EARLY VIGOUR AS AN IMPLICATION IN SCREENING FOR COMPETITIVENESS FOR CROP-WEED COMPETITION IN RICE

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Crops with increased competitiveness more effective in weed suppression or better interference tolerance, or both[1]. For effective germplasm screening, evaluation criteria should be selected non-destructively. Main objective of this study was to quantify differences in shoot and root growth traits as completely as possible for a diverse set of rice cultivars under severe competition. Both weeds and cultivars were used as neighbours to compare inter and intra specific competitive effects on cultivar dry matter production. Secondary objective was to relate early vigour measured via particular traits to cultivar dry matter production under competition.

Nine cultivars were selected including three new improved and traditional varieties, namely BG 300, BG 358, BG 359, as the representatives of new improved groups, while varieties namely *Kalu-heenati, Suwandel, Pachcha-perumal, Kuruluthuda, Rathkadha, and Rath-thambiliya*were selected to represent the traditional germplasm. Cultivars were grown in pots surrounded by either barnyard grass (*Echinochloa crus-galli*) (Trials 1 and 2) or themselves (Trial 3). These experiments were conducted in randomized complete block designs, in plant house conditions in Faculty of Agriculture, Rajarata University of Sri Lanka. Trials with barnyard grass neighbours consisted of eight replicates, and that with cultivar neighbours consisted of four. Plants were grown in 0.35 m diameter pots (approximately 0.12 m^3) filled with lowland field soil. Nitrogen fertilizer was applied in two splits: 30 kg N ha^{-1} basally at planting (0.47 g per pot), followed by 30 kg N ha^{-1} at 21 DAS. Pots were watered to field capacity once every other day during first 14 days and daily thereafter. A total of 32 measured and observed parameters were used for analysis.

Significant differences between cultivars were found at each harvest for almost all the response variables ($p<0.05$) (Table 01). There were significant differences among cultivars, measured weekly.For example, both rates and magnitudes of tillering and heights differed greatly. Total dry matter (W_T) often varied significantly between the two trials (1 and 2), perhaps because of the difference of the tiller number. The leaf-related variables such as leaf dry matter (W_L), LA, and leaf area ratio (LAR) were mostly affected by fertility. Notably, differences were large for total dry matter (W_T) (Table 01). Cultivars also differed in stem dry matter (W_S), root dry matter (W_R), and leaf dry matter (W_L), but weight ratios were often equal across cultivars and sometimes constant over W_T. The RWR of *Suwandel* was significantly greater and the SWR lesser (both $p<0.01$) at 48 DAS than all other cultivars(Table 01). The most productive cultivars under interference were consistently *Pachcha-perumal* and *Kurulutuda*. The least productive cultivar was BG 358, with mean WT =4.4 g.In Trial 1, DM at 21 and 48 DAS were less correlated than in Trial 2, but both correlations were significant ($p<0.05$).In Trial 3, cultivar dry matter differed significantly at each harvest, but differences were much smaller than in Trials 1 and 2. Mean WT at 48 DAS increased by demonstrating that intra-specific competition was much less severe than competition against barnyardgrass. In particular, mean WT of *Pachcha-perumal* at 48 DAS in Trial 3 was about two times greater than in Trials 1 and 2, and did not differ significantly ($p>0.05$) from that of *Kalu-heenati, Kuruluthuda, Rathkadha, Suwandel* or *BG 359*. Mean LA and dry matter at 48 DAS in Trial 3 were not significantly correlated ($p<0.05$) with LA and dry matter in Trials 1 and 2 (Table 02), but LA and dry matter at 21 DAS were significantly correlated across all trials.

Rice cultivars can be evaluated for competitiveness on the basis of early height, leaf number, tilleringand some non-destructive measurements in identifying least vigorous cultivars in monoculture, which are least productive in inter-specific competition. If that methodology proves useful[1,2], screening for competitiveness can be done in standard nurseries, without the need for more complicated field practices, such as weedy stands and destructive harvests.

Table 01: Mean growth variables for nine rice cultivars at 48 DAS in trials 1 and 2 under inter-specific competition

Cultivar	W_T	W_R	W_L	W_S	AGR	RGR	LA	RL	H_m	T_m
Kalu-heenati	4.44	0.39	1.76	2.38	0.12	0.071	0.029	31.1	0.77	3.4
Pachcha-perumal	6.38	0.59	2.56	3.01	0.16	0.074	0.037	41.4	0.85	4.4
Kurulutuda	5.77	0.54	2.24	2.09	0.15	0.065	0.042	45.5	0.70	7.3
Rathkandha	5.14	0.41	1.98	2.62	0.13	0.066	0.037	40.6	0.60	7.7
Suwandel	4.79	0.53	2.04	3.25	0.16	0.073	0.032	39.0	0.73	5.5
Raththambiliya	3.68	0.33	1.30	2.46	0.13	0.073	0.024	22.0	0.85	3.5
BG 358	3.48	0.44	0.85	1.25	0.07	0.058	0.017	32.5	0.63	4.1
BG 300	4.89	0.46	1.89	2.86	0.14	0.072	0.037	36.1	0.67	7.4
BG 359	5.35	0.44	2.07	2.59	0.13	0.071	0.028	25.2	0.70	6.1
Mean	**4.39**	**0.46**	**2.43**	**2.60**	**0.13**	**0.069**	**0.031**	**34.8**	**0.72**	**5.5**
DMRT	**0.67**	**0.12**	**0.32**	**0.45**	**0.023**	**0.005**	**0.005**	**10.6**	-	-

Table 02: Mean growth variables for nine rice cultivars at 48 DAS in trial 3 under intra-specific competition

Cultivar	W_T	W_R	W_L	W_S	AGR	RGR	LA	RL	H_m	T_m
Kalu-heenati	10.4	1.61	3.95	4.87	0.36	0.124	0.108	101.1	1.05	6.9
Pachcha-perumal	12.0	1.76	4.40	5.79	0.41	0.119	0.123	103.7	1.17	9.5
Kurulutuda	10.6	2.03	3.72	4.82	0.36	0.113	0.119	147.7	0.95	11.9
Rathkandha	9.8	2.05	3.38	4.35	0.34	0.115	0.103	141.5	0.80	12.0
Suwandel	11.0	1.68	3.96	5.39	0.38	0.125	0.094	136.4	1.05	10.5
Raththambiliya	10.9	1.45	3.47	5.98	0.38	0.125	0.087	101.6	1.28	5.5
BG 358	9.6	2.08	3.57	3.91	0.33	0.136	0.091	116.8	0.95	9.8
BG 300	9.4	1.77	3.36	4.28	0.32	0.117	0.105	110.1	0.95	11.0
BG 359	11.8	1.75	4.35	5.74	0.41	0.118	0.108	120.8	1.05	9.8
Mean	**10.6**	**1.79**	**3.79**	**5.01**	**0.37**	**0.121**	**0.104**	**121.1**	**1.03**	**9.6**
DMRT	**1.9**	**0.50**	**0.67**	**1.01**	**0.07**	**0.007**	**0.020**	**46.2**	-	-

REFERENCES

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