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'Jonagold' Apple

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Out of the hundreds of apple varieties originating from apple breeding programs 'Jonagold' is one of the few that has become extensively grown on a commercial scale by apple growers in many parts of the world. Because 'Jonagold' was introduced only two decades ago, it still has not reached its pinnacle of production. However, its planting is increasing rapidly and there is a strong potential for even greater production in the future.

In 1988 'Jonagold' received the Outstanding Fruit Cultivar Award from the American Society for Horticultural Science (1). This 3-inch bronze medal recognizes "a modern fruit introduction having a significant impact on the fruit industry."

'Jonagold' was bred and introduced at the New York State Agricultural Experiment Station, Cornell University, Geneva, NY. It was released from the extensive apple breeding program at Geneva that started in 1895 and has been continuous to the present.

'Jonagold' was produced by conventional methods of apple breeding. In 1943 flowers on an orchard tree of 'Golden Delicious' were emasculated and pollen of 'Jonathan' was applied to the stigmas. In 1946, 52 seedlings of this cross, growing on their own roots, were planted in a first-test orchard. Some of these seedlings bore their first fruits in 1953. One produced outstandingly good fruits and was selected for further evaluation. It was assigned the number, N.Y. 43013-1. In 1954 this selection was budded on Malling 7 rootstocks in the nursery and in 1956, 4 one-year-old nursery whips were planted into second-test orchards where fruiting performance was further evaluated for another 10 years.

This unnamed selection was also tested by James Oakes, a commercial apple grower at Lyndonville, NY. He was enthusiastic about 'Jonagold's' performance and encouraged the Experiment Station to name it. 'Jonagold' was introduced in 1968 (18). 'Jonagold's' name is a combination of the names of its two parents, 'Jonathan' and 'Golden Delicious.' Commercial and home orchard growers quickly learned about 'Jonagold's' virtues and propagating wood was distributed to fruit tree nurseries. 'Jonagold' was not patented.

Statistics are not available on the number of trees nor the tons of 'Jonagold' produced in recent years in the various apple growing regions of the world. However, 'Jonagold' is known to be an important variety in Belgium, The Netherlands, West Germany, France, Switzerland, Italy, the United Kingdom, Japan, the United States and Canada. Schechter and Proctor (14) compiled 1986 data on 'Jonagold's' production in 5 countries and reported that 7% of the apples produced in The Netherlands were 'Jonagold.' Production has increased greatly since then.

In 1981, 'Jonagold' was being planted in western Europe more than any other apple cultivar, including Europe's own 'Cox's Orange Pippin' and 'Belle de Boskoop,' and also more than 'Golden Delicious' which Europe grows so extensively (2). In 1986, the European Economic Community produced 116,000 metric tons (Belgium 50,000 MT) of 'Jonagold' apples. (12). In Belgium, 50% of all trees planted since

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1977 were 'Jonagold' (5). In a presentation to the annual conference of the International Dwarf Fruit Tree Association in Toronto, Dr. H. Oberhofer, Fruit Extension Service, Lana, Italy proclaimed, "The United States should erect a monument to the 'Jonagold' apple." (4).

'Jonagold' is a heavily yielding variety (often 1000 bushels per acre) and it also has excellent eating quality. These attributes have contributed to the widespread interest in 'Jonagold' across Europe (15). According to Brian Lovelidge, correspondent for *The Grower* (UK) magazine, in Europe, 'Jonagold' yields as well and grows almost as easily as 'Golden Delicious,' but is more attractive and has far better flavor, and in the next 5 years, 'Jonagold' may become *the* prominent apple variety, replacing 'Golden Delicious' (16). Predictions indicate that by 1995 the most popular varieties in Holland will be 'Jonagold' and 'Elstar,' and 'Jonagold' will cover an estimated 22% of all apple acreage (6).

In the United States, 'Jonagold' is being extensively tested by the commercial apple growing industry in every apple growing region of the country. However, because the fruit does not have brilliant red color, its acceptance in this country has been less dramatic than it has been in Europe where more emphasis is put on good eating quality. With the recent introduction of new red strains, planting of 'Jonagold' will increase in the U.S. Dr. Robert A. Norton, Washington State University, Mt. Vernon, WA stated that in the region west of the Cascade Mountains of Washington State, 'Jonagold' has already become the leading apple variety (9). In Medford, Oregon, the Harry and David Company have packed 'Jonagold' in their fruit gift packages for the Fruit of the Month Club (7). Dozens of U.S. nurseries now sell trees of one or more red strains of 'Jonagold.'

The extent of commercial acceptance of 'Jonagold' in British Columbia was assessed by Dr. Harvey A. Quamme, Pomologist, Agriculture Canada Research Station, Summerland, BC (personal communication, April, 1988): "Apple growers in British Columbia have a strong interest in planting commercial orchards of 'Jonagold'; 50,000 trees of 'Jonagold' (a conservative estimate) have already been planted. In descending order, the 3 most important apple varieties planted in British Columbia in 1987 were 'McIntosh,' 'Jonagold' and 'Gala.'"

Similarly, in Japan, except for 'Tsugaru,' 'Fuji' and 'Starking,' 'Jonagold' was one of the most important varieties being planted in commercial apple orchards in the late 1980s. In October 1988, Roger Way and his wife, Mary, were invited as guests to an apple festival held by the Esashi City Apple Growers Association in northern Japan. They celebrated the 10th anniversary of the arrival of 'Jonagold' to their area. The Ways and 'Jonagold' were featured on Japanese national television. The Ways were presented with an expensive gift, an ornate Samurai Warrior's helmet, to show Japan's appreciation for this very popular new apple variety. In Japan, individual 'Jonagold' fruits sell on the retail markets for $3 each, more than any other variety.

Fruit. The average harvest date of 'Jonagold' at Geneva is October 12, 2 days later than 'Delicious.' Fruits adhere well to the tree after they have reached harvest maturity. Fruits are very large, mostly 3 inches and often 3½ inches in diameter. The shape is round-conic, nearly symmetical and only indistinctly ribbed. The skin is 30-80% covered with a medium shade of red; it is only slightly striped and is slightly dull. Sometimes there is a little scarfskin. The ground color is an attractive yellow with only a slight tinge of green which presents a pleasing over-all appearance.

The fruit flesh is colored light yellow, semifirm in texture, of medium grain,

crisp and unusually juicy. It is subacid to sweet, aromatic and excellent in eating quality, having a sprightly, Jonathan-like flavor. When the flesh is exposed to air, browning caused by oxidation develops slowly.

'Jonagold's' eating quality is rated by many as being the very best of any apple variety. In random tests of 600 Belgian consumers conducted by Hendrick De Coster, National Research Station, St. Truiden, 'Jonagold' always ranked first and 'Elstar' always ranked second (8). Similarly, R. A. Norton asked 19 apple experts in 9 countries to list the 10 best commercial dessert apples in the world. All 19 rated 'Jonagold' as first. Other high rating varieties were 'Gala,' 'Golden Delicious,' 'Cox's Orange Pippin,' 'Fuji,' 'Elstar,' 'Empire' and 'Red Delicious' (10).

The core of 'Jonagold' is very small relative to its large fruit size, which is a desirable attribute when fruits are being cored for processing. Smaller cores result in fewer carpel particles which must be expensively hand trimmed from slices.

In addition to its excellent quality as fresh fruit, 'Jonagold' also has very good processing characteristics. In controlled processing tests conducted by the Food Science and Technology Department at Geneva, 'Jonagold' rated good for applesauce and fair to good for canned slices and frozen slices, while 'Northern Spy' rated excellent for all three products. In 1990, applesauce manufacturers in New York State paid $10.50 per hundred pounds for large 'Jonagold' fruits which was a higher price than any other apple variety, except 'Northern Spy' (13).

'Jonagold' fruits have a long storage life. When stored at 31° F, they remained in a good marketable condition, without rot or shrivel, often as long as 6 months. The shelf life after storage is better than that of most varieties (17).

'Jonagold' performs best in the cooler apple growing districts, such as northern Europe, northern Japan, west of the Cascade Mountains, British Columbia and New York. But in hot districts such as eastern Washington, it generally does not perform well because fruits often are affected by sunburn (11).

Tree. 'Jonagold' trees are vigorous and somewhat above medium in size, similar to 'Golden Delicious,' but not as vigorous as 'Delicious' trees. Trees are very productive, annually cropping and have excellent orchard behavior. They have no special resistances to insects or diseases. Yield comparisons in the first 10 years showed 'Jonagold' trees to be about 20% more productive (22.3 bu cumulative yield) than comparable 'McIntosh' trees (18.6 bu). Fruits are borne mainly on spurs.

'Jonagold' trees bloom in midseason, along with 'Delicious.' 'Golden Delicious' is cross incompatible with 'Jonagold' but most other diploid varieties that bloom in midseason can serve as effective pollenizers. 'Jonagold' is triploid and therefore its pollen is not viable and it cannot serve as a pollen source for any other variety. Because it has 3 sets of chromosomes, it cannot be used as a parent in a conventional apple breeding program. Thus, it is at the end of its family line and there is no possibility of passing its excellent qualities on to another generation, unless genetic engineering techniques can be used.

Strains. Ballard (3) stated that the Henri Fleuren Nursery in Holland tested 59 strains of 'Jonagold.' The following are some of the most widely publicized strains: 'King,' 'Wilmuta,' 'Jonagored,' 'Jonured,' 'Highwood,' 'Crowngold,' 'Nicobel,' 'Rubinstar,' 'De Coster,' 'Jonica,' 'Jonasty,' 'Jonabel,' 'New Jonagold.' In 1989 the 'Jonagored' strain was exhibited by R. Morren-DeCoster of Belgium at the Marden Fruit Show in England where it won the prestigious prize for the best dessert apple and it received a challenge cup which had never left England until then.

Definitive and comparative descriptions of these strains have not been published. These discoveries of many strains of 'Jonagold' within the brief period of two decades after introduction indicate that its skin color is genetically unstable. Thus, it has mutated several times for increased red color and also, strains having even less red color than the original 'Jonagold' have been observed.

All red strains have been touted as having better fruit color than the original 'Jonagold.' The relative attractiveness of color of the various strains has yet to be fully evaluated. Indeed, some do have better color and for this reason, in the future, the original 'Jonagold' will no longer be marketed. All future propagations will be red strains. Several of them have been patented.

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Book Review

The Culture of Plum: Production, Marketing and Processing Techniques. Editors: S. Sansavini and M. Tagliavini.

This book is the outcome of a meeting held in Faenza (Italy) in 1989 and organized by the Institute of Arboriculture and Fruit Science of the Bologna University with the Italian Society of Horticultural Science and the Provincial Government. It includes a series of both review and original contributed paper that gives a wide and up-to-date overview of the Italian plum culture.

The different training system methods and rootstocks used are discussed. New advancements in mechanical harvesting and new selections from Italian plant breeding program are described. Information is given on the different susceptibility of different cultivars to bacterial-caused diseases. The book also includes a detailed description and discussion of new techniques in plum storage and processing. Problems of marketing and international trade as well as economic evaluations of major cultivars are reviewed.

The book is well illustrated and written in Italian language, with summaries of the papers in English.