Table 5. Yield deviation of visual selections from actual mean yield across three replications made by four groups of selectors at three selection intensities at ICRISAT Center in December 1980 (data in kg/ha).

Group of selectors	*n*	Top 4 selected		Top 8 selected		Bottom 4 selected	
		Mean	Range	Mean	Range	Mean	Range
Breeders	13	84	8-145	68	20-120	70	38-119
Nonbreeders	9	76	35-162	53	28-107	70	38-121
Technical Assistants	6	41	11- 57	31	5- 82	73	38-126
Laborers	7	96	52-156	84	50-113	77	40-127
Mean		70	8-162	60	5-120	75	38-127

In general, with the relatively small number of plots involved in this test, it appears that some observers can select, quite precisely, the highest yielding plots. For example, one volunteer chose 11 of the possible 12 highest yielding plots at the 17% selection pressure and deviated only 8 kg/ha from the mean of 1035 kg/ha. It should be noted that the yield level of this test was quite low and that similar tests at different yield levels are required before any general conclusions can be drawn about the reliability of visually selecting for yield in pigeonpeas. This study is continuing to determine the accuracy of visual selection for yield in pigeonpea under a range of environmental conditions.

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Improving Protein Quality in Pigeonpea Through the Use of Wild Relatives

Protein quality of a legume is basically determined by its protein content and amino acid composition. At ICRISAT we have a program designed to increase protein levels and raise levels of limiting amino acids in pigeonpeas. The sulphur amino acids, methionine and cystine followed by tryptophan, are the limiting essential amino acids of pigeonpea.

As a first step to improving the protein quality of pigeonpea we have analyzed several thousand pigeonpea germplasm accessions and a few *Atylosia* species for their grain protein content. Some of the *Atylosia* species, which are putative progenitors of pigeonpea, were found to contain higher protein content than cultivated pigeonpea.

With this material a systematic attempt is being made to assess the usefulness of *Atylosia* species for upgrading protein quality of cultivated pigeonpeas. For this purpose crosses have been made between different *Atylosia* species and standard pigeonpea cultivars. The seed protein content of the pigeonpea cultivars, *Atylosia* spp and their hybrids and derivatives, has been determined using a Technicon auto analyzer (Table 6). The protein content in the F_1s of all the six intergeneric crosses was close to the high parent, indicating that high-protein content is a dominant character. The F_2 distribution for protein content in crosses involving the pigeonpea cultivars ICP-6997 and Pant A-2 with *Atylosia albicans* indicated that protein inheritance is quantitative.

The amino acid composition of pigeonpea cultivars, *Atylosia* spp, and their derivatives has also been analyzed with the help of a Beckman Model 120C amino acid analyzer. No difference in the amino acid profiles among the *Atylosia* species and pigeonpea were observed. Fortunately, the F_6 results repor-

Table 6. **Protein content in the dehusked seeds of pigeonpea cultivars, *Atylosia* spp and their hybrids and derivatives.**

Material	Generation	Mean protein (%)a
Cajanus cajan		
cv T-21	-	22.8
cv Pant A-2	-	24.4
cv Baigani	-	27.2
A. sericea	-	30.0
A. scarabaeoides	-	28.7
A. albicans	-	30.2
T-21 x *A. scarabaeoides*	F6	27.8
T-21 x *A. sericea*	F6	27.9
Pant A-2 x *A. sericea*	F1	30.5
Pant A-2 x *A. scarabaeoides*	F1	28.5
Pant A-2 x *A. albicans*	F1	29.5
Baigani x *A. sericea*	F1	33.4
Baigani x *A. scarabaeoides*	F1	29.0
Baigani x *A. albicans*	F1	31.3

a. Moisture-free basis (N x 6.25)

ted in Table 6 indicate that it is possible to develop cultivars with higher total protein levels through introgression of *Atylosia* genes into the cultivated pigeonpea.

We are currently engaged in selecting for high protein content as well as agronomic desirability in early generation intergeneric crosses. Attempts are being made to intermate high-protein segregates to accumulate genes for high protein in one or a few genotypes.

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Physiology/Agronomy

Field Screening of Pigeonpeas for Tolerance to Soil Salinity

At ICRISAT we have developed a simple and efficient technique by which pigeonpea lines can be screened for their alinity tolerance. In this method a tolerant and susceptible check is grown on either side of a row of the line to be tested. Long rows were used on a naturally saline Vertisol. Analysis of pooled soil samples from six places in the field showed that, in the upper 30 cm, the electrical conductivity of a 1:2 soil extract was 2.5 mmhos/cm and, in the 30-60 cm zone, 5.5 mmhos/cm.

Based on preliminary observations in the laboratory and field, checks tolerant (cv C-11) and susceptible (cv Hy-3C) to soil salinity were selected. During the rainy season of 1979 a total of 47 lines, 30 advanced lines of breeders' material, 11 cultivars and 6 species of *Atylosia*, were grown in between the tolerant and susceptible checks. These were grown in single 20-m long rows 37.5 cm apart with a within-row spacing of 10 cm. The percentage survival of test materials was scored against the immediately adjacent tolerant and susceptible checks.

The field was far from uniform in its level of salinity, but the method adopted enabled the test lines to be compared with immediately adjacent tolerant and susceptible checks. There was a good differential response, with a much lower rate of survival in the susceptible check rows than in the tolerant. The survival of most of the lines tested was intermediate between that of the tolerant and susceptible checks, but 9 out of the 47 tested lines showed better survival than the tolerant check. These better lines include four selections from ICP-7623, one each from ICP-7118, ICP-7182 and ICP-7035 plus the local cultivar ST-1 and the related genus *Atylosia scarabaeoides*.

This preliminary experiment has shown that, by using a system of alternating rows of test and check lines, screening for salinity tolerance in the field is feasible in spite of the lack of uniform salinity levels. Presently at ICRISAT, this system of alternating rows of test and check lines is being used in a replicated design and lines identified as tolerant to soil salinity will be investigated further under more controlled conditions using artificially salinized soil.

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