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Identification and tagging of fertility restorer (*Rf*) genes in chilli (*Capsicum annuum* L.) cultivars

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SUMMARY

A unique feature of CMS is that the expression of the trait is influenced by nuclear fertility restorer (*Rf*) genes .Gene specific primers were used in the present study to identify the accessions carrying the fertility restorer gene. Primers specific to *Rf* gene successfully amplified *Rf* region in G-4, S-49, Jwala, GVC-121, LCA-436, GVC-101, GVC-111, RHRC Pendent, Reshampatti cultivars indicating that these may be the potential restorer lines which can be utilized in heterosis breeding programme.

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Key words : *Capsicum annum*, CMS, *Rf* gene

Male sterility in pepper has been studied by Peterson (1958). Since then, much information dealing with the trait have been reported, including its isolation, mutagenic induction, inheritance, cytology and, particularly potential for hybrid seed production.

The CMS (cytoplasmic male sterile) phenotype is suggested to originate from some mutations in the mitochondrial genome of the male fertile progenitors as a result of some mutations of intra- or intermolecular recombination events. The association of CMS with abnormal mitochondrial gene expression has been reported in many plant species including maize, petunia, sunflower and common bean. Although it can appear spontaneously in nature, either in inter- or intraspecific crosses, for commercial hybrid seed production, often it is induced.

A unique feature of CMS is that the expression of the trait is influenced by nuclear fertility restorer (*Rf*) genes (Schnable and Wise, 1998). Nuclear restorer genes can suppress the effect of sterile cytoplasm and restore fertility to the next generation, which is a desirable requirement of the F1 commercial hybrid seed production. These fertility restorer genes are thought to block or compensate for cytoplasmic dysfunctions that are phenotypically expressed during pollen development. Although pepper is evaluated as a leading vegetable crop, the mechanism underlying CMS has not been sufficiently characterized yet. The mechanism by which the nuclear restorer gene acts to restore fertility is also poorly understood. Gene specific primers were used in the present study to identify the accessions carrying the fertility restorer gene.

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MATERIALS AND METHODS

Plant material

The experimental material used which consisted of thirteen cultivars of *Capsicum annuum* for determination of genetic diversity amongst the released cultivars. The cultivars and their origin are G-4 (Andhra Pradesh), AVNPC (Gujarat), S-49 (Gujarat), Jwala (Delhi), GVC-121(Gujarat), LCA-436(Andhra Pradesh), GVC-101(Gujarat), GVC-111(Gujarat), RHRC Pendent (Maharashtra), Punjab Gucchedar (Punjab), Kumthi (Local), Phule Jyoti (Maharashtra), Reshampatti(Gujarat).

Isolation of DNA from chilli leaves:

Genomic DNA was extracted from the leaves by Cetyl trimethyl ammonium bromide (CTAB) method (Zidani *et al.*, 2005) with some modifications. The young and healthy leaves from each cultivar of frozen tissue (0.300mg) was ground in a mortar and pestle in liquid nitrogen and homogenized in 1ml of preheated (600C) extraction buffer containing: 1M Tris-HCl (pH8.0); 1.4M Nacl; 20mM EDTA; CTAB 4% (w/v), 1% β-mercaptoethanol (added fresh in extraction buffer) and