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The 'Granny Smith' Apple

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'Granny Smith,' like many of the current commercial apple cultivars, arose as a chance seedling. It has been in cultivation for over 120 years but did not achieve significant volumes on international markets until after 1950. It is grown widely in many countries throughout the world but is particularly important in the southern Hemisphere (i.e., Australia, Argentina, Chile, New Zealand, South Africa) where production in 1991 was estimated to exceed 50 million cartons (one carton = approximately 18.5 kg). It currently accounts for about 7% of the USA production and about 4% of European apple production.

Origins

There have been many interesting and different stories about the origins of the cultivar but the most authentic and plausible appears to be that told by Mr. Benjamin Spurway, a grandson of Maria Ann "Granny" Smith after whom the cultivar is named (13). "Granny" Smith was born Maria Ann Sherwood in 1800. She married Thomas Smith in Sussex, England and emigrated to Australia in 1838. With a young family of six children they settled in the Ryde district near Sydney and later acquired a small block of land in Eastwood which they established as an orchard and market garden. Mrs. Smith assumed the weekly task of making the arduous 15 mile trip by horse-drawn cart to the Sydney markets to sell the family's produce. On one such trip she was given some apples, apparently of the cultivar 'French Crab' from Tasmania, by a fellow stall holder (Mr. Thomas Lawless) to test their cooking quality. On returning home she baked a pie from this fruit but deliberately sowed the seeds in the cultivated ground outside her kitchen window. Only one seed germinated and it was left undisturbed to grow. When the tree bore fruit, Mrs. Smith realised that it produced very fine apples that both cooked and stored well and consequently she nurtured the tree and harvested the fruit for her own use. Mr. Spurway proudly noted that "it is the best cooking apple, the best carrier, best drying apple, and, if allowed to remain on the tree until thoroughly ripe, then picked and placed in straw until it mellows, it takes its place amongst the best eating" (13).

An alternative version to this story is that told by a Mr. T. Small who claimed that, as a 12 year-old boy in 1868, he had gone with his fruitgrowing father, Mr. E. H. Small, to visit the Smiths. Mrs. Smith had taken them to see the apples growing on a tree on the property. This tree had apparently grown from some rotting 'French Crab' apples in gin cases that Mrs. Smith had brought back from the market and discarded near the creek on her property. One seedling survived and grew and this eventually became the 'Granny Smith' known today (8, 9). By the 1860's, Mrs. Smith had long been a popular figure in the Ryde-Eastwood district and now an elderly lady, she was affectionately known as "Granny." She died in 1870.

'Granny Smith' is, therefore, widely regarded as being the progeny of open-pollinated 'French Crab' but the true parentage cannot be confirmed. Some of the American 'Greening' apple cultivars have similar features. 'Cleopatra' is also very similar and may

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have come from a common source to 'Granny Smith.'

Mrs. Smith did not exploit the cultivar but gave wood for grafting or budding to those who asked for it. It was, in fact, Mrs. Smith's sons-in-law James Spurway and Henry Johnston, and another local orchardist, Edward Gallard that began the first significant cultivation of the cultivar. It was first recorded by the Royal Horticultural Society in 1883 (12). In 1895, a New South Wales Agricultural Gazette article on export fruit by Albert H. Benson, then fruit expert of the Department of Agriculture lists 'Granny Smith Seedling' as a late cooking apple suitable for export (3, 9). Benson was apparently the first to arrange for the cultivar to be grown outside of the district where it had originated. A colour plate of 'Granny Smith' was published in the N.S.W. Agricultural Gazette in September 1904 (opposite page 910). The commercial possibilities for the cultivar were recognised by nurserymen at about the turn of the century and significant plantings occurred from the 1920's onwards. By 1975 39% of Australian apple production was from 'Granny Smith' and that proportion remained in 1990/91 (9).

The commercialisation of 'Granny Smith' also occurred rapidly in New Zealand. The Auckland nurserymen, Mr. David Hay & Son of Montpellier Nurseries, were advertising 'Grannie Smith' for sale in 1895 and in their 1905-06 general catalogue, described the cultivar as:

> "A very large, green, handsome, long-keeping cooking apple. Superior to *French Crab*. The fruits resemble *Cleopatra* in shape and general appearance, but are much larger. A valuable addition to late keepers."

At that time trees were sold at the following prices: "Price, 1s [approx 5c US] each; 10s to 12s [50c to 60c US] per dozen, unless where otherwise quoted. Large purchasers liberally dealt with."

Their catalogue also stated boldly: "Winter's coming on! If the cellar is full of apples, the children won't go short of pies."

Another important New Zealand nurseryman, Mr. Hayward Wright (responsible for the selection of 'Hayward' kiwifruit) actively promoted the use of 'Granny Smith' in the 1920's. It was approved for export from New Zealand to Europe in 1923, and rapidly became an important commercial cultivar. Throughout the last decade it has been the most important single cultivar accounting for about 40% of total New Zealand apple production. Major expansion of 'Granny Smith' in North America and Europe occurred much later in the 1970's and was largely the result of demand generated through the popularity of the cultivar among consumers of fruit exported from the Southern Hemisphere. It is currently the third largest volume apple cultivar shipped from Washington State (6).

Plantings world-wide of 'Granny Smith' are predominantly of the standard non-spur type. Spur types such a 'Greenspur' and 'Granspur' have been selected and patented (1, 15) but these have a reputation for producing lower yields and poorer quality fruit than the standard type.

'Granny Smith' appears to have been used as a parent in some early apple breeding programmes. A cultivar named 'Granny Mack' was listed in nursery catalogues in New Zealand in the 1940's and was described as a cross between 'Granny Smith' and 'McIntosh' — the fruit of this late dessert cultivar was apparently similar in appearance to 'Granny Smith' but had a red rather than green skin colour (16).

Fruit description

Fruit are round conical in shape, fairly regular, somewhat flattened at the base and apex, and slightly five-crowned at the apex (4). Fruit size is classed as medium and under commercial production in New Zealand the

median size is in the 100 - 113 fruit/carton count (165 - 205 g) (14).

The fruit skin has a bright green ground colour that becomes greenish yellow with maturity. There are no stripes and lenticels can be very conspicuous as numerous large areolar dots. The skin is smooth and quite greasy in advanced maturity. The flesh is greenish white, firm and rather coarse-textured. It is a juicy, subacid and refreshing apple but lacks flavour (4, 12).

Growth Habit and Yields

'Granny Smith' has been classified as a Type IV cultivar with an acrotonic growth tendency (7) i.e., in a natural growth form trees develop as an inverted cone. The majority of fruit buds are borne on one- and two-year-old wood initially in terminal positions but later in lateral positions on horizontal and inclined (bending) branches. Spurs develop easily although significant zones of "blind" wood can persist. With such a growth habit, heading cuts will stimulate strong vegetative growth rather than encourage fruit bud formation (8).

In many New Zealand fruit growing districts (such as Hawke's Bay), growth is moderately vigorous] on rootstocks such as MM.106 but excessively vigorous on rootstocks such as Northern Spy, M.12 and M.16.

'Granny Smith' is partially self-sterile and compatible pollen from other diploid cultivars such as 'Red Delicious,' 'Rome Beauty,' 'Akane,' 'Golden Delicious,' 'Criterion' and 'Winter Banana' must be provided through an adequate interplanting arrangement (1). In most years 'Granny Smith' is self-thinning but it can have a tendency towards biennial bearing. Bloom thinning with chemicals is practised but must be carried out with caution as overthinning can easily result from inappropriate timing or application.

Yields of 'Granny Smith' of 2,500-3,000 bushels/acre (120-130 tonnes/ha) can be routinely achieved under commercial production systems in New Zealand on orchards which are more than 10 years old (10, 14). Lower yields are achieved in both North America and Europe. The record crop for a mature commercial 'Granny Smith' orchard in New Zealand is 4,000 bushels/acre (10).

Maturity

'Granny Smith' has long been regarded as an excellent multi-purpose apple, having both good dessert (fresh) and culinary properties.

The cultivar is classed as being late to very late (12). Fruit is harvested in New Zealand in April - May and in the Pacific Northwest it is regarded as a 180-day apple (i.e., days from full bloom to harvest) resulting in an October-November harvest (1, 6). Harvest is usually carried out with a once-over pick.

Ethylene production cannot be used as a maturity marker for 'Granny Smith' (unlike some other cultivars such as 'Cox's Orange Pippin' and 'Braebum') as it remains very low throughout the commercial harvest period (15).

Premium postharvest storage quality is achieved by harvesting fruit with a medium (not dark) green skin colour and a starch-iodine index number of one or higher for 95% of the fruit; fruit should not be harvested until starch has begun to disappear from the core (2, 6, 11). Premature harvest, especially of solidly green coloured fruit, will result in poor eating quality reduced storage longevity and enhanced storage scald development.

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Conservation System of Fruit Tree Genetic Resources and Recently Released Cultivars from Fruit Tree Research Station in Japan

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Abstract

Plant genetic resources, including fruit, are becoming increasingly significant on a worldwide scale. In Japan also, the importance of genetic diversity of crops has been recognized and the Gene Bank System has been developed for crop breeding. This manuscript gives basic information about conservation of fruit tree genetic resources and new cultivars released recently from the Fruit Tree Research Station in Japan.

Introduction

The Gene Bank Project was started in 1985 by the Ministry of Agriculture, Forestry and Fisheries (MAFF), with the creation of exploration, introduction, classification, conservation, evaluation, utilization and documentation of genetic resources systems. In this project, the National Institute of Agro-

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