

Macro and micro-morphological mutants in varieties of sunflower (*Helianthus annuus* L.) by using gamma-rays, sodium azide and combined treatment

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Accepted : April, 2010

SUMMARY

Two varieties of viable seeds of sunflower (USH-430 and Nidhi-999) treated with gamma-rays, sodium azide and combined treatments. The following micro-mutants were scored *viz*: patchy albino, white margin, virescent, darker green, xantha purple, albino. The micro-mutants were increased with increased dose concentrations with all three treatments in both the varieties. The micro-mutations rate was high with sodium azide followed by combined and gamma-rays treatment. The macro-mutants include, branched, basal stem bifurcation, rosette and compact leaf arrangement, double headed, dwarf early-I, dwarf early-II and mosaic leaf arrangement. The macro-mutations were scored high at gamma-rays followed by combined and with sodium azide treatments.

Key words : Mutation breeding, Macro and micro-mutations, Gamma-rays and sodium azide

Sunflower has become an important oil seed in the Indian vegetable oil pool following its introduction from Russia in 1969, and in such a imported varieties, some valuable traits have been lost due to poor farming techniques by poor farmers. Characters not known in the natural variability of species (or population) concerned may be created by induced mutation in up to date variety. Macro-mutations technique has been used for continuous improvement of newly introduced varieties and in this way to extend their life span. In mutation breeding programmes, macro-mutants may be used directly. Macro-mutants may be very useful in cross-breeding since they may carry desired characters which otherwise are to be found only in non adapted varieties such as primitive types or even in wild forms. The desired goal of plant mutagenesis has been to control and direct the induced mutation process to generate mutation at specific loci and alter the mutation spectrum. For mutation breeding this goal is more specific, since the desire here is to produce “at will mutations” that having a beneficial value for crop improvement.

A wide range of morphological and physiological mutants have been reported in barley (Nilan *et al.*, 1973 and Kleinhofs *et al.*, 1978) with sodium azide which is very potent mutagen. Gamma-rays induced chlorophyll and macro-mutations in rice (Miah *et al.*, 1970), in barley

(Swaminathan *et al.*, 1962). Some combinations of mutagens have been tested in rice by gamma-rays and combined with sodium azide (Reddi and Rao, 1988). Further Gaikward and Kothekar (2004) with combined treatment scored the macro-mutants and chlorophyll mutants in lentil. Hence, the present investigation was carried out to assess the effect of gamma-rays and sodium azide independently and with combined treatments on two varieties of sunflower in generating the macro and micro-mutations in employing them in this crop improvement.

MATERIALS AND METHODS

Genetically pure and viable seeds of two varieties of common sunflower (*Helianthus annuus* L.) *viz.*, USH-430 and Nidhi-999 were procured from Acharya N.G. Ranga Agricultural Research Centre (ANGRARC), Anakapalli, A.P. and were used in the experiments. Seeds with 11 per cent moisture content were exposed to 2kR, 4kR, 6kR, 8kR and 10kR of gamma-rays (Cobalt⁶⁰) at Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, Tamil Nadu. The seeds were also presoaked in distilled water for 10 hours and then subjected them to the treatment with sodium azide at different concentrations of 2mM, 4mM, 6mM, 8mM and 10 mM. Gamma-irradiated seeds were also again (combined) treated with sodium azide at (2kR + 2mM, 4kR + 4mM, 6kR + 6mM, 8kR + 8mM, 10kR + 10mM), respectively.

The seeds were sown in Botany experimental farm separately in seed beds and watered as per schedule. The seeds without exposure to the gamma-rays were sown in separate seed beds and termed as control plants. After 15 days of sowing the seedlings were transplanted to

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