

ABSTRACT

Hybridization and pollen compatibility in pigeonpea (Cajanus cajan (L.) Millsp.) and a wild relative Atylosia platycarpa Benth., were studied.

First the floral biology of pigeonpea and Atylosia platycarpa were investigated. In pigeonpea and A. platycarpa the stigmas were receptive (48 hours and 30 hours, respectively) and the anthers dehisced (18 hours and 20 hours, respectively) several hours before anthesis.

In in vitro studies of pollen germination the requirements for optimum germination were 40% sucrose, 250 ppm boric acid and 200 ppm calcium nitrate for pollen of pigeonpea; 20% sucrose, 100 ppm boric acid and 300 ppm calcium nitrate for pollen of A. platycarpa. In a study of the osmotic pressure within the pollen grains it was found that the osmotic pressure of pigeonpea pollen was greater than that of A. platycarpa pollen.

Attempts made at crossing pigeonpea and A. platycarpa were unsuccessful. Histological studies of fertilization and embryo development 1, 2, 4 and 8 days after pollinations were carried out in pigeonpea, A. platycarpa and their reciprocal crosses. There was incompatibility at the level of stigma and style which inhibited pollen germination and prevented pollen tubes from reaching the ovules after cross-pollination. Fertilization and embryo development were demonstrated in pigeonpea and A. platycarpa.

Several experiments were done in which the efficiency of self pollen and foreign (intra-varietal and inter-varietal) pollen were compared. For the varieties of pigeonpea studied foreign pollen tended to be more efficient in both germination and pod formation.

Tripping with or without the addition of foreign pollen resulted in a reduction of the time for which pigeonpea flowers remained open. Tripping also caused an increase in pod setting.

The existence of a self-incompatibility mechanism and the need for insect pollinators in pigeonpea is suggested and discussed.