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Presentation Topic:

IMPROVEMENT OF SWEETCORN USING GENOMICS-ASSISTED BREEDING

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Abstract: Sweet corn is popular both as processed and fresh vegetables, and holds significant share in domestic and international markets. Fresh sweetcorn products such as sweetcorn milk and soups are gaining popularity. Further, green plants serve as source of fodder to the cattle,

and therefore provide extra sources of income. Two genes affecting the starch metabolism *viz.*, *sugary1* (chromosome-4) and *shrunken2* (chromosome-3) have been extensively used in sweetcorn cultivar development. Sugary varieties (*sugary1*) at the milky ripening stage possess ~3-times more reducing sugar and sucrose, and 10-times more water soluble phytoglycan than traditional maize. Sugary kernels have creamy texture with good flavour and look plumpy, thus preferred by the consumers. However, the content of reducing sugars and sucrose in the *shrunken2*-kernels is ~6-fold higher than ordinary maize. The depletion of sugar level is much slower in *shrunken2*-type; thus varieties have extended shelf-life. Linked markers for *sugary1* and *shrunken2* have been developed and used in the breeding programme. Later, functional markers specific to *sugary1* and *shrunken2* have been successfully developed, validated and utilized in the molecular breeding programme. Sweetcorn genotypes with both *sugary1* and *shrunken2* with higher sweetness have been developed. Besides, *shrunken2* gene has been introgressed to convert normal maize into sweetcorn version. However, traditional sweetcorn is poor in nutritional quality such as lysine, tryptophan, provitamin-A and vitamin-E. These nutritional factors are essential for human growth, and deficiency of which leads to serious health problems. Utilization of recessive *opaque2* gene (chromosome-7) has led to significant increase in lysine and tryptophan in sweetcorn kernels. While, mutant *crtRB1* (chromosome-10) and *vte4* (chromosome-5) genes enhanced the levels of provitamin-A and vitamin-E, respectively. Sweetcorn hybrids with elevated levels of lysine, tryptophan, provitamin-A and vitamin-E have been successfully developed using genomics-assisted breeding. These newly developed sweetcorn hybrids would play vital role in enhancing food and nutritional quality.
Keywords: sweet corn, genomics-assisted breeding, *sugary1*, *shrunken2*, introgression