

Importance of fruit growth stages in immature seed culture for development of tomato interspecific F₁ hybrid (*L. esculentum* x *L. peruvianum*)

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ABSTRACT

Tomato interspecific hybridization was undertaken with two cultivars (*L. esculentum*) and six accessions of *L. peruvianum*. An unilateral compatibility was observed with the use of tomato cultivar as a maternal parent and *L. peruvianum* as a pollen parent. Post-zygotic sterility was responsible for immature seed development during fruit ripening. Among eight fruit growth stages studied from 10-49 days after pollination (DAP) at an interval of 5 days, the most critical fruit stage for culture of immature hybrid seeds (i.e. which resulted in maximum seed germination) was varied according to tomato cultivars used as a maternal parent. For tomato cv. Dhanashree, the most critical fruit stage was 30-34 DAP (0.77% seed germination) while for cv. 85-1, it was 25-29 DAP (0.38%). However, early (10-14 DAP) and late (40-49 DAP) fruit growth stages were not found suitable for culture of immature hybrid seeds.

Key words : *L. peruvianum*, Tomato interspecific hybrid, Immature seed, Fruit growth stage, Post-zygotic sterility.

Cultivated tomato is highly susceptible to several biotic and abiotic stresses in particular, susceptibility to viral diseases like Tomato Spotted Wilt Virus (TSWV), Tomato Leaf Curl Virus (TLCV) are major threats to tomato cultivation in tropics. As chemical plant protection measures cannot offer protection against viruses, incorporation of genetic resistance from wild *Lycopersicon* species from "peruvianum complex" is the only solution against viral diseases. Therefore major crop improvement in tomato *Lycopersicon* species to commercial tomato cultivars, especially for disease resistance through interspecific hybridization. *L. peruvianum* is the most important reservoir of resistance for biotic and abiotic stresses (Kalloo, 1991). In view of this an interspecific crossing programme was carried out at Department of Horticulture, MPKV, Rahuri with the major objective of incorporation of resistance for biotic and abiotic stresses from wild taxa to cultivated type.

During the crossing programme it was observed that normal fruit development can be obtained in interspecific hybridization when wild tomato is used as a pollen parent but seeds do not develop completely. This is due to post zygotic sterility which can be overcome through culture of embryos (Smith, 1944; Thomas and Pratt, 1981) It is therefore necessary to employ tissue culture technique for the embryo rescue and further development of interspecific hybrid plants. However, recent approach to

circumvent interspecific crossing barriers in tomato is culture of immature seed (Imanishi *et al.*, 1985, Wu *et al.*, 1987 and Patil *et al.*, 1993). However, Chen Lanzhuang (1996) and Lai *et al.* (1990) stated that selection of fruit growth stage was the most crucial factor in culture of immature seeds obtained from tomato interspecific crosses. Nevertheless, most of the earlier studies in tomato interspecific hybridization were limited with exotic tomato cultivars, which were suitable particularly for polyhouse cultivation under temperate climatic conditions. In this regard present experiment was conducted to identify proper fruit growth stage for immature seed germination in tomato interspecific hybridization programme involving Indian tomato cultivars, which are suitable for field cultivation under tropical diverse agro climatic conditions

MATERIALS AND METHODS

In the present investigation, two Indian field cultivated tomato (*L. esculentum*) cultivars *viz.*, Dhanashree and 85-1 were reciprocally crossed with six accessions of *L. peruvianum viz.*, EC 127774, EC 106294, EC 252, EC 486, EC 34479 and EC 492. Thus total 24 crosses were attempted in following manner.

One hundred crosses for each cross combination were obtained while using tomato cvs. as a maternal parent. Whereas fifty crosses for each cross combination were attempted when tomato cultivar was used as a pollen parent. The fruit set in tomato interspecific hybridization programme was observed only in one way crossing (i.e. in 12 cross combinations) when tomato cvs. were used