Spontaneous mutation frequencies in barley

Estimation of the spontaneous mutation frequency requires screening of very large populations and has therefore rarely been carried out in higher plants. A study on inter-allelic recombination in the ml-o locus allowed to collect some data on spontaneous chlorophyll mutants. 1866 barley plants were progeny tested in the greenhouse. 25 plants segregated for newly arisen, spontaneous chlorophyll mutant genes. Among a total of 470129 seedlings screened there were 79 mutants ($1.7 \pm 0.6 \times 10^{-4}$). If these data are pooled with others from similar materials the resulting estimate is 1.6×10^{-4} in about 1,43 million seedlings. The estimate of the chlorophyll mutation rate per generation is close to 6.3×10^{-4} per diploid genome. Assuming that the number of loci that can give rise to chlorophyll mutants is in the order of 500, the spontaneous mutation rate would be in the order of 6×10^{-7} per locus and haploid genome per generation.

From: JÖRGENSEN, J.H. and JENSEN, H.P. (Agric. Res. Dept., Risö National Laboratory, D-4000 Roskilde, Denmark). Hereditas 105 (1986) 71-72.

Application of mutagenesis for improvement of grapevines

The objectives of our mutation breeding programme are to improve good clones in a limited number of characteristics. One year old grafted vines were treated with x-rays during dormancy just before bud burst. Root stocks and base of the grafted vines were shielded. Among varieties irradiated with 2-6 kR were the following: "White Riesling" clone 239-25 Gm, "White Riesling" clone 110-18 Gm, "Müller-Thurgau" clone 6-8 Gm, "Ruländer (Pinot gris)" clone 2 Gm, "Blauer Spätburgunder (Pinot noir)" clone 20 Gm and "Trollinger". Grafted and rooted vines were found to tolerate higher doses of radiation than unrooted cuttings. In M_1V_2 many chimeric and non-chimeric variant shoots could be observed.

Two stable periclinal chimeras were obtained in "White Riesling" and "Trollinger" after irradiation. Out of irradiated "Ruländer", mutants of "Weisser Burgunder (Pinot blanc)" type were selected. In another experiment using 1500 rad of fast neutrons mutants with the characteristics of "Blauer Spät-Burgunder (Pinot noir)" were found. Within progenies of irradiated "Blauer Spätburgunder" early ripening types with dark skin berries were discovered.

New mutant clones under evaluation show interesting properties with regard to stem rot, Botrytis, yield and quality.

From: BECKER, H., (Institute of Grape Breeding, D-6222 Geisenheim, FRG). Schweizerische landw. Forschung 26 (1987) 3.

Improvement of soybean variety "Bragg" through mutagenesis

Variety "Bragg" (Jackson x D49-2491) of soybean (Glycine max. (L.) Merrill) was found to be high yielding and widely adaptable throughout India. Its yield stability, however, is unsatisfactory, probably due to low germinability necessitating use of higher seed rate. With the main objective to rectify this defect, mutagenesis involving chemical as well as physical mutagens was used. Dry seeds were treated with EMS or MMS (0.2, 0.4 and 0.6%), or gamma rays (15, 20 and 25 kR) with and without additional exposure to UV (2 hrs at 260 nm) in 1982 [1]. In M_2, a

mutation frequency ranging from 2.24 to 22.85% was observed. Screening of M_2 and of subsequent generations yielded a broad spectrum of mutations. Some of the mutants are agronomically useful. Among them, mutant "$T_2$14" resulting from 25 kR gamma rays + UV, was found to possess better germinability (+15%), earliness (5 days) and high yield during both rainy and post-rainy seasons in 1986 and 1987, when compared with the parent variety "Bragg". The mutant has smaller seed-size (TGW 125 g) than the parent (145 g). In soybean, large-seeded varieties were reported to have poorer seed germinability [2]. Thus, the better germinability of the mutant might be related to its reduced seed size. Seeds of the mutant show a light brown colour of the hilum in contrast to the black hilum of "Bragg". In other characters the mutant is similar to "Bragg".

The mutant should have potential for commercial cultivation in India. For confirmation of its agronomically superior performance, it is undergoing national evaluation in multilocational trials under "All India Co-ordinated Research Project on Soybean (ICAR)". The strain has been named "NRC-2".

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(Contributed by P.S. Bhatnagar, Prabhakar, S.P. Tiwari and J.s. Sandhu, National Research Centre for Soybean, Indore, 452 001, M.P., India).

Induced mutation altering flower colour in Chrysanthemum

"Flirt" is a double Korean type, small flowered Chrysanthemum of red colour. Rooted cuttings were treated with 1.5 - 2.5 krad gamma rays. A chimeral flower colour mutant was detected after 1.5 krad treatment. After purification through repeated cuttings a mutant clone was developed and released as commercial cultivar "Man Bhawan". It produces bi-coloured flower-heads: yellow and red at full bloom stage becoming completely yellow later on. By chromatography, 6 pigment spots could be identified in the variety "Flirt" but only 5 in the mutant, violet (hRf 69.83) being absent. Spectrophotometric analysis of petal extracts showed presence of three peaks in both "Flirt" and "Man Bhawan" at full bloom stage but only two in "Man Bhawan" at fading stage.

From: DATTA, S.K., (National Botanical Research Institute, Lucknow 226001, India). J. Nucl. Agric. Biol. 16 (1987) 217-218.

"Hari" a mutant cross derived rice variety released in India

TR-RNR-21 is a derivative from a cross between "IR-8" and "TR-5", the latter being a N_f-induced dwarf mutant of the salt tolerant variety SR-26-B. In initial yield evaluations at BARC during 1972-78 it gave higher yields of 54% in monsoon season and 19% in dry season over "Jaya" and compared favourably with "IR-8" and "Sona".