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INHERITANCE OF PROSTRATE MUTANT IN PIGEONPEA

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ABSTRACT

A true breeding, spontaneous, prostrate mutant was found in the population of pigeonpea [*Cajanus cajan* (L.) Millsp.] germplasm accession ICP 102. The mutant grows horizontally on the ground. Inheritance studies conducted in F_1, F_2 and testcross generations of two crosses indicated that this trait is controlled by a single recessive gene.

Key words: Pigeonpea, *Cajanus cajan* (L.) Millsp., prostrate, mutant, inheritance.

Pigeonpea [*Cajanus cajan* (L.) Millsp.] is a short lived perennial leguminous bush that usually grows over 2 m in height. It is commercially cultivated as annual crop for its green and dry seeds. At ICRISAT Centre, a spontaneous, prostrate mutant plant growing horizontally on the ground was found in the population of germplasm accession ICP 102. Selfed progeny of this plant bred true to type.

The morphological description of the present mutant matches well with that reported earlier by Deshpande and Jeswani [1]. For about a month after germination, the seedlings of the mutant progeny grew normally, and mutant plants could not be distinguished from normal plants. After 35–40 days, the main stem of the mutant plants began to show a tendency to bend towards the ground. Under favourable agronomic conditions the mutant plants produced profuse foliage and flowers, but podding was sparse. No male or female sterility was observed in the flowers. The main stem of normal ICP 102 plants grew over 150 cm tall, while in mutants, the main stem only grew about 100 cm.

Based on the segregation pattern in the progenies of normal and prostrate single plants selected from the source population, Deshpande and Jeswani [1] reported that the prostrate trait was controlled by a single recessive gene pair. The other studies reported on inheritance of a similar mutant were confined to F_1 and F_2 generations and no attempt was made to confirm these findings in F_3 and backcross generations. Shinde et al. [2] observed an F_2 ratio of 13 prostrate : 3 normal plants, suggesting digenic control of the prostrate character with one of the genes exhibiting inhibitary action. On the contrary, in a similar cross Chaudhari and Thombre [3] reported F_2 ratio of 3 normal : 1 prostrate. D'Cruz et al. [4] observed the ratio of 54 normal : 10 prostrate plants in F_2 generation. They also observed that this trait was linked with seed coat colour. Since the information on the inheritance of the mutant is inadequate and controversial, the present inheritance study has been undertaken in F_1, F_2 and testcross generations.

MATERIALS AND METHODS

Two crosses were made using the mutant as female parent. In the first cross (mutant × Prabhat), F_1, F_2 and testcross generations were grown, while in the second cross (mutant × ICPL 87), only F_1 and testcross generations were studied. The F_2 population of the second cross was damaged at seedling stage during intercultivation. The mutant and normal plants were counted in various generations.

RESULTS AND DISCUSSION

In both crosses, the F_1 plants were normal, indicating recessive nature of the gene responsible for prostrate character. The F_2 population of the first cross segregated into 2666 normal and 897 mutant plants, and the χ^2 test showed a good fit to the expected ratio of 3 : 1 ($\chi^2 = 0.059$, $P = 0.81$), indicating that the mutation is controlled by a single recessive gene. In the testcross progeny of the first cross, 69 normal and 59 mutant plants were found, while in the other testcross, 32 normal and 38 mutant plants were recorded. The testcross ratio (1 : 1) in the cross involving Prabhat ($\chi^2 = 0.691$, $P = 0.41$) as well as ICPL 87 ($\chi^2 = 0.514$, $P = 0.47$) confirmed a single recessive gene pair controlling the prostrate growth habit in pigeonpea.

Similar ageotropic mutants have earlier been observed in maize [5] and rice [6]. The loss of geotropism in maize mutants was found to be due to nonuniform distribution of plant growth hormones in the stem [9].

At present ageotropic mutants in pigeonpea do not appear to have any economic value. However, as suggested by Deshpande and Jeswani [1] the mutant may possibly be useful as a pasture or cover crop to control soil erosion. Also, considering the vigorous canopy, deep root system, and perennial habit of pigeonpea, the mutant could be useful in weed control in young tropical plantations, where alternative crops are difficult to establish.

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