Internat. J. Agric. Sci. Vol.4 No.1 January, 2008 : 146-151

Mutagenic response and induced macromutation in finger millet

K. C. MUDULI*[1] AND R. C. MISRA
Department of Plant Breeding and Genetics, Orissa Univ. of Ag. & Tech., BHUBANESWAR (ORISSA) INDIA

ABSTRACT

Seed samples of two varieties of finger millet, namely, VR 708 and GPU 26 were treated with three doses each of Gamma rays (15, 30 and 45 kr), ethyl methane sulphonate (0.15, 0.30 and 0.45%) and nitroso guanidine (0.015, 0.030 and 0.045%) in addition to combination treatments of Gamma rays (30 kr) with EMS (0.30%) or NG (0.030%). In the M_1 generation, the mutagenic treatments showed reduction in mean values of all the eight characters studied and the magnitude of reduction was directly related to the dose/concentration of the mutagens. Such adverse effects in the M_1 parameters were more pronounced in NG followed by Gamma rays + NG combination treatment. The varieties also showed differential response to mutagenic treatments. In the M_2 generation, the mutagenic treatments were effective in inducing various types of chlorophyll and morphological macromutations and a few of those affecting flowering, maturity and plant height were of some breeding value. The frequency of macromutations increased with increase in dose of mutagen and in general, was more in combination treatments followed by NG and Gamma rays treatments. Though there was no definite trend or specificity in the spectrum of different macromutations and frequency of each macromutation, there was wide difference with respect to the mutagens and the genotypes.

Key words : Finger millet, Induced macromutations, Mutation frequency and Spectrum, Mutagenic treatments.

INTRODUCTION

Artificial hybridization and recombination breeding for varietal improvement in finger millet (*Eleusine coracana* Gaertn.) could not be taken up in a big way because of small floret size. Under this situation, the induced mutagenesis is one of the alternative breeding methods which can be applied to enhance the variability and correct one or more defects of a cultivar. For any breeding programme, selection of effective and efficient mutagen(s) is very essential to recover high frequency of desirable mutants. The primary objectives of mutation breeding are to enlarge the frequency and spectrum of mutations and to increase the occurrence of viable mutations as an approach towards directed mutagenesis. The present paper, a portion of the mutation breeding project, aims to report the effect of Gamma rays, ethyl methane sulphonate and nitroso guanidine in isolation and combination treatments on mutation frequency and spectrum in two established varieties of finger millet.

MATERIALS AND METHODS

Well filled and matured seeds of two improved varieties of finger millet *viz.* VR 708 and GPU 26 were treated with three doses each of Gamma rays, ethyl methane sulphonate (EMS) and nitroso guanidine (NG) employed individually or in combination. The dose/concentration of mutagens and treatment code of the eleven mutagenic treatments are presented in Table 1. Dry seeds were given Gamma rays treatment at BARC, Trombay. Treatment with EMS and NG were given for 6 hours after pre-soaking the seeds in distilled water for 10 hours. For combination treatments, seeds were first irradiated with 30 kr dose of Gamma rays and then treated with 0.30% EMS or 0.030% NG solution for 6 hours at room temperature. The treated seeds were thoroughly washed in running water, blotted dry and immediately sown in the nursery bed. The M_1 generation was raised in RBD with two replications during September-December 2001 in two separate trials for both varieties. Observations on germination percentage, seedling height and root length were recorded in the laboratory by putting the seeds in Petridishes. Observations on plant height, tillers/plant, fingers/ear, finger length and yield/plant were recorded on twenty randomly selected plants. The M_1 generation was harvested as treatment bulk. The M_2 generation along with the parental variety was raised during July-November 2002. Two separate trials, one for each variety were conducted in RBD replicated thrice. Each treatment was represented by 10 rows of 3m length with a spacing of 30 x 10 cm. Recommended doses of fertilizers were applied to raise the crop. Different types of chlorophyll mutations were

* Author for correspondence.
[1] Department of Seed Science and Technology College of Agriculture, O.U.A.T., BHUBANESWAR (ORISSA) INDIA