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A SPONTANEOUS LEAF COLOUR MUTANT IN *SACCHARUM*

M. N. PREMACHANDRAN

Sugarcane Breeding Institute, Research Centre Cannanore 670002

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ABSTRACT

A *Saccharum edule* Hassk. clone 57 NG 234, with purple leaves, leaf sheaths and cane, had a green-purple striped bud mutant. On clonal multiplication the striped form gave rise to plants with purple, green or striped leaves and leaf sheaths. This mutation is proposed to be due to a transposable element acting on a gene affecting anthocyanin synthesis, analogous to the B gene in maize.

Key words: *Saccharum edule*, leaf colour mutation, transposable element.

The present commercial varieties of sugarcane are complex hybrids involving *Saccharum officinarum* L. with other species of *Saccharum*. Due to the cytogenetic peculiarities and the inherent difficulties in controlled crosses, sugarcane was neglected by geneticists. The genetics of qualitative characters of sugarcane was least studied. The bud mutations occurring in different clones of *Saccharum* can be used for initiating genetic studies. The clone 57 NG 234 in the world collection of sugarcane germplasm at Cannanore classified under *Saccharum edule* Hassk. [1], is characterised with purple leaves, leaf sheaths and cane. The present report is on the clonal analysis of a bud mutant with green stripes on leaves and leaf sheaths.

A bud mutant of the uniformly purple (i.e. cane, leaf sheaths and leaves) *S. edule* clone 57 NG 234 with green-purple striped leaves and leaf sheaths was identified in the germplasm maintenance plots in 1990. The cane from the striped form was clonally multiplied which gave rise to purple, green and striped forms. They were planted separately as single budded setts, and the colour of the shoots were observed. The parental purple form (57 NG 234) was stable, giving rise to only purple forms in the clonal progeny. The striped form gave clonal segregation to purple, green and striped. Out of 40 plants obtained from the striped form, 5 were striped, 14 green and 21 purple. The stripes were not present in all the leaves, and the size of the green and coloured sectors also varied. The buds from the wholly purple sectors of the striped form gave rise to purple forms, buds at the wholly green sectors of the cane gave rise to green, and those at partially purple and green sectors gave

rise to plants with stripes. The green forms on clonal multiplication gave rise to green plants only. The cane colour of such plants was also green. In one green plant, a leaf developed purple sector, indicating the possibility of somatic reversion of this mutation.

Mutations affecting cane colour were reported in *S. officinarum* [2], where clones produced green or red bud mutants from a green-red striped form and then reverted to the striped form with no apparent change in the original combination and concentration of the basic pigments. Many *S. officinarum* clones in the world collection of germplasm have striped canes, and some of their self-coloured mutants are also being maintained. None of these clones had purple-green stripes on the leaves as observed in clone 57 NG 234, therefore the leaf colour mutation observed in this case may be different from the cane colour mutations in *S. officinarum*.

The variegated colour patterns of the kernels of maize (*Zea mays* L.) and flower petals of snapdragon (*Antirrhinum majus* L.) were reported to be due to different transposable genetic elements which inhibit colour formation [3]. The sporadic excision of the mobile element results in development of coloured segments on colourless background. Such somatic instability is a consequence of repeated insertion mutations. Hence, the leaf colour mutation observed in the *Saccharum* clone 57 NG 234 may be due to a transposable element acting on the gene for anthocyanin synthesis.

The purple colour on the leaves and leaf sheaths in the parental clone 57 NG 234 develops only on exposure to sunlight, the clone remains green in the absence of light. The green stripes on purple leaves even after exposure to sun may be due to the absence of the factor controlling pigment formation in the green sectors. In maize, the absence of the B gene, which conditions the leaf colour results into total lack of pigment [4]. Another locus with its recessive allele pl has sunlight-dependent colour formation in presence of gene B, and with Pl, the dominant allele, the plant becomes coloured even without exposure to sun. The situation in the purple leaved clone 57 NG 234 may be analogous to B pl and the gene combination in the green leaved form could be b pl. The transposable element when inserted at or near B will make the gene to act as its recessive allele b.

The unstable striped form in the clone 57 NG 234 can be maintained clonally along with the mutant green and the parental purple forms.

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