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Production of interspecific hybrids through ovule culture in sesame

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SUMMARY

Sesame (*Sesamum indicum* L.) is one of the oldest traditional oilseed crops, valued for its high cooking quality and medicinal value of its oil. Globally it is being cultivated on a sizable acreage but its productivity is low and particularly in India, its yield levels are the lowest among all major oilseed crops. This may be due to a dearth of high yielding cultivars, lack of resistance to pest and diseases. Genetic diversification of crop species through wide hybridization can be a first step in plant breeding programme. The wild species of sesamum have long been recognized as an important source of resistance to pest and disease and other novel traits such as male sterility. Although, interspecific hybridization can lead to broadening of genetic base and introgression of useful genes into cultivated genotypes, it has been difficult to produce interspecific hybrids due to incongruity barriers. Thus, the frequency of interspecific hybrids obtained is either nil or extremely low. The present investigation was initiated to standardize protocol to produce interspecific hybrids in sesamum. Increase in ovule germination percentage was observed as the age of ovules increased upto 12 days after pollination. and also better response was observed in half MS medium. The procedure to standardize removal of ovule seed coat and influence of MS media composition and genotypic differences on success of ovule culture was discussed in detail.

Key words : Fertilization barriers, Genetic diversification, Interspecific hybridization, Ovule culture, *Sesamum indicum*

Sesame (*Sesamum inducum* L.) credited as the "Queen of Oilseeds" owing to the high cooking quality and medicinal value of its oil. India is considered to be the major centre of genetic diversity of sesamum and also is the largest producer covering 42 per cent of world's sesamum area and 27 per cent of production. The limited breeding efforts to develop high yielding cultivars, in addition to the lack of resistance to biotic and abiotic stresses, is the major cause of low productivity in sesame. The variability and germplasm resources available in *S. indicum* are limited to combat these diseases and pests (Ashri, 1998). The genus *sesamum* has 38 species along with cultivated species *S. indicum.* Some of the wild species are known to have useful genes including disease and pest resistance. Although, interspecific hybridization utilizing cultivated and wild species of sesamum can lead to broadening both nuclear and cytoplasmic genetic base of the cultivated species and introgress desirable traits into cultivated genotypes, it has been difficult to produce interspecific hybrids due to incongruity barriers. Thus, the frequency of hybrids obtained is either nil or extremely low. The barriers to hybridization can occur at any stage from pollination to fertilization or even at later stages of development of the hybrid plants (Levin, 1971). Studies to identify the specific barriers and methods to over come them form an important step for developing successful wide hybrids at higher frequencies. However, such systematic studies in crosses between wild and cultivated species of sesamum are limited. Post fertilization barriers result in failure of fertilized ovules to develop into seeds. These barriers operate at different stages of embryo development or during germination and subsequent development of the F_1 hybrid. Earlier report of Ramesh *et al*. (2003) between the cross S.*radiatum* x S.*indicum* indicated the absence of pre fertilization /presence of post fertilization barriers. The present investigation was taken up to standardize the protocol and techniques to overcome post-fertilization barriers in sesamum through ovule culture.

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MATERIALS AND METHODS

The experiments were conducted at Department of Genetics and Plant Breeding, UAS-Dharwad, India, during 2003-07. Two wild species *S.occidentale and S.radiatum* a source of desirable traits like resistance to drought, phyllody and leaf curl disease (Prabhakaran,1996) were used as female parents to cross with two cultivars (DS-1 and E-8) of cultivated species, *S. indicum*. The crossed pods from *S. occidentale and S. radiatum* with *S. indicum* (DS-1 and E-8) were collected at nine to twelve days after pollination and before aborting. The capsules were surface sterilized with 0.2 per cent $HgCl_2$ solution for 20 minutes in laminar air flow chamber. After draining off the sterilant, the capsules were rinsed with sterile distilled water for 5 times. The capsules were