

# GENETIC PURITY ASSESSMENT IN LINSEED (*LINUM USITATISSIMUM* L.) VARIETIES USING MICROSATELLITE MARKERS

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## ABSTRACT

The present investigation was undertaken in the Department of Genetics and Plant Breeding, ICGV, Raipur, India during Rabi 2012-13 and 2013-14 season. The present investigation was carried out with the objectives to identify informative SSR marker allele (s) for fingerprinting popular linseed cultivars, and to identify specific SSR markers in seed genetic purity assessments. A set of 38 SSR markers located across the 10 chromosomes of linseed were used, out of which 28 SSR markers were observed to be polymorphic for cultivars considered in the study. These loci were screened in breeder seed of four popular cultivars of linseed. Out of These Thirty-eight microsatellite markers six microsatellite (LU-1, LU-7, LU-8, LU-9, LU-24, LU-25) markers were found polymorphic which are used for fingerprinting in population. Based on the polymorphic status, 6 SSR markers were found to be informative for discriminating the genotypes and showed a total of 24 alleles. To validate the utility of the SSR markers in genetic purity assessment, seed lots of R 552, Deepika, Indira Ahi 32 and RLC 92 were assessed for their genetic purity using both SSR marker analysis and 18 morphological characters in a grow-out test (GOT). The results indicated practical utility of the SSR markers in assessing the genetic purity of the linseed cultivars and their fingerprinting.

**Abbreviations:** CTAB-Cetyl Trimethyl Ammonium Bromide, DUS-Diversity Uniformity Stability, PAGE-Poly Acrylamide Gel Electrophoresis, PCR-Polymerase Chain Reaction, PIC-Polymorphic Information Content, SPSS-Single Plant Selection, SSR-Simple Sequence Repeats, UPOV-Union for Protection of New Plant Varieties.

## INTRODUCTION

Linseed (*Linum usitatissimum* L.) belongs to the genus *Linum* of the family *Linaceae* commonly known as "Alsi" and has 2n = 30 chromosomes. Linseed is one of the important rabi oilseed crops of India, cultivated in light soil under one of two irrigation in Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Maharashtra, Rajasthan, West Bengal, Karnataka, Orissa and Bihar. In Chhattisgarh, linseed is grown mostly rainfed as "utera" as well as in crop fields (Pali and Mehta, 2014). It is one of the oldest crops cultivated by man. Based on diversity of plant types, linseed has two centers of origin i.e., South West Asia, particularly in India (Vavilov, 1935; Richharia, 1962) and the Mediterranean region of Europe (Darlington, 1963). In industrial oil production, it ranks first in the country. It is a long day, self pollinated crop and is cultivated in 34 countries of the world. Genetic diversity in sesame, based on morphological, biochemical, metabolic, and molecular markers, has been reported by many researchers worldwide (Tripathi et al., 2013; Yol and Uzun 2012).

Fingerprinting with molecular markers allows precise and rapid cultivar identification, which has been proved to be an efficient tool for crop germplasm characterization, collection and management. SSR markers have been widely used for genetic analysis and cultivar identification because of their abundance, co-dominance, inheritance, high polymorphism,

reproducibility and ease of assay by PCR (Kulrung et al., 2004 and Xie et al., 2011). Fingerprinting of the commercial linseed popular varieties based on molecular markers is a crucial measure for unambiguous and quick identification of similar or closely-related cultivars.

The genetic purity of varieties is conventionally determined by the grow-out test (GOT), which is based on assessment of morphological and floral characters called "descriptors" in plants grown to maturity. However, it is a time and resource consuming exercise, influenced by environmental factors and the results are often subjective. The above limitations can be managed effectively by employing molecular markers, particularly DNA based markers which can be assessed through the technique of PCR.

Among the molecular markers, microsatellites also called Simple Sequence Repeat (SSR) markers are most suitable for many applications because of the ease in handling, reproducibility, co-dominant inheritance and genome-wide coverage (McCouch et al., 1997). The use of SSR markers for assessing genetic purity of parental lines and hybrids has been reported in agricultural crops like rice (Sundaram et al., 2008) and maize (Mingsheng et al., 2006).

The above limitations can be managed effectively by employing molecular markers, particularly DNA based markers which can be accessed through the technique of

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