

would have developed from two distinct megaspores with positional changes so as to lie side by side and can be placed under 'false polyembryony'<sup>3</sup>. The mature embryo sac is pear-shaped. Its chalazal pole after fertilisation elongates and pushes deeper into the nucellar tissue. The three antipods, probably stimulated by pollination and fertilisation, undergo divisions resulting in a group of conspicuous densely stained cells that remain persistent even at the globular stage of the proembryo. Endosperm is of the nuclear type. Cell wall formation proceeds in a centripetal pattern and finally it becomes cellular and occupies the entire area of the embryo sac. The endosperm cells immediately around the embryo are with dense cytoplasm and distinct boundary (Fig. 6). In the chalazal region, the peripheral endosperm cells are rectangular in shape and appear to be meristematic. Laterally, along one side, a distinct pouch-like organisation with a central small, haustorial outgrowth is clearly recognised (Fig. 5). Its exact origin, and its haustorial nature, if any, are to be traced.

The zygote embarks upon its first division only after the primary endosperm nucleus has undergone few divisions. The transverse division of the zygote results in a terminal cell and a basal cell. Both the cells undergo transverse divisions to form a linear row of 5 or 6 cells. Further development could be traced to a globular proembryo with a massive suspensor (Fig. 7).

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#### DEVELOPMENT OF TOMATO GENOTYPES WITH EXSERTED STIGMA AND A SEEDLING MARKER FOR USE AS FEMALE PARENTS TO EXPLOIT HETEROSIS

The detection of a mutant IHR 7-1 with exserted stigma (*ex*) was reported earlier<sup>3</sup>. Since exserted stigma provides ready accessibility for hand pollination without emasculation, it has a potential use in

hybrid seed production. Incorporation of suitable recessive marker gene/s into this mutant for detection of chance selfing was considered desirable. Potato leaved (*c/c*) character (a recessive seedling marker) was successfully incorporated in this mutant through hybridization, using IHR 174 as a donor parent. IHR 174 is also characterised by positional sterility conditioned by the recessive gene *ps*. This gene causes fusion of anthers and petals, preventing dehiscence and thereby fruit-set, in nature.

Adopting pedigree selection in the cross IHR 174 × IHR 7-1, two lines in F<sub>2</sub> generation with exserted stigma and potato leaves were isolated. They were provisionally designated as Ex-1, having normal flowers, and Ex-3, having positional sterility (Fig. 1). On progeny testing over two seasons, these lines were observed to be breeding true for the exsertion of stigma, and hence were genetically stable for this character. Exsertion of stigma in tomato has been reported by many workers, to be genetically governed<sup>1, 2</sup>.

The extent of natural fruit set was assessed both in Ex-1 and Ex-3. Under open pollination Ex-1 (with normal flowers) had high fruit-set of 39%. Of the 255 seedlings raised from the open pollinated seeds of Ex-1, cut-leaved (*c*<sup>+</sup>) plants resulting from out-crossing were as low as 5.6%. Obviously the exserted stigma does not prevent natural selfing. The drooping nature of the floral disposition probably permits adequate quantities of pollen to drop on the stigma, following anthesis. On the other hand natural fruit-set in Ex-3 was as low as 3.0%. Of 106 seedlings of Ex-3 raised from its open pollinated seeds 99.05% were potato leaved, indicating predominant selfing. Since all the open pollinated potato leaved seedlings from Ex-3 were observed to have the positional sterile (*ps*) gene, the possibility of its natural crossing with Ex-1 was ruled out. The low fruit-set was obviously attributable to the breakdown of the non-dehiscent mechanism in a few anthers resulting in self-pollination.

Ex-1 was crossed with six promising high yielding collections using the latter as male parents. The crosses were effected by bud pollination of Ex-1 without emasculation. A high percentage of hybrid plants were observed in the resultant seedlings as evidenced by 94% cut-leaved plants among a total of 923 plants raised in the nursery. The hybrid plants obtained from these crosses were evaluated along with their parents for yield and other attributes. Heterotic expression for yield and several other characters was observed in all F<sub>1</sub> hybrids. Heterosis for yield ranged from 14.0 to 48.8%.

These results show that Ex-1 has a good general combining ability which deserves to be exploited. Since the step of emasculation can be avoided, these

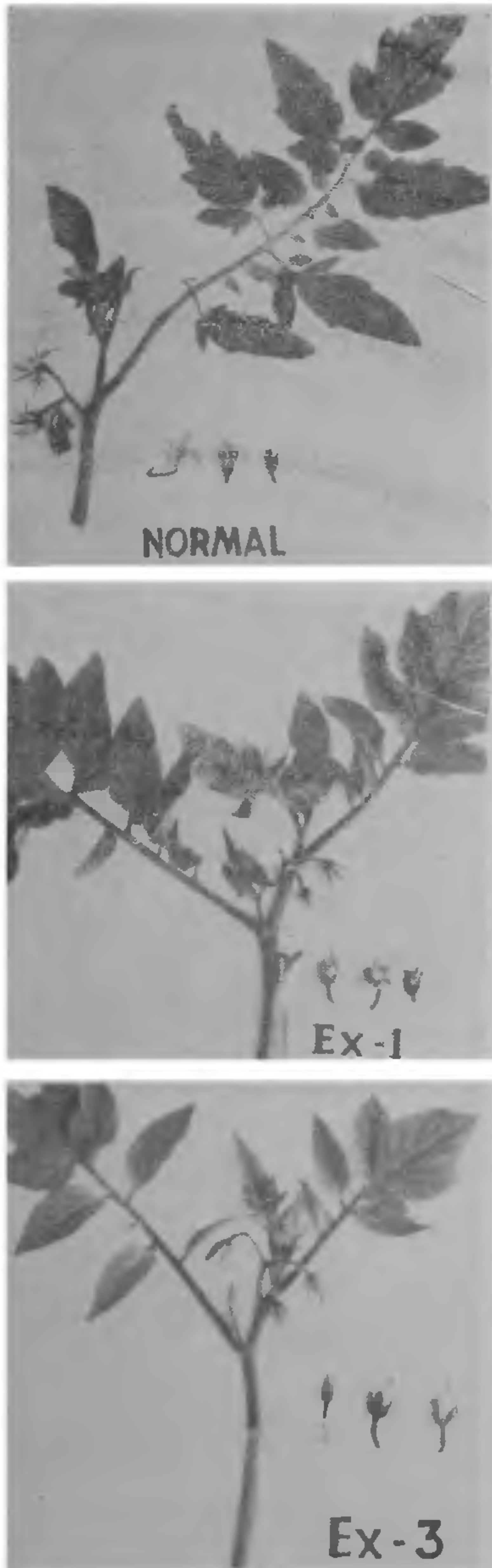


FIG. 1. Comparative leaf shape stigma exsertion and flower disposition in Ex - 1 ( $e, ex, ps^+$ ), Ex - 3 ( $e, ex, ps$ ) and normal ( $e^+, ps^+$ ) genotypes.

genotypes can prove useful in economising hybrid seed production in tomato. Further studies on the suitability of Ex-1 and Ex-3 as general combiners and as female parents in hybrid seed production are in progress.

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#### ISOLATION OF *CORYNEBACTERIUM PSEUDOTUBERCULOSIS* FROM TWO ABORTED EQUINE FOETUSES

*Corynebacterium pseudotuberculosis* has been well established as the cause of caseous lymphadenitis in sheep and ulcerative lymphangitis in horses<sup>1,2</sup>. In recent years, a second form of the disease, viz., abscess formation in pectoral, lower abdominal and inguinal regions in the equines has been associated with this organism with increasing frequency<sup>3-5</sup>. Although generalised infection, in the equines, with *C. pseudotuberculosis* has rarely been recorded<sup>6</sup>, its association as a specific cause of abortion in the mare has not been reported. This report documents the association of *C. pseudotuberculosis* with abortion in mares.

Two foetuses, aborted between 140 and 160 days of gestation were examined for bacterial infection. The mares were reported to be otherwise normal. No abnormality of the placentae was noticed. The heart blood and stomach contents of the two foetuses were collected aseptically and inoculated on blood agar plates (7% ox blood). Incubation was done at 37°C under 10% carbon dioxide tension in an anaerobic jar for 48 h before examination.

The heart blood and the stomach contents of both the foetuses yielded smooth, circular and rounded colonies. A narrow zone of beta haemolysis was observed around the colonies. The isolates from the two foetuses were identified as *Corynebacterium pseudotuberculosis*<sup>7</sup>. Pathogenicity tests were conducted in adult albino mice using 18 h broth cultures of the two isolates by the intraperitoneal route. One mouse died in 5 days and the other in 7 days after inoculation