

Research Reports

Breeding/Genetics

Indication of Possible Linkage Between Male-sterile Gene *ms₁* and Temperature Sensitivity in Pigeonpea

N.B. Singh¹, N. Pandey², and K.B. Saxena³ (1. Rajendra Agricultural University (RAU), Dholi, Bihar, India (presently with ICRISAT); 2. RAU; 3. ICRISAT Center)

Male sterility in pigeonpea [*Cajanus cajan* (L.) Millsp.] is governed by a single recessive gene *ms₁* (Reddy et al. 1978). This has been used to develop the first commercial hybrid ICPH 8 (Saxena et al. 1989). However, the use of genetic male sterility poses practical difficulties in the commercial seed production of male steriles and hybrids because it requires manual roguing of fertile plants from the rows of female plants. So far no genetic marker associated with male sterility has been identified and, therefore, individual plants have to be carefully examined for sterility. This paper reports a possible linkage between the male-sterile gene *ms₁* and temperature sensitivity.

A long-duration male-sterile line ICP 3783 having the *ms₁* gene was sown in an observation nursery at the Rajendra Agricultural University, Dholi, Bihar, India, in the last week of June 1989 to study the extent of natural outcrossing. It was observed that pod-setting in the male-sterile plants was very poor in comparison with fertile segregants, especially in December and January. In contrast, the second flush of flowers which started in February produced a normal pod-set. Considering the potential utility of this observation in the hybrid pigeonpea program, an experiment was subsequently planned to monitor the effects of low temperature on flowering and pod-setting behavior of male-sterile line ICP 3783 during the 1990/91 crop season.

The sib seed of *ms* ICP 3783 was sown in the first week of July 1990 with an interrow spacing of 60 cm and intrarow spacing of 20 cm. In this population, flowering started 127 days after sowing (DAS). The male-sterile plants flowered 2-3 days earlier than the male-fertile sibs. In the second week of November, when the minimum temperature was above 15°C with the mean day temperature ranging from 22 to 29.5°C inclusive, the fertile as well as the sterile plants produced open flowers, and good pod-setting was recorded. In the last week of

November, when the minimum temperature dropped to 12°C and less with a mean day temperature of about 18°C, a marked reduction in pod-setting was observed in the male-sterile plants and the flower buds began to drop before opening. In the beginning of December, when the minimum temperature dropped further to below 10°C and the mean day temperature to below 18°C, bud drop further increased. During this period, the male-fertile plants, however, flowered and podded normally. This trend continued till the last week of January 1991. In February, when the minimum temperature rose to above 10°C and the mean day temperature to above 18°C, flower buds in the male-sterile plants started opening and good pod-setting was noticed.

From these preliminary observations, it is apparent that temperature regimes of below 10°C might cause floral bud abscission in the male-sterile plants suggesting a possible linkage between these two traits. We consider this an extremely useful observation which requires confirmation under varied field and controlled environmental conditions with diverse male-sterile lines. If confirmed, it may have a significant impact on the seed-production technology of male-steriles and hybrids by enabling easy and economical identification and roguing of male-fertile plants thereby ensuring the quality of hybrid seed.

References

- Reddy, B.V.S., Green, J.M., and Bisen, S.S. 1978. Genetic male sterility in pigeonpea. *Crop Science* 18:362-364.
- Saxena, K.B., Gupta, S.C., Kumar, R.V., Reddy, L.J., Singh, L. and Paris, D.G. 1989. ICPH 8, the first commercial male-sterile pigeonpea hybrid. *Pigeonpea Newsletter* 4:1-11.

Inheritance of Oval Leaflet Shape and its Behavior in Relation to Male Sterility in Pigeonpea

Rajni Raina, R. Nandan, U.P. Singh, and R.M. Singh (Department of Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi 221 005, Uttar Pradesh, India)

In pigeonpea [*Cajanus cajan* (L.) Millsp.] the identification of a suitable marker linked with genetic male ster-