

Likewise, the performance of a new seedling or strain will vary from area to area. It is easier for us to comprehend this slowness when we review the history of 'Golden Delicious'. It was discovered by Lloyd Stark in 1914 and took twenty-five years to become established as a major commercial variety.

During the past ten to fifteen years we have evaluated several new yellow varieties. Of these, three appear to be of excellent 'Golden' type. They can be recommended for *testing* but, as of today, have not gained the distinction of being a sure-fire commercial success. Only time can reveal this. These three apples are *'Early Golden'* (Hawaii strain), *'Criterion'* (Crites strain), and *'Firmgold'* (Howell strain). All three are diploid and have been proven to be acceptable pollenizers for 'Red Delicious'.

**Early Golden (Hawaii strain)**

The late William E. Silva of Sebastopol, California, introduced this excellent apple in 1965. It was the result of his hand pollinated cross on a 'Gravenstein' tree with 'Golden Delicious' pollen. The patent was granted May 11, 1965. It was originally assigned as 'Hawaii' to the Sierra Gold Nursery of Yuba City, California. Mr. Silva claimed it had a pineapple flavor but that odd distinction has never surfaced in any Washington grown fruit as of 1977.

Mr. Silva gave me two trees to test in 1966. Early bearing fruit as well as fruit from commercial orchard tests in later years indicated eating quality and appearance was equal to true 'Golden Delicious'. Its harvest date varied from year to year but was always seven to fifteen days ahead of standard 'Golden Delicious'. For this reason, the descriptive name 'Early Golden' was attached to the original name 'Hawaii'.

The appearance of 'Early Golden' (Hawaii strain) is nearly identical to 'Golden Delicious'. Tests are underway by both research stations and nurseries in other states to evaluate performance with regard to fruit finish (russet), pollination, and storage ability.

The early maturity feature arouses interest of Golden growers located in early districts. This feature may move this variety into the pollination choice of 'Red Delicious' because it would give the grower an early salable product. The present Northwest first choice of 'Winter Banana' is not generally recognized as a salable product. 'Early Golden' (Hawaii strain) offers some hope to begin the apple harvest season a bit earlier.

"Early Golden' (Hawaii strain) propagation rights were re-assigned in 1975 by Mrs. Marie Silva to the Sierra Gold Nurseries of Yuba City, California.

**Criterion (Crites strain)**

'Criterion', a chance seedling, was discovered by Francis Crites in 1968 near Yakima, Washington. The new variety sprouted in the proximity of 'Red' and 'Golden Delicious' trees. The fruit type more closely resembles the shape of 'Red Delicious' than 'Golden Delicious'. The main difference is

broader shoulders. The calyx end points are very pronounced and the color is bright yellow with pink to rose blushing on the exposed cheeks. Firmness exceeds either 'Red' or 'Golden Delicious' by two to four pounds throughout the harvest and storage seasons. It is this firmness and flavor that arouse the interest of Northwest fruit growers. The flavor is more aromatic than 'Red Delicious' and has a very sweet tartness to remind you of 'Golden Delicious'.

The tree growth characteristic is willowy resulting in excessive sun exposure to the fruit of young trees coming into bearing. It reminds us that evaluation of new varieties should not be hastily concluded before the tree settles into a mature status.

The high quality of 'Criterion' has stimulated many growers to plant commercial trials in Central Washington. The maturity date puts 'Criterion' in about the same season as 'Rome Beauty'. Early fruit from these trials is being channeled into market reception tests in California. The results of both storage ability and market acceptability has been very encouraging according to Everett Brandt, Carlton Nursery representative near Parker, Washington.

'Criterion's' patent was granted in 1974 and propagation rights were assigned to the Carlton Nursery Company, Dayton, Oregon.

### Firmgold (Howell strain)

'Firmgold' was discovered in the Zeb Howell orchard near Zillah, Washington, in 1969. It grew as a chance seedling in an area surrounded by 'Red' and 'Golden Delicious'.

'Firmgold' is a very typey late 'Golden' with its five prominent points. One of its outstanding features in 1977 was the uniformity in type even with a low seed count. 'Red' and 'Golden Delicious' usually develop lopsided apples if the seed count is low. 'Firmgold' can develop a pink blush on exposed cheeks. Sunburn did *not* show when it occurred on other nearby varieties this year.

As near as we can determine, its harvest season is with 'Rome Beauty' or later by a day or two. As the name implies, the flesh is very firm when compared to 'Golden'. 'Firmgold' did not show any bitter pit in 1977 even though it appeared frequently in nearby spur 'Golden Delicious'.

The flavor and sweetness of 'Firmgold' is as good as 'Golden' if the apple is allowed to remain on the tree until the ground color breaks from green to yellow.

The patent for 'Firmgold' was granted in 1977 to Zeb Howell. The propagation rights are assigned to Callahan Nursery Sales of Yakima, Washington.

## Breeding of Avocados in Australia

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There are now some 500 ha of avocados (*Persea americana* Mill.) in Australia chiefly of the varieties Fuerte and Hass. Less than 30% of the trees are of bearing age so it is evident that the industry is expanding but at the same time is rather restricted in its variety composition. The only variety developed in Australia which is grown commercially is Sharwil. This variety was produced by Mr. F. K. Sharpe of Queensland.

At present over 150 registered varieties of avocado exist throughout the

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