Useful mutations in Iraqi black barley

Barley (Hordeum vulgare L.) is an important fodder crop in Iraq, with a cultivated area of about 1 392 375 ha and a total production of about 838500 t. The 2-row black barley "LBB" is the most desirable one in semi-arid zone in northern part of Iraq, because of its drought tolerance and high protein content. However, this cultivar is susceptible to powdery mildew, and lodges. Gamma rays and EMS were used to induce mutations in "LBB" and its hybrid with "Arivat". Nine mutants with improved lodging were selected during the first six generations [1,2].

Five mutants INRC-BB-1, INRC-BB-3, INRC-BBR-4A, INRC-HB552 and INRC-HB-553 were resistant to powdery mildew while 2 mutants INRC-BBH-1 and INRC-HBR-3 were moderately resistant. Two mutants INRC-BB-123 and INRC-HBR-3 were also resistant to drought under 350-400 mm rainfall. Three mutants INRC-BB-1, INRC-HBR-3 and INRC-HBR-88 exceeded their original variety in seed weight per spike and TKW.

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(Contributed by I.F. Ibrahim, Dept. of Plant Protection, Faculty of Agric. and Biology, NRC, P.O. Box 765, Baghdad, Iraq).

Release to farmers of "Carioca Arbustivo Precoce 1070" (CAP-1070), a bushy bean mutant induced by gamma rays in Brazil

Seeds of the indeterminate growth type bean cultivar "Carioca" have been treated with 32 krad gamma rays. In $M_2$, a mutant showing bushy growth type has been selected. The mutant also shows earlier maturity (5-14 days) and therefore was called "Carioca Arbustivo Precoce 1070" (CAP-1070). The determinate (bushy) growth habit is due to one recessive gene and earliness is associated with this habit. CAP-1070 maintained the same response to diseases as the orginal cultivar [1].

In trials carried out in several states of Brazil, yield was lower, similar or greater than "Carioca" depending on conditions. The short flowering period of CAP-1070, resulting from the bushy growth habit may reduce grain yields but under favourable circumstances, CAP-1070 may yield more than other varieties. CAP-1070 raised great interest among farmers visiting experimental fields of F.T. Pesquisa e Sementes, a private plant breeding firm at Ponta Grossa, Paraná. Therefore, the firm decided to multiply the seeds and distribute them to farmers, who have now been cultivating CAP-1070 since 1986 between coffee rows.

The CAP-1070 is the first induced bean mutant cultivated by farmers in Brazil. However, like the original cultivar "Carioca", CAP-1070 became susceptible to diseases. Therefore, we crossed the mutant and have obtained promising lines with bushy habits, disease resistance and higher yield [2, 3]. CAP-1070 is also used in cross-breeding programmes of Government research institutes in Brazil.

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(Contributed by A. Tulmann Neto, Centro de Energia Nuclear na Agricultura, C.P. 96, 13.400 Piracicaba S.P. Brazil, $CNP_q$ fellow and J. Alberini, F.T. Sementes e Pesquisa, C.P. 409, 84.100 Ponta Grossa, PR Brazil).

## New cultivars of jujube induced by mutation

Mutation breeding of jujube (Ziziphus mauritiana Lin.) received attention by the Food Crops Research Institute since 1978. Mutations can be directly released as new cultivars or indirectly as bud grafting source.

N-methyl-N-nitroso urea (MNH) was used at a concentration of 0.02 - 0.04% for 12 h treatment of pregerminated seeds of different jujube cultivars. Some useful mutants were selected and directly released as new cultivars to farmers. Of the selected mutants two cultivars, "Ma hong" and "Dao tien", are the most preferable and popularly grown in the country.

"Ma hong" is a mutant of "Gia Loc", a very popular cultivar. Main useful traits of "Gia Loc" such as early maturing, two crops of fruits per year are maintained (harvest in December and August). "Ma hong" has round-formed, pink rose coloured, sweeter fruits and stable fruit yield in off-season (Aug.) as compared with oval-formed, yellow-coloured and sour fruit of "Gia Loc".

"Dao tien" is a mutant of the local variety "Thien Phien" with quite different traits. The original cultivar is late maturing (harvested in Feb.) with one crop of fruit per year and has small fruits (mean wt. of fruit at harvest 20 g). "Dao tien" is one month earlier in maturing allowing two crops of fruit per year (harvested in Jan. and Nov.). Fruits are round-formed, bigger (mean wt. of fruit: 25 g) and more tasteful (peach-flavored and brittle).

(Contributed by V.T. Hoang and N.V. Tuynh, The Food Crops Research Institute, C-40, TULOC, Hai Hung, Vietnam).