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Short Communication

RELATIONSHIP BETWEEN NIL, AUTO- AND ALLO-COMPETITION AND THEIR IMPLICATIONS IN COWPEA BREEDING

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Competition among genotypes encounters in the genetic and plant breeding studies, causing strong confounding effects not only on different genetic parameters [1] but also on performance *per se* and ranking of cultivars [2]. Therefore, the present study was undertaken to assess yield performance of cowpea cultivars under nil-, auto- and allo-competition and the impact of their relationships in cowpea breeding.

Three cowpea (*Vigna unguiculata* L. Walp) cultivars differing in growth habit, maturity duration and yielding ability (IT82D-716, IT82E-18 and IT84E-124) were evaluated under the conditions of nil-, auto- and allo-competition for four growing seasons (summer and rainy seasons of 1987 and 1988). The 18 treatments that represented conditions of auto- and allo- competition were evaluated in a randomized complete block design with four replications following alternate-row design of Hanson *et al.* [3]. Each plot had a single-row of 2-m length spaced 40 cm apart with 10 cm distance between plants. The same set of treatments was also evaluated under nil-competition wherein all the treatments were arranged in a randomized complete block design with four replications at the plant spacing of 40 cm in 4-m long rows spaced 40 cm apart. At this spacing, the competition effects were found nonsignificant [4]. Ten plants from each row were harvested individually for seed yield. The average performance of cultivars under nil-, auto- and allo- competition was compared with each other. Correlation coefficients were estimated for grain yield under different competition situations.

The results of the nil-, auto- and allo-competition experiments (Table 1) revealed IT82D-716 as a low yielder with high competing ability. This cultivar recorded the lowest yield under nil- and auto- competition and the highest yield under allo-competition. The opposite holds true for other cultivars, IT82R-18 and IT84E-

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124, which were found to be high yielding under nil- and auto-competition and poor yielding under allo-competition, indicating their poor competing ability. The results revealed a negative correlation between yielding and competing abilities of cowpea cultivars. Correlation coefficients between nil-, and allo-competition (Table 2) showed that nil- competition and auto-competition are correlated positively *inter se* and negatively with allo-competition.

Table 1. Grain yield (g/plot) of cowpea cultivars under nil-, auto- and allo-competitions

Cultivar	Nil-competition				Auto-competition				Allo-competition			
Season	I	II	III	IV	I	II	III	IV	I	II	III	IV
IT82D-716	130	107	113	88	128	117	116	106	178	158	136	148
IT84E-124	147	135	137	124	130	105	129	94	125	160	114	171
IT82E-18	182	195	185	168	159	154	161	136	119	113	106	111
Mean	153	146	145	127	139	125	135	112	141	144	119	143
SE ±	12.6	21.2	17.3	18.9	8.2	12.1	10.9	10.2	15.3	12.5	7.3	14.3

Table 2. Correlation coefficient estimates between seed yields under nil-, auto- and allo-competitions

	Seasons				
Correlation between	I	II	III	IV	Combined
Nil- and auto-competition	0.964 (1.000)	0.851 (0.500)	0.998 (1.000)	0.734 (0.500)	0.860 (0.830)
Nil- and allo-competition	–0.809 (–1.000)	–0.876 (–0.500)	–0.908 (–1.000)	–0.639 (–0.500)	–0.690 (–0.710)
Auto- and allo-competition	–0.624 (–1.000)	–0.999 (–1.000)	–0.877 (–1.000)	–0.991 (–1.000)	–0.754 (–0.810)

All values were statistically significant at 1%; Parenthesis contains rank correlation coefficient

The negative correlation between yielding and competing abilities indicates that the genotypes with high competing ability (yielding high in competition but low in pure stand) would have better chance of being selected as an outstanding genotypes because of their accumulation at the plus end of the frequency distribution, whereas the genotypes with high yielding ability would be discarded. Therefore, selection for genotypes with superior auto-competition performance in segregating population at densities where allo-competition prevails has very little chance of success due to

negative correlation between auto- and allo-competition. This may explain, to some extent, the slow progress observed for grain yield in cowpea. These findings corroborated analogous results presented by Fasoulas [5]. Therefore, single plant selection in early generations should be made at spacing where every plant exploits environmental resources according to its genetic potential without being affected by other genotypes.

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