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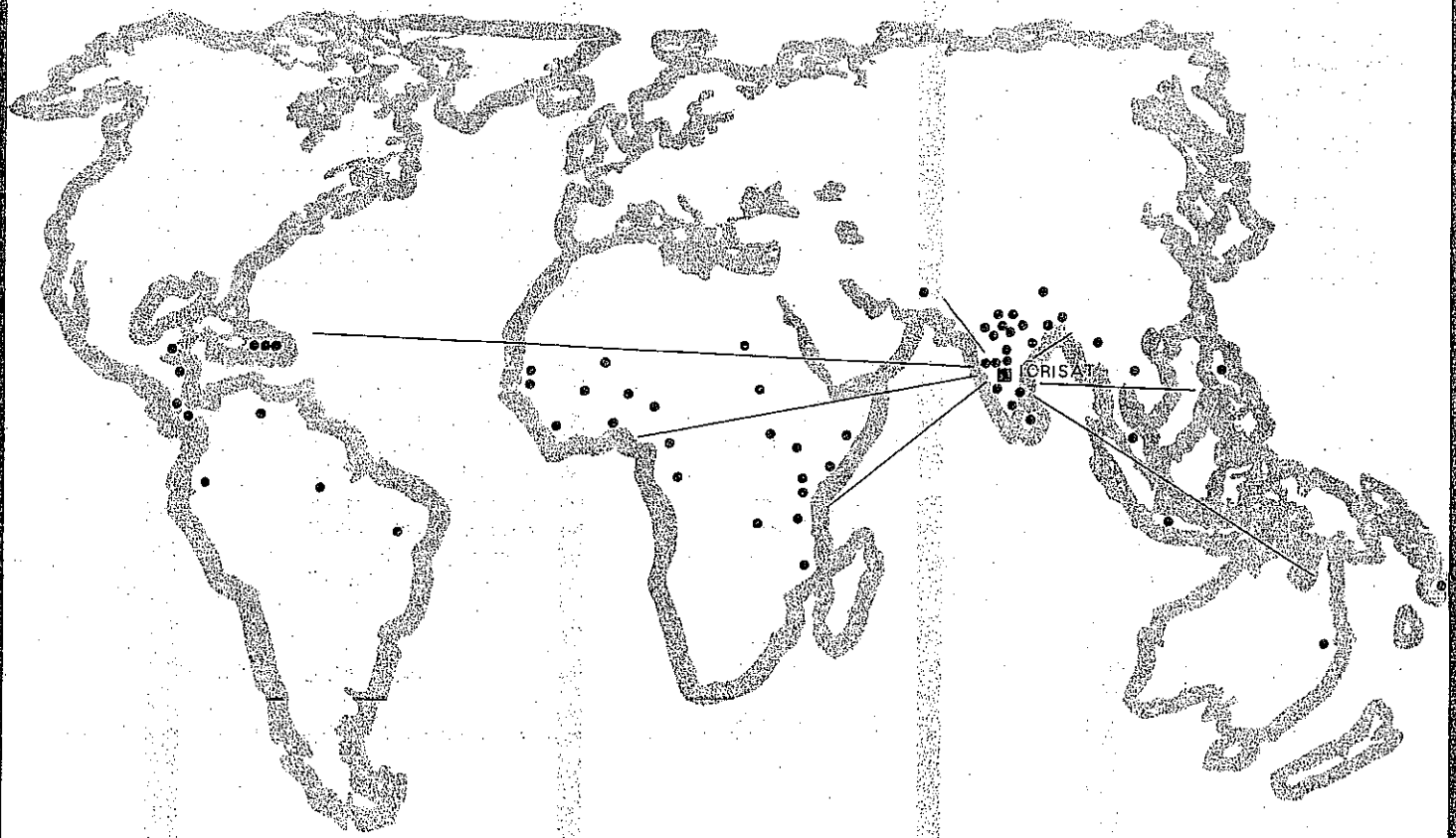

the eastern blocks and to a lesser extent in southern blocks at all distances except 0 m. These results indicate that the wind direction, which was generally from the north-west at the time of flowering, probably influenced the movement of the insects and hence the amount of outcrossing. The level of outcrossing observed in this experiment may have been lower than expected because the material was planted late. However, the results from this study provide information useful in establishing isolation requirements for pigeonpea seed production under conditions similar to those found in this test.

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Test Plot Size in Pigeonpea

It is important for breeders and agronomists to know what plot size is adequate for conducting their trials. In pigeonpeas, information on plot size is scanty. Therefore, a preliminary investigation was carried out by harvesting individual rows from six-row plots in a replicated yield trial.

The experimental material consisted of the F_2 populations plus the parents from a diallel cross using seven medium-maturing, indeterminate, semispreading lines. The 28 entries were planted in a Vertisol during the 1976 rainy season in a randomized complete block design using four replications. The spacing between the 5-m-long rows was 150 cm and between plants, 30 cm. Five sets of plot sizes were formed by combining the yield of middle two, middle four, all six, random two and random four rows in each plot (including guard rows). An analysis of variance was carried out on each set and coefficients of variation (CVs) were used to compare the relative precision of the various plot sizes.

The populations did not differ in general appearance (plant height and plant type), and 50% flowering ranged from 103 to 120 days. This was because of the close similarly in the phenology of the parents. Using the standard middle four-row plots, yield of the F_2s ranged from 1280-1592 kg/ha with a mean of 1446 kg/ha. The highest yield of 1720 kg/ha was recorded for cultivar C 11.

To rule out the effect of plant stand on yield, plants per row were counted and differences were found to be nonsignificant.

Analysis of variance (Table 1) showed that,

Table 1. Analysis of variance for yield in various plot sizes drawn from six-row pigeonpea plots at ICRISAT Center in 1976.

Source	df	Mean squares				
		Middle 2-row plot	Middle 4-row plot	All 6-row plot	Random 4-row plot	Random 2-row plot
Replication	3	0.07	0.36	0.95	0.32	0.07
Genotypes	27	0.11*	0.34**	0.79**	0.38**	0.12*
Parents	6	0.24**	0.90**	2.15**	1.07**	0.36**
F_2	20	0.07	0.18	0.39	0.18	0.06
Parents vs F_2	1	0.02	0.16	0.65	0.16	0.06
Error	81	0.06	0.16	0.27	0.15	0.04
CV (%) - Overall		14.0	11.4	9.9	11.0	11.9
CV (%) - Parents only		18.6	13.7	11.1	12.2	15.1
CV (%) - F_2 only		13.3	10.5	9.2	10.4	10.4

irrespective of plot size, the statistical significance of genotypes, parents, and F_2s generally remained the same. However, CVs were reduced with increasing plot size. The CV was lowest when all six rows were included in a plot, indicating that in this material border effects were unimportant where entries of similar phenology were planted at a 150-cm row spacing. The high CV observed in the set of middle two rows might be a function of large plot-to-plot heterogeneity in a constant test area. Sampling two rows within each plot at random may give a better sampling of the soil heterogeneity in that same test area which may account for the relatively low CV in comparison with taking the paired rows from the center of each plot. In the set of middle four-row plots, the CV was intermediate between six-row plots and two-row plots. A slight reduction was observed when random four rows constituted a plot.

When the F_2s and parents were analyzed separately, changes in CVs in both groups, due to different plot sizes, followed the same trend as was observed in the overall analysis. However, the magnitude was greater for parents than for F_2s, indicating less plot-to-plot variation in the F_2s which was due probably to population buffering operating in the heterogeneous segregating populations.

The results suggest that, where entries of similar plant type and maturity are compared in a yield test, a plot size smaller than the six-row plots gives similar precision. The precision could be improved further by increasing the number of replications within the test area. Drawing rows from large plots to form small plots, as was done in this trial, favors larger plot size to some extent because there is a constant total test area over which the small plots are scattered. To get conclusive results in determining the optimum combination of plot size and number of replications in yield tests, it would be desirable to plant tests with varying plot sizes or to conduct uniformity trials.

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Physiology/Agronomy

Returns from Intercropping Pulses with Sorghum in Rajasthan

Field experiments were conducted at our station in medium heavy Vertisols from 1975 to 1977 to evaluate the suitability of some pulses and oilseeds for intercropping with sorghum. Sorghum and the intercrops were grown in alternate rows 30 cm apart at optimum plant populations. The system performance can best be judged from the income obtained from component crops at prevailing market prices (Table 1).

Table 1. Mean gross income[a] (Rs/ha)[b] from various intercrop systems grown in two seasons at Udaipur, Rajasthan, India.

Intercrop system	Year		Mean
	1975-76	1976-77	
Sorghum(S) sole	6211	6561	6386
S + soyabean	7893	7426	7660
S + mungbean	6847	6415	6631
S + black gram	6574	6772	6673
S + sunflower	5057	3789	4423
S + pigeonpea	7894	7388	7641

[a]Prevailing market rates
- Sorghum Re 1 per kg
- Pigeonpea, mung, black gram Rs 2 per kg
- Sunflower Rs 1.50 per kg
- Stover (all crops) Rs 10 per 100 kg

[b]One U.S. dollar approximately equals Rs 9.00.

Intercropping with pigeonpea, soyabean, mung bean or black gram gave increased returns over the sole sorghum crop. Pigeonpea or soyabean intercropped with sorghum gave the greatest gross returns over the two seasons.

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