

ABSTRACT

ETHYLMETHANE SULPHONATE INDUCED MUTATIONS AND OTHER STUDIES ON JAMAICAN SORREL

(Hibiscus sabdariffa var. sabdariffa)

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Jamaican Sorrel (Hibiscus sabdariffa var. sabdariffa) is grown by most small farmers in Jamaica. The fleshy calyces are used to produce a traditional Christmas drink. There was limited variability available for genetic improvement with only two cultivars grown: Jamaican Red (JR) and Jamaican Green (JG).

The objectives of the study were: 1. to induce variation in qualitative and quantitative traits in Jamaican Red and Jamaican Green cultivars, using ethylmethane sulphonate (EMS); 2. to study the segregation pattern of mutants induced, if any; 3. to select for early and late flowering types from the advanced generations; 4. to study the extent of heterosis for economically important traits in hybrids between the Jamaican cultivars and others received from the USDA; and 5. to estimate the natural outcrossing rate in Jamaican Sorrel.

Seeds of JR and JG were presoaked in distilled water for 4 hours and treated with 0.0%, 0.4%, 0.8% and 1.2% EMS for 8 hours, and 0.0%, 0.6% and 0.8% EMS for 6 hours, respectively. The results indicated that 0.6% EMS was an effective concentration for inducing variation in JG. Very few mutants were observed in the genotype JR.

Segregation patterns indicated monogenic inheritance for *marginata*, red stem over green and *chlorotica-virescens* mutants. Ratio of 13:3 (gene interactions) was observed for *xanthescens*, unopened flower, non-serrated leaf and rosette dwarf mutants. Dwarf-1 and dwarf-2 mutants had rows that segregated for 15:1 and 3:1.

The rosette dwarf mutant was found to be gibberellic acid-insensitive and the non-serrated leaf mutant was essentially female sterile (lacking a stigma). It is recommended that the female sterility should be transferred in the genetic background of JR, producing a continuous supply of seed-less capsules. These mutants can be used to study linkages with known qualitatively inherited traits and in the genetic improvement of Jamaican sorrel.

EMS was useful for inducing quantitative variation in days to flowering, plant height and number of capsules per plant, as estimates of variances were higher than parentals. Response to selection for early and late flowering was found in JR and JG, respectively, indicating that the variability had a genetic basis.

Three hybrids showed negative heterosis for days to flowering and positive heterosis for plant height and number of capsules per plant, over midparent, better parent and JR as the standard parent. It is suggested that the photoin sensitivity genes present in PF s60-M35 should be introduced into JR.

Natural outcrossing rate was less than 1% indicating that Jamaican Sorrel was highly self-fertilized at this site. Therefore, for maintenance of varietal purity and genetic improvement, the local cultivars can be handled similar to any other self-pollinated crop.