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Mutsu: Performance and Evaluation Over Three Decades

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Changing consumer preference has rocketed the green-skinned Australian cultivar Granny Smith into the limelight in North American apple markets. It has become the highest priced apple and may become the number 3 apple in production in America shortly (7). Mutsu, a Japanese bred, greenish-skinned apple is also becoming established in North American orchards (15). The success of these two cultivars, in a very traditional and conservative marketplace, can be traced to specific cultivars characteristics and promotion. This review will discuss Mutsu's characteristics in relation to cultural requirements and future production and marketing in North America.

Mutsu, a cross of Golden Delicious x Indo, originated in 1930 at the Aomori Apple Experiment Station, Japan, and was named and introduced into the United States in 1948 (3). In subsequent years there have been accasional reports on Mutsu, e.g. Sudds (12) in Connecticut, but it has only been in the last decade or so that more complete evaluations of it have appeared (4, 6, 9, 10, 11).

Horticultural Characteristics

Tree is typically triploid with a vigorous, open, spreading growth habit, with wide angled, strong crotches, and large, dark green leaves. In a survey of 9 cultivars, Mutsu had the largest average spur leaf size, and this was correlated with the highest accumulated yields during a 17-year period (10).

The fruit is oblong, medium to large, comparable in size to Northern Spy (9). Its skin is smooth with light colored lenticels and unlike one of its parents, Golden Delicious, it is highly resistant to russetting. Overall color is bright green changing to greenish-yellow or golden-yellow with an occasional orange-brown flush. The flesh is white, juicy, sub-acid in flavor, and is crisp and fresh which has lead the English to rename it Crispin.

Productivity and Rootstocks

Research and grower trials have shown Mutsu to have medium yields relative to other cultivars. It is, however, a very *consistent* yielder provided that pollination requirements are met, and biennial bearing is not allowed to occur (see below, Pollination and Fruit Set). Proctor, *et al.* (9), reported in 1974, that in a trial with 7 cultivars on M.26, Mutsu tied with Delicious for third highest accumulated yield. This position in research trials has also been reported by Ferree *et al.* (6), for Mutsu on M.7 rootstock. In general, Mutsu is less effi-

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Table 1. Planting of Mutsu apple in Ontario on different rootstocks. Data for 1981 are for existing trees (Ontario Tree Fruit Census, 1981) and for 1983 are for trees sold by Ontario nursuries to growers in that year (data supplied by W. J. Blackburn, Agriculture Canada).

Year	Rootstock (% of total)							Total Number of Trees	Percent of all Cultivars
	M.9	M.26	M.7	M.2	MM.106	MM.111	Other		
1981	0.4	62.2	15.1	2.3	12.9	2.9	4.2	55,592	2.5
1983	0	51.1	28.4	0	19.2	1.3	0	6,831	1.2

cient (total crop ÷ the area of the trunk cross-section) than other cultivars; while this is due to its vigorous growth. Variation and production of Mutsu in grower orchards parallel research findings (13).

Way (15) showed that in New York Mutsu was becoming an important cultivar ranking 9th in new orchards. In Ontario in 1981 (Ontario Fruit Tree Census) it ranked 8th with 4.1% of all trees 1-5 years old. In Ontario, the preferred rootstock for Mutsu continues to be M.26 (Table 1) and these trees are planted at high density—over 200 trees per acre. Cummins (4) reported that in the first 8 years in the orchard Mutsu on 8 different rootstocks was most productive on M.2 and MM.106. Fruit on MM.106 were unattractive so the choice of rootstock was either M.2 or MM.102 in New York.

Pollination and Fruit Set

In Ontario, Mutsu is a mid-season bloomer and has been adequately set by similar season cultivars. Since it is a triploid, its pollen is not viable so a third cultivar will be necessary. Golden Delicious pollen appears to be incompatible with Mutsu (2). Fruit set can be heavy and can lead to biennial bearing – a trend which we have observed (9) and which persisted in the same trial (data not shown). However, Ferree *et al.* (6), have shown that Mutsu can be a very consistent producer based on the coefficients of variation of yields. Biennial bearing should not be a problem since crop load and fruit size are easily regulated with chemical thinners.

Winter Hardiness

In a survey following the severe winter of 1980-81 when a low of −37° C was experienced Mutsu had a very low hardiness rating comparable to Delicious (14). Low temperatures can also reduce the ability of Mutsu flower clusters to set fruit (10, 14). Mutsu is therefore being planted mainly in the milder parts of Ontario—the southwest and the Niagara peninsula (Ontario Tree Fruit Census, 1981).

Pest Problems

Mutsu has relatively few pest problems. Its most serious pest problem is bacterial blister spot, a disease causing shallow lesions (blistered brown centers with a dark purple border) around the lenticels of the fruit (5). Control sprays of the antibiotic, streptomycin have been tried, but are costly, not fully satisfactory and not registered for this use. Mutsu is considered to be only slightly susceptible to fireblight (1).

Maturity, Storage and Marketing

Mutsu is a late season apple being harvested after Golden Delicious at about 150 days after full bloom, but long before Granny Smith (180 to 190 days). It should be picked when it has a minimum of yellow (<10%), at this stage, it will store well in cold storage until May. Mutsu placed in controlled atmosphere (CA), storage has been

evaluated (11) and in North America it gives very satisfactory results. It is a dual purpose apple being readily accepted by processors as well as in the fresh trade.

In the fresh markets Mutsu receives high repeat sales and returns. For example, in the Toronto wholesale market from April to the end of June 1983, average price per bushel (42 lb.) for CA McIntosh was $12.00 and for Mutsu was $15.00.

The Future

Larsen (7) predicts that Granny Smith may be the third most important world cultivar within this decade. It is unlikely that Mutsu will receive this prominence even though it is a high quality, premium apple. The chief reasons are that it is newer (30 years vs. 100 years), growers are hesitant about planting triploids since they expect pollination problems, and it has not received the necessary promotion. Mutsu has relatively few faults or problems compared to Granny Smith (7). It should not be considered a substitute for Granny Smith, but an alternative especially since Granny Smith requires a long growing season which is not found in all apple producing regions in North America. Mutsu is a high value, premium apple with a great deal of consumer appeal. With a vigorous marketing program consumer acceptance and demand could increase in the marketplace to parallel Granny Smith.

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ERRATUM

Title in paper by G. Ames and R. Rom on page 155 of V. 38 (4) of FVJ should read "Black Ben Davis or Gano: A Question of Right, Truth and Justice."