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In vivo studies on pollen germination, tube growth and micropylar penetration in interspecific crosses of sesame (*Sesamum indicum* L.)

VIKAS KULKARNI AND O. SRIDEVI

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SUMMARY

The genus *sesamum* has 38 species and some of the wild species are known to have useful genes like disease and pest resistance and other novel traits such as male sterility. Prevalence of wild forms of a cultivated species need not guarantee success in germplasm enhancement scheme. A prerequisite for it is a successful hybridization with the cultivated taxon. Earlier attempts to introgress useful genes from wild relatives into cultivated sesame have been less successful due to low crossability in the interspecific crosses. An understanding of the biological nature of incompatibility systems that impede hybridization offers tools for successful introgressions into cultivated sesame. The objective of this investigation was to observe pollen germination and pollen tube growth in cross pollinated wild sesame pistils as an indicator of pre-zygotic barriers operating in wide crosses involving *S.indicum*. Five wild species: *S. mulayanum*, *S.malaaricum*, *S. occidentale*, *S. radiatum* and *S. prostratatum* were used in hybridization with *S. indicum*. All the interspecific hybrids were studied for pollen germination, pollen tube growth and micropylar entry of pollen tube using fluorescent microscopy. Pollen grain germination and micropylar entry of pollen tube was more in the cross involving *S. malaaricum* and *S.mulayanum with S.indicum* compared to *S.occidentale*, *S.radiatum*, and *S.laciniatum* with *S.indicum* crosses. Techniques to overcome these incompatibility barriers to produce successful interspecific hybrids are discussed.

Key words : Aniline blue, Fluorescent microscopy, Interspecific crosses and Sesamum spp.

Sesame (*Sesamum indicum* L.) is an important annual oilseed crop grown especially in developing countries as a rich source of oil, protein, calcium and phosphorus. Among oilseed crops, sesame is the most ancient oilseed known and grown by humans according to archaeological records (Nayar, 1984; Salunke *et al.*, 1991). While it is being cultivated from ancient times on a sizable area, its yields levels are the lowest among all the oilseed crops (Brar and Ahuja, 1979).

This may well be due to a dearth of high yielding cultivars, lack of resistance to pest and diseases and poor response to improved agronomic practices. Major diseases causing yield losses are *Alternaria* leaf spot, *Cercospora* leaf spot and phyllody and an important pest attacking sesame is shoot webber. 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 and some of the wild species are known to have useful genes like disease and pest resistance. This creates the potential for using the wild forms of sesamum as germplasm donors in breeding programmes for various biotic and abiotic stresses (Prabhakaran, 1996). Although interspecific hybridization utilizing cultivated and wild species of sesamum can lead to broadening both nuclear and cytoplasmic genetic base of the cultivated species. Crop improvement in sesame through an infusion of germplasm from wild relatives has also been reported from the 1940s (Ramanujam, 1942, 1944). But it has been difficult to produce interspecific hybrids due to incongruity barriers. Thus, the frequency of hybrids obtained is 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 (Stebbins, 1958; Levin, 1971). Systematic investigations of incompatibility barriers that hinder wide hybridization would certainly assist in developing methods to overcome them intern realize interspecific hybrids. Such systematic studies in crosses between wild and cultivated species of sesamum are limited. This study was carried out to observe *S. indicum* pollen germination, pollen tube growth and micropylar entry of ovule on stigmas of wild sesame.

MATERIALS AND METHODS

Five wild species of sesame *viz.*, *Sesamum malabaricum*, *S. mulayanum*, *S. prostratum*, *S. radiatum* and *S. occidentale* and two cultivars DS-1 and E-8 of cultivated species *S. indicum* were used as parents in the present investigation. A description of cultivated and wild species with regard to specific morphological

Correspondence to:
VIKAS KULKARNI, Syngenta India Ltd., Yelhanka New Town, BENGALURU (KARNATAKA) INDIA
Authors' affiliations:
O. SRIDEVI, Syngenta India Ltd., Yelhanka New Town, BENGALURU (KARNATAKA) INDIA