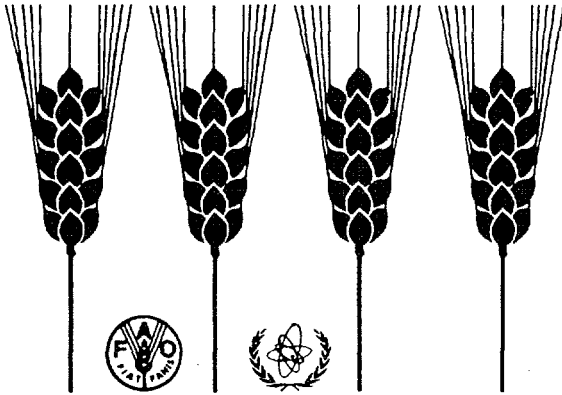




XA0201317-38

INIS-XA--480



Mutation Breeding Newsletter

JOINT FAO/IAEA DIVISION OF ISOTOPE AND RADIATION APPLICATIONS
OF ATOMIC ENERGY FOR FOOD AND AGRICULTURAL DEVELOPMENT
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA

Issue No. 32
July 1988



RESEARCH NEWS

XA0201318

"Golden Haidegg", a new apple mutant clone with improved marketing value

"Golden Delicious" and its derivatives are the leading apple cultivars in Austria. Traits limiting the economic yield are susceptibility to russeting, a heterogenous fruit assortment score and consumer preferences.

Mutation breeding was started in 1972. Dormant five bud scions of "Golden Delicious" were irradiated with 40, 50 or 60 Gy gamma rays at a dose rate of 20 Gy min⁻¹ and grafted on rootstocks M9. M₁V₁ survival rates were 78% (40 Gy), 36% (50 Gy) and 6% (60 Gy). Surviving scions produced, on the average, two primary shoots from which three to five buds were used for summer budding. Primary shoots were pruned back to force M₁V₂ shoots from the lower secondary buds.

An incidental occurrence of viruses and mycoplasmas was overcome by thermotherapy, but delayed completing procedures of selection, re-selection and confirmation of the selected traits till the M₁V₆ generation. Desirable mutations in shoot vigor, growth type, fruit size and fruit quality characters were obtained from the 40 and 50 Gy treatments only, while 60 Gy produced generally grossly aberrant phenotypes. A mutant with smooth sheen fruits associated with a more flat shape and non-russeting was selected from the 50 Gy treatment.

Smooth sheen and non-russeting are evidently independent traits. Among 18 different mutant clones tested in microtrials, only the russet-free, smooth sheen clone was superior to the parent cultivar in market value. This clone, named "Golden Haidegg", was tested during four

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years in different environments, compared with other clones derived from "Golden Delicious", i.e. Lysgolden, Belgolden, Supergolden, Cloden, Golden 1972, Golden s.r E9, Golden clone A and B, Golden Shay, Golden Missouri, Charden, Mutsu and Smoothe. All trees were virus free, grafted on rootstock M9 and trained as slender spindle; applied field management conditions were identical. The evaluation concerned yield, russetting, fruit-shape, colour, weight, assortment and cold-storability. Clone "Golden Haidegg" exerted similar performance as "Lysgolden" but had a better score of non-russetting and of fruit assortment. Though the fruit yield per unit area was insignificantly lower than of the highest yielding "Golden Delicious" clone, "Golden Haidegg" exceeded considerably the marketing value of "Golden Delicious" (99% compared to 63% A quality). While the fruit colour of "Lysgolden" is yellowish green with a dump reddish cover, "Golden Haidegg" has a faint yellow base and a brown-red cover colour. These differences may be associated with the 7-10 days later maturity of "Lysgolden". "Golden Haidegg" fruits have a 2-week longer cold-storability at 3°C and 90% rel.h. than "Lysgolden". Sensoric tests have valued the sweet-acid-aromatic components of "Golden Haidegg" higher than "Golden Delicious" which would improve acceptability by the consumer. Thus the new apple variety has a series of characteristics of economic value. "Golden Haidegg" has been released in 1984 and is already grown in several European countries.

REFERENCE

MOORE, J.N. and JANLCK, J., Methods in fruit breeding. Purdue Univ. Press, 1-464.

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XA0201319

Pollen irradiation method to obtain mutants in cucumber

Seed irradiation for mutation induction in dioecious crops like cucumber is not very useful because chimerism of the mutated tissues makes the segregation of mutants in the M_2 generation nearly impossible. This problem does not exist with pollen irradiation. Cucumber (Cucumis sativus L. var. Nishikisuyo) was used for a model experiment. The petals of male and female flowers were closed by pinching with binding wire before flowering to prevent pollination by insects. On the flowering day, the male flowers were collected and irradiated with 1 kR to 10 kR of acute gamma rays (^{137}Cs), then used to pollinate the female flowers. The M_1 seeds thus obtained are not chimeric but heterozygous for induced mutations. When planted, no mutant phenotype appeared. Selfing within a plant lead to segregation of mutants in the M_2 generation. Seedling examination revealed eight mutants (Table). One mutant line, in which the shape of leaves changed from pentagonal to round heart shape, was found under field conditions.

The optimal dose for pollen irradiation seems to be between 2 kR and 4 kR.