Table 1 *Oxidation of ammonium to nitrate by soil fusaria*

Fungus	µg nitrate/50 ml medium		
	10*	20	30
Fusarium culmorum	5.3 (0.9)	16.6 (3.2)	21.3 (2.6)
F. equiseti	3.0 (1.2)	19.3 (6.1)	21.3 (2.6)
F. moniliforme	1.6 (0.6)	28 6 (0.5)	33.0 (1.6)
F. oxysporum	12.6 (3.7)	23.0 (2.8)	32.9 (0.9)
F. semitectum	2.3 (1.8)	25.0 (0.1)	24.6 (3.7)
F. solani	5.3 (2.4)	14.0 (1.6)	22.3 (2.0)

*Incubation time, in days; Figures in parentheses denote SD values ($n=3$).

each culture were withdrawn at 10-day intervals for NO_2^-–N[8], and NO_3^-–N[9] determinations.

The formation of 25 µg of nitrite-nitrogen was recorded only after 10 days of incubation in the medium inoculated with *F. oxysporum*, but not in the subsequent samples withdrawn after 20 and 30 days of incubation. There was no nitrite in the samples inoculated with the other five fusaria. This observation clearly indicates that the heterotrophic nitrification mediated by *F. oxysporum* leads to the transient accumulation of nitrite in the medium.

Low quantities of nitrate-nitrogen were found in all the inoculated samples after 10 days of incubation (table 1). However, there was a progressive increase in the formation of nitrate with increasing period of incubation. By the end of 30 days after inoculation, fairly good amounts of nitrate (21 to 33 µg 50 ml^{-1} medium) were detected in the cultures. Thus, the accumulation of more nitrate as a result of biological oxidation of ammonium is probably associated with the maximum growth of the fungal cultures as suggested by Schmidt[10]. *F. moniliforme* and *F. oxysporum* produced larger quantities of NO_3^-–N when compared to the other species. The present results reveal that fusaria, the most abundant soil mycoflora, bring about nitrification, an ecologically important transformation of the major element nitrogen.

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INTERSPECIFIC CROSS BETWEEN *ATYLOSIA ALBICANS* AND *ATYLOSIA CAJANIFOLIA*

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An interspecific cross between *Atylosia albicans* ($2n = 22$), a perennial climber (figure 1) and *Atylosia cajanifolia* ($2n = 22$), an erect perennial shrub (figure 2) yielded hybrid progeny in 0.69% of the pollinations. The F_1 was semifertile and showed erect spreading habit with profuse branching and thick canopy (figure 3). In contrast to F_1, some of the F_2 plants were fertile.

Seeds of *A. albicans* (W. & A.) Benth. and *A. cajanifolia* Haines, were obtained from ICRISAT, Hyderabad. Meiotic studies were done using propionocarmine technique.

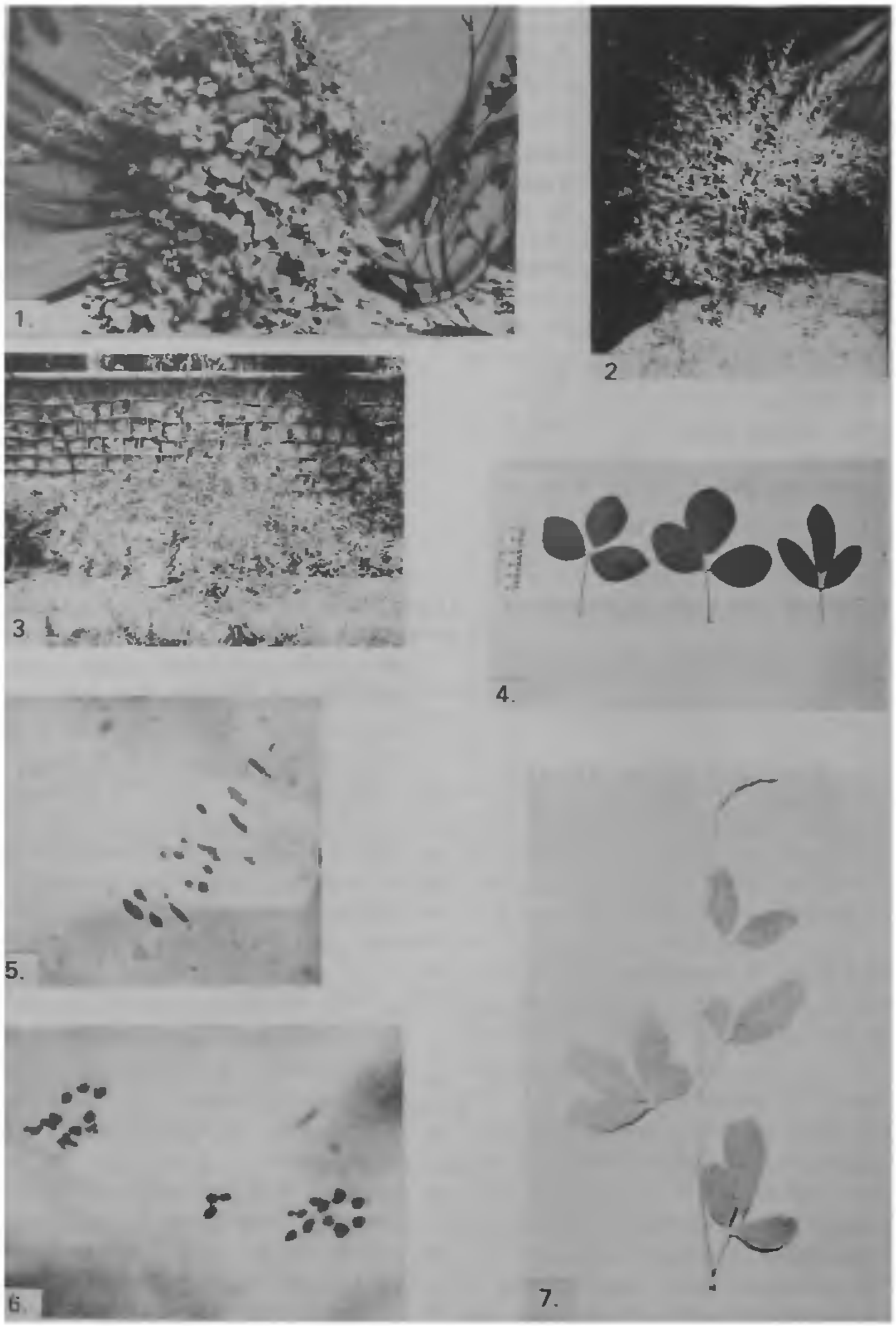
The shape of the first pair of leaves of *A. albicans* (seed parent) was ovate and that of *A. cajanifolia* (pollen parent) lanceolate. Dominance of lanceolate shape of first pair of leaves was noticed in the F_1 hybrid. Other characters of *A. cajanifolia* viz. red colour of standard petal, brown colour of pods, hairs on mature pods were dominant to those of *A. albicans* (table 1). The leaflets in *A. albicans* are abovate with an obtuse tip while those in *A. cajanifolia* are lanceolate with acute tip and the F_1 was intermediate for leaf shape (figure 4). F_1 showed vigour for some characters viz. size of leaflets, number of primary and secondary branches and size of the standard petal (table 1). F_1 had considerably low pod setting (10%) while it was 61.5% in the seed parent and 38% in pollen parent. Likewise, reduced ovule fertility was recorded in the F_1 in comparison to both the parents (table 1).

Table 1 *Morphological observations in A. albicans, A. cajanifolia and their F_1 hybrid*

Characters	*A. albicans* (♀ parent)	*A. cajanifolia* (♂ parent)	F_1 hybrid
Shape of first pair of leaves	Ovate	Lanceolate	Lanceolate
Growth habit	Twining shrub	Erect shrub	Semierect
No. of Pr. branches	11	4	25
No. of sec. branches	17	19	75
Shape of central leaflet	Obovate	Lanceolate	Intermediate
Length of central leaflet (cm)	4.2	4.9	7.6
Breadth of central leaflet (cm)	3.2	2.2	4.5
Days to flowering	136	123	154
Colour of standard petal	Yellow	Red	Red
Colour of pod	Green	Brown	Brown
Hairs on mature pod	Absent	Present	Present
Pod set (%)	61.5	38.0	10.0
Ovule fertility (%)	72.0	91.0	53.2

Table 2 *Chromosome associations at metaphase-I of A. albicans, A. cajanifolia, F_1 and F_2s (figures in parentheses are percentage)*

		Chromosome associations at Metaphase-I								
Plant	Cells studied	$1IV+8II'_s+2I'_s$	$1IV+7II'_s+4I'_s$	$11II'_s$	$2I_s$	$4I_s$	$6I_s$	$8I_s$	$10I_s$	Pollen stainability (%)
A. albicans	70	—	—	70 (100)	—	—	—	—	—	99.4
A. cajanifolia	50	—	—	50 (100)	—	—	—	—	—	99.7
A. albicans × *A. cajanifolia* (F_1)	74	—	1 (1.3)	24 (32.4)	7 (9.45)	35 (47.25)	—	5 (6.75)	2 (2.6)	64.0
F_2 plant No.										
1.	94	—	—	69 (73.4)	25 (26.5)	—	—	—	—	66.8
2.	37	2 (5.4)	—	35 (94.5)	—	—	—	—	—	69.5
3.	63	—	—	54 (85.7)	4 (6.32)	5 (7.90)	—	—	—	72.8
4.	52	—	—	38 (73.0)	6 (11.52)	8 (15.36)	—	—	—	73.7
5.	44	—	—	44 (100)	—	—	—	—	—	80.6
6.	36	—	—	24 (66.6)	12 (28.8)	—	—	—	—	76.5
7.	37	—	—	37 (100)	—	—	—	—	—	78.2
8.	50	—	—	21 (42.0)	29 (48.0)	—	—	—	—	79.2
9.	41	—	—	21 (51.2)	—	10 (24.0)	3 (7.2)	7 (10.8)	—	56.2
10.	60	—	—	60 (100)	—	—	—	—	—	91.8



Figures 1–7. **1.** Plant of *A. albicans*; **2.** Plant of *A. cajanifolia*; **3.** Plant of *A. albicans* × *A. cajanifolia* F_1 hybrid; **4.** Leaves of *A. albicans*, F_1 hybrid and *A. cajanifolia*; **5.** 6 $II_s' + 10\ I_s'$ at M-I of F_1 hybrid; **6.** Laggards at A-I of F_1 hybrid, and **7.** Branch of F_2 plant showing bifoliate, trifoliate and quadrifoliate leaves.

In F_1, at meiotic metaphase-1, 11 bivalents were noticed in 32.4% PMCs, whereas $9II_s + 4I_s$ were recorded in 47.2% of PMCs (table 2). A maximum number of 10 univalents (figure 5) were noticed in 2.67% of PMCs. Varying number of univalents in F_1 hybrid might have resulted due to precocious separation of bivalents. However, the possibility of non-homology existing between the chromosome

complements of the parental species cannot be ruled out. During anaphasic separation, by and large, equal distribution of chromosomes to the poles was recorded, except in a few cells, where 1–3 laggards (figure 6) were noticed. Pollen stainability in F_1 was 64% and ranged from 56.2% to 91.8% in the F_2 plants (table 2).

In contrast to the viny growth habit of seed parent and erect habit of pollen parent some of the F_2 plants showed semierect and spreading growth habits. In some of the F_2 segregants increase in fertility and chromosomal pairing could possibly be due to the existence of close homology in their chromosomal complements. Tripathi and Patil[1] reported increase in the chromosomal pairing/fertility in some of the F_2 segregants of the cross between *A. albicans* and *A. scarabaeoides*.

Apart from trifoliate leaves, bifoliate and quadrifoliate leaves were also noticed on some of the branches of F_2 plant (figure 7). The variation in leaf morphology could possibly be due to consequence of differential gene expression in different branches.

The wild relatives of crop species have been suggested as possible source of high protein in *Avena sterilis*[2,3], *Vicia narbonensis*[4] and *A. albicans*[5]. Thus, the possibility exists in isolating some of the highly nutritive cultivar in onward generation on one hand and the variabilities in morphological characters open scope for breeding new plant types, on the other.

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CONTACT ELECTRON MICROGRAPHY FOR CHARACTERIZATION OF PAPER : A NEW TECHNIQUE

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We describe here some preliminary results and the details of a simple technique, abstracted earlier[1] for photographically recording a contact electron micrograph of thin paper and film materials using the conventional plate camera system of a transmission electron microscope (Philips EM-300).

Sheets of standard filter papers in various porosity grades, and other types of papers were cut to photographic cut sheets (8.3 × 10.2 cm) after ensuring that the specimen did not bend or fold during cutting. The specimen, one each was held in position over the emulsion of photographic cut film in the dark room, and slided together into the groove guide of the film holder, keeping the specimen on top. A suitable packing (cardboard or discarded cut film) was provided below the recording film, to hold its emulsion in tight contact with the specimen.

With objective lens current set to a minimum value at 80 kV acceleration potential, the second condenser lens current was so adjusted to have the objective aperture (thin gold foil self-cleaning) enlarged equal to the outer diameter of the circular fluorescent screen of the plate camera. In other words, the effective divergence of the electrons from the objective aperture was kept lowest for their near normal incidence on the specimen. Exposures (1 and 2 sec in this case) were pre-calibrated for each kind of specimen paper and recorded using the half masking facility.

Figures 1 and 2 show the contact electron micrographs of fast and slow filter papers No. 41 and 42 respectively, in which the white dots represent the actual clear pore spaces distributed within the matrix of the papers, The surface distribution and dimensions of clear pore space can be estimated from these micrographs, besides assessing uniformity in the dispersion of the fibrous pulp from the density of blackening on the film. Obviously the surface density of pores, in fast filter papers is considerably higher (figure 1) as compared to that in slow filter paper (figure 2). Wire/cloth mesh size used during their manufacture can also be estimated (figure 2).