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MORPHOLOGICAL FEATURES OF F₁ HYBRIDS BETWEEN *CAJANUS CAJAN* AND *ATYLOSIA ALBICANS*

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Introduction

The cultivated pigeonpea (*Cajanus cajan* (L.) Millsp.) is closely related to several wild species of the genus *Atylosia*. These species possess several desirable characters and the most important one is resistance to *Fusarium* wilt and pod-borer^{8,9}. The seeds of various species of *Atylosia* are also rich in protein contents⁷. Plant breeders have been trying to transfer these characters in pigeonpea and it has been successfully hybridized with different species of *Atylosia*^{1,2,10}.

The present paper is a part of investigation undertaken with the aim of transferring some of the desirable characters of *Atylosia* species into *C. cajan* and deals with the morphological characters of F₁ hybrids of *C. cajan* and *A. albicans*.

Materials and Methods

The strains used in this study (*C. cajan* var. P-4382 and *A. albicans* W. & A.) were obtained from the Genetic Resource Unit, ICRISAT, Patancheru, Hyderabad. The F₁ hybrids were produced by using *C. cajan* as female parent. The characters studied were percentage of seed germination, rate of plant survival, pollen fertility, seed setting and morphology of parents and F₁ hybrids.

Results and Discussion

The morphological characters of *C. cajan* var. P-4382 (Fig. 1), *A. albicans* (Figs. 2 & 3) and their F₁ hybrid (Fig. 4) are shown in Table 1.

It is evident from Table 1 that in the hybrids, the characters of *A. albicans*, namely twining growth habit (Fig. 3), hairy nature of mature pods, seeds with strophioles were dominant compared to those of *C. cajan*. The ovate shape of primary leaves and green colour of seeds of *A. albicans* were recessive. The other characters, namely shape, length and breadth of leaflets; length of petioles; period from sowing to flowering; size of standard petal; pod size, beak of the

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TABLE 1. Morphological features of *C. cajan*, *A. albicans* and their F₁ hybrids

Character	<i>C. cajan</i>	<i>A. albicans</i>	F ₁ hybrid
Shape of primary leaves	Lanceolate	Ovate	Lanceolate
Leaflet shape	Lanceolate	Ovate	Intermediate
Growth habit	Erect	Twining	Twining (Intermediate)
Branching	Racemose with wide angled branches	Racemose with basal branched	Racemose with intermediate angled branches
Days from sowing to first flowering	113 days	165 days	129 days
Colour of standard petal	Dark yellow	Light yellow	Reddish yellow
Pod length	4.8 cm.	2.8 cm.	3.1 cm.
Pod colour	Brownish with black streaks	Greenish	Uniformly reddish brown
Hair on mature pods	Absent	Present (brownish)	Present (brownish)
Nature of mature pods	Non-shattering	Shattering	Intermediate
Beak of the pod	Prominent	Minute	Intermediate
Pod Setting (%)	64.3	55.9	6.5
Seed strophiole	Absent	Present	Present
Seed mottles	Absent	Present	Present
Seed colour	Whitish brown	Greenish	Light brown
Seed setting (%)	95.0	86.1	73.4
100 seed weight	8.6 gm	2.7 gm	5.5 gm
Seed germination (%)	94.5	73.7	46.2
Plant survival (%)	87.3	88.6	70.4
Pollen fertility (%)	94.8	94.6	80.7

pod and its shattering nature were intermediate in the hybrids (Fig. 4). The pod colour in the hybrids was uniformly reddish brown in contrast with greenish pods in *A. albicans*. The percentage of pod setting in F₁ hybrids was only 6.5 as compared to 64.3 and 55.9 in *C. cajan* and *A. albicans*, respectively. However, the percentage of seed setting in F₁ hybrids was 73.4 and in *C. cajan* and *A. albicans* it was 95.0 and 86.1 respectively. The weight of 100 seeds in hybrids was 5.5 g, while in *C. cajan* and *A. albicans* it was 8.6 g and 2.7 g respectively. The percentage of seed germination and plant survival in F₁ was 46.2 and 70.4, respectively. On the other hand, in *C. cajan* and *A. albicans* there was 94.5% and 73.7% seed germination and 87.3% and 88.6% plant survival, respectively. Pollen fertility in F₁ hybrids was 80.7% as compared to 94.8% and 94.6% shown by *C. cajan* and *A. albicans*, respectively.

Cajanus, a monotypic genus, is different from its allied genus, *Atylosia* in the absence of aril on seeds in the former. *A. albicans*, a creeping species,

produces hybrids with *C. cajan* only when used as the male parent. Similar one way cross-compatibility has also been reported in intergeneric crosses of *C. cajan* and other species of *Atylosia*, namely *A. sericea*⁴⁾ and *A. lineata*^{5,6)} as well as *A. albicans*.

PUNDHIR⁴⁾ has observed that in F₁ hybrids of *C. cajan* × *A. sericea*, persistent stipules and petals, hairy and shattering nature of pods and brown seeds with strophiole of *A. sericea* were dominant compared to those of *C. cajan*. The lanceolate shape of primary leaves of *C. cajan* was dominant. The shape, length and breadth of leaflets; length of petiole; period of flowering; size of standard petal; beak of the pod and seed size were intermediate in the hybrids. However, plant height, pod size, number of chambers and seeds per pod and seed weight were nearer to those of *A. sericea*.

REEDY⁵⁾ and REDDY and DE⁶⁾ have recorded that characters of *C. cajan*, namely fugacious stipules, absence of pigmentation on the standard petal, deciduous petals, absence of hairs on the pods, non shattering nature of pods, reddish brown seed colour without mottles and absence of strophiole on the seeds were recessive compared to those of *A. lineata*. According to REDDY,⁵⁾ seed germination in *C. cajan*, *A. lineata* and their F₁ hybrids was 92.5%, 64.0% and 47.2% respectively. The percentage of plant survival rate was 98.25, 89.5 and 48.1 in *C. cajan*, *A. lineata* and F₁ hybrids, respectively. Similarly, *C. cajan*, *A. lineata* and their F₁ hybrids exhibited 97.2%, 98.8% and 55.1% pollen fertility. The meiotic behaviour of the hybrid was regular except for minor abnormalities. According to REDDY and DE⁶⁾, *A. lineata* comes taxonomically very close to *C. cajan* on the basis of plant morphology, crossability, hybrid fertility and meiotic behaviour.

Recently, KUMAR *et al.*³⁾ have studied the inheritance of morphological characters in *C. cajan* × *A. albicans* F₁ hybrids. They have observed twining growth habit in hybrids. The hybrids at the initial stages were intermediate for leaf shape and texture. However, after nearly 100 days, the leaves resembled *C. cajan*. The pod characters in F₁ hybrids were similar to those in *A. albicans*. The strophiole on the seed in *C. cajan* was rudimentary, while in *A. albicans* and F₁ hybrid it was prominent. The present authors also obtained the similar to those of KUMAR *et al.*³⁾ Judging from the results, high level of hybrid fertility and surviving rate of F₁ hybrids, *A. albicans* is also very close to *C. cajan* like *A. sericea* and *A. lineata* mentioned above.

Summary

Cajanus cajan was successfully hybridized with *Atylosia albicans*, when used as female parent. In the F₁ hybrids, morphological characters of *A. albicans*, namely twining growth habit, hairy pods and strophiolated seeds were dominant compared to those of *C. cajan*. The ovate shape of primary leaves and green

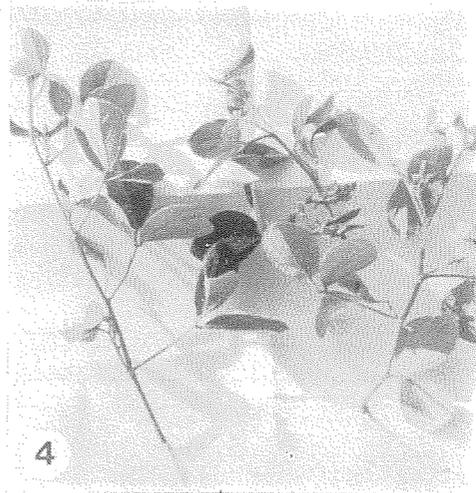
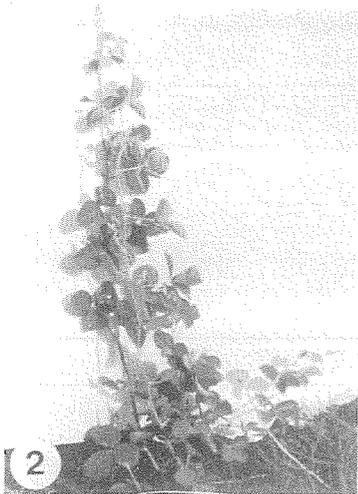
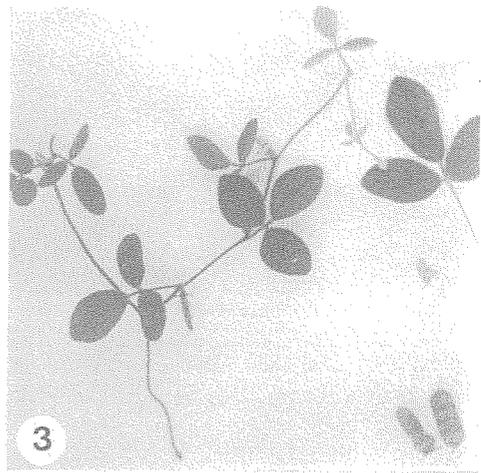
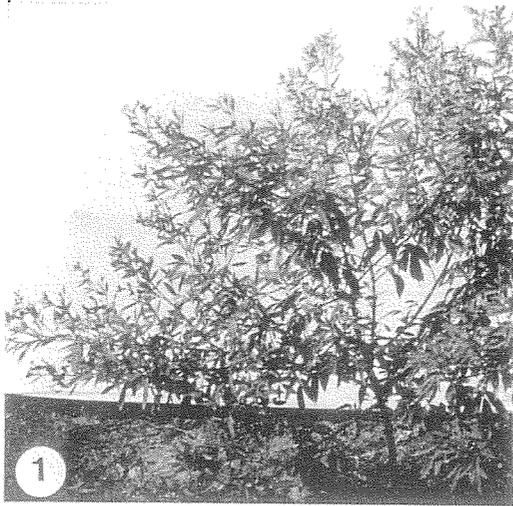
colour of seeds of *A. albicans* were recessive. The other characters, namely shape, length and breadth of leaflets, length of petioles, days from sowing to flowering, size of standard petal, pod size and pod beak and its shattering nature were intermediate in the hybrids. The plant height, pod length and the number of seeds per pod were near to those of *C. cajan*. On the basis of plant morphology, the high level of hybrid fertility and surviving rate of F₁ hybrids, *A. albicans* comes taxonomically very close to *C. cajan*.

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Legend for Plate

Fig. 1. *Cajanus cajan*

Fig. 2. *Atylosia albicans*

Fig. 3. *A. albicans* twining branch with flower and pods.

Fig. 4. F₁ hybrid branches with flowers and pods.