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Short communication

GERMPLASM EXPLOITATION FOR COLD TOLERANCE IN PIGEONPEA

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Pigeonpea (*Cajanus cajan* L. (Millsp.) spreads pantropically and grows well in warm climates. The low temperatures (below 20°C) affect its germination and growth adversely (Jabrun *et al.*, 1981). The cultivation of pigeonpea is basically confined in tropical plains and negligible in temperate climates. The production trends during last three decades have shown a stagnation in Indian subcontinent and one of the possible strategy for increased production is development of cultivars suitable for non traditional areas and cold seasons. To evolve such cold tolerant types, a search for variation in the germplasm is essential.

Large germplasm collections of pigeonpea are available and they can be utilized provided evaluation for searching cold tolerant types is done. In pigeonpea, techniques for screening germplasm to cold tolerance is completely lacking. Steps are necessary for evolving some selection criteria at early germination/seedling stage under laboratory conditions as field trials will require lot of manpower and funds to screen huge germplasm collections.

In order to get some idea about cold tolerance in the pigeonpea, the spring planting (February, 1988) of accessions were done at low atmospheric temperature and mean soil temperature of 14.8°C at 5 cm depth. All genotypes showed a poor emergence (below 50%) except one genotype with 64 per cent emergence. Further studies with different accessions of pigeonpea were done under laboratory conditions in incubator for their capacity to germinate at low temperature i.e. 14°C, which was considered low for pigeonpea germination. The comparisons were also done at 20°C and 28°C (normal). The mean germination at these three temperatures showed wide variation in genotypic behaviour (Fig.1). Genotypes at number 21, 23, 25, 27, 29 and 31 showed high or at par germination both at low and normal temperatures while others were

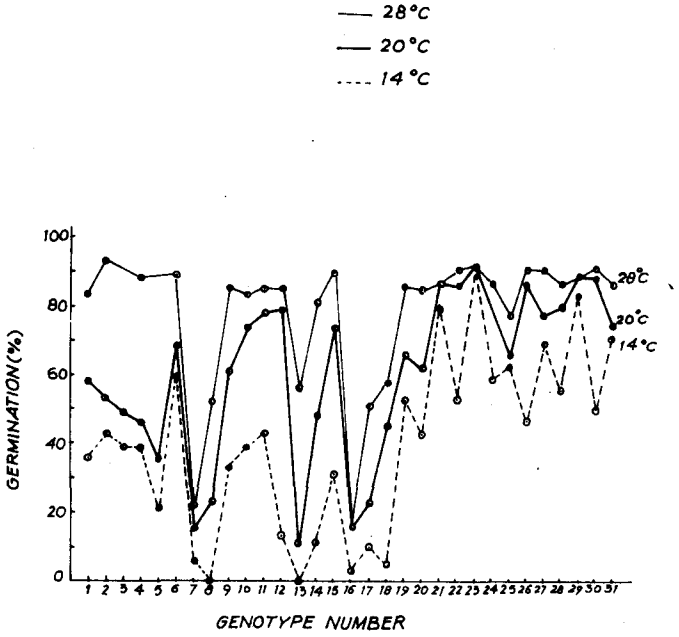

Fig. 1. Germination (%) at 15 day in pigeonpea genotypes at three incubation temperature

poor at low temperatures. The good germinators had high speed of germination as well at low temperatures. It was also apparent (Fig. 2 & 3) that differences in genotypic germination were more pronounced at low and medium tempera-

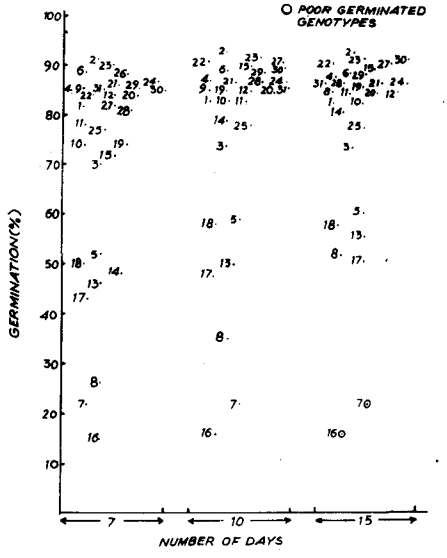

Fig. 2. Germination (%) on different days in pigeonpea germplasm at 28°C incubation temperature

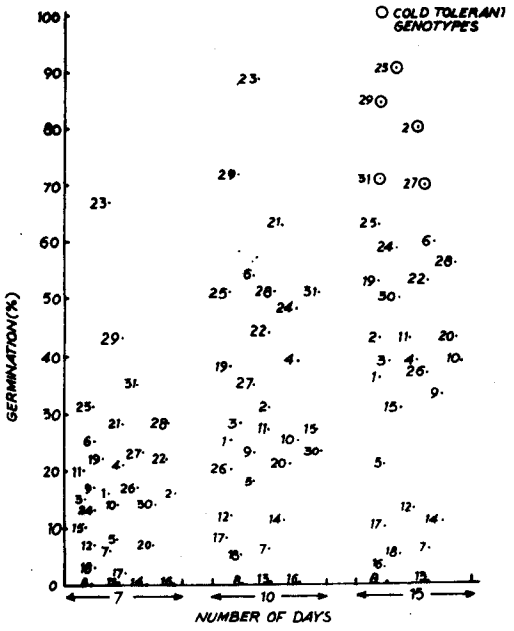

Fig. 3. Germination (%) on different days in pigeonpea germplasm at 14°C incubation temperature

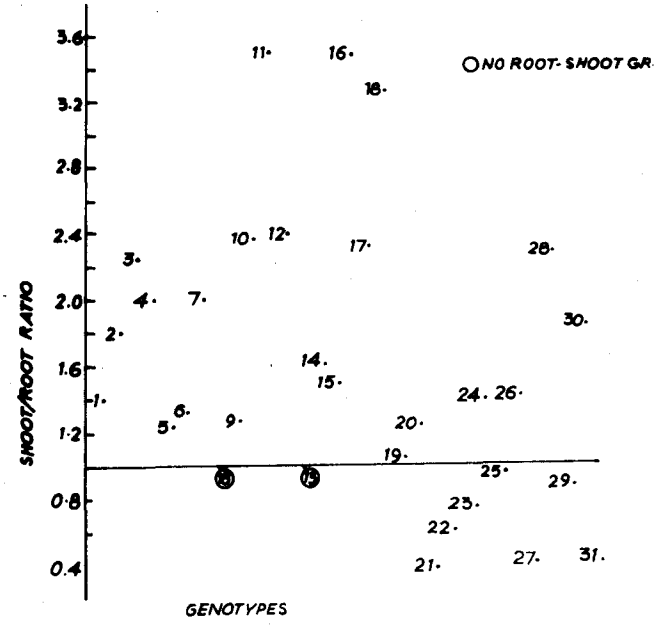

Fig. 4. Shoot/root ratio in pigeonpea genotypes at 28°C incubation temperature

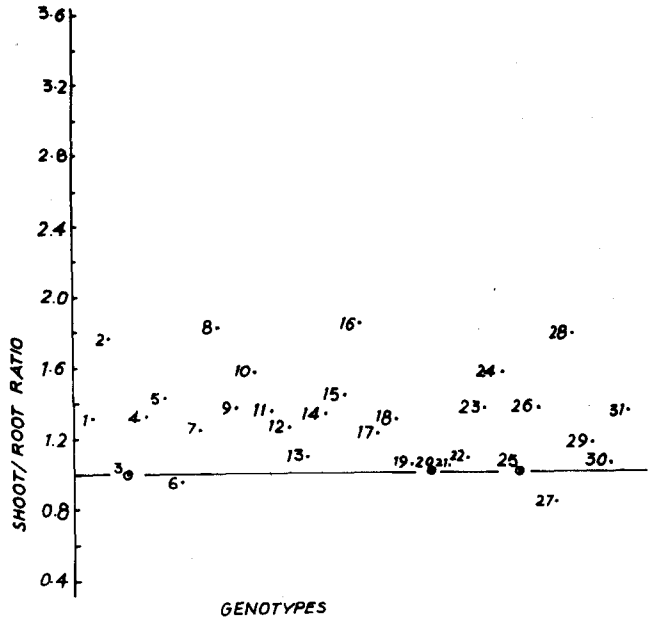

Fig. 5. Shoot/root ratio in pigeonpea genotype at 14°C incubation temperature

tures while at normal (28°C) temperature regime, genotypes showed clustering at higher peaks. The similar behaviour was recorded for field emergence at a colder site by the cold tolerant types i.e., better germinators at low temperatures. Such genotypic differences in early growth at cold temperatures during germination can become good selection criteria. Among the seedling traits it was indicative that shoot length can not be taken a criteria for selection of cold tolerant types, while the character-root length shows contrasting differences between cold tolerant and other groups at low incubation temperatures. The shoot/root length ratio in cold tolerant types at 14°C was found less than one i.e. longer roots than shoots while most of the other genotypes had a ratio more than one (Fig. 4, 5). These results confirm well under laboratory and field conditions.

Further studies on physiological, cytological and biochemical parameters being conducted, the results of which have not been presented in this paper.

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