negligible. The indirect effects of plant height, number of branches/plant, number of clusters/plant, pod length and number of seeds/pod via number of pods/plant was high and positive. Thus it can be inferred that number of pods /plant, plant height, number of branches/plant, pod length and number of seeds/pod could be considered as reliable variables for further crop improvement in ricebean.

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Standardisation of seed processing methods for hybrid rice

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Abstract: Standardisation of seed processing methods for hybrid rice was carried out at Department of Seed Science and Technology, TNAU Coimbatore. Considering, the high seed recovery and seed quality, 1.7 mm sieve can be used for size grading of TNRH-16 and TNRH-17 rice hybrids and 1.6 mm sieve for CORH-1 hybrid. Specific gravity separation of size graded seeds into four density grades showed the superiority of heavy, medium and light seeds over very light seeds in terms of seed quality parameters. Among the hybrids, CORH-1 showed its superiority in respect to seed quality over TNRH-16 and TNRH-17. *(Key words: Hybrid rice, Size grading, Density grading, Quality parameters).*

Availability of quality seed is one of the major constraints in increasing the productivity of agricultural crops. Among the seed quality attributes seed size and weight (density) are most important. The cleaner-cum-grader separates the seed on the basis of seed size by making use of different sieve sizes. However, this grader will not separate entirely the illfilled light seeds from the matured heavy seeds. This can be achieved in a specific gravity separator, where the heavy seeds irrespective of their size are separated from the lighter ones.

Materials and Methods

The bulk seeds of three hybrids *viz.* CORH-1, TNRH-16 and TNRH-17 were precleaned, dried to 12% moisture content and graded with 1.7 mm and 1.6 mm oblong sieves. The different fractions of seeds retained in 1.7 mm and 1.6 mm sieves and passed in 1.6 mm sieve were subjected to seed quality parameters *viz.* germination, drymatter production and vigour index. The vigour index of seedling was computed using the following formula suggested by Abdul– Baki

and Andorson (1973) and expressed in whole number.

Vigour index = Germination x Dry matter production

After size grading, the seeds retained in 1.7 mm and 1.6 mm sieves were pooled together and subjected to density grading by using the specific gravity separator and separated into four grades *viz.* heavy (G1), medium (G2), light (G3) and very light (G4) seeds. After density grading the different fractions were subjected to seed quality parameters as did earlier.

Results and Discussion

The results of the study that the seeds of TNRH –16 and TNRH-17 retained in 1.7 mm sieve recorded higher recovery of large size seeds and 1000 seed weight, whereas in CORH-1 higher recovery were obtained in seeds retained both in 1.6 mm and 1.7 mm sieves (Table 1). The differences in seed recovery could be attributed to varietal differences. The larger size seeds of TNRH-16 and TNRH-17 retained in 1.7 mm sieve registered the maximum germination (88% and 86%) and in CORH-1 the higher germination (above the minimum certification standard of 80%) was recorded by the seeds retained in both 1.7 mm and 1.6 mm sieves. Higher germination of large size seeds could be attributed to the higher initial capital which conferred initial advantage, (Ashby 1936). Wood *et al.* (1977) reported that bigger sized seeds possess well developed embryo which could be the cause for greater seed viability against smaller seeds. It is in agreement with the findings of Dronavalli (1985) and Mahantheshappa *et al.* (1992) in rice. The dry matter production also showed the similar trend as that of germination (Table 2). Hence, it could be suggested that 1.7 mm size sieve may be used for size grading of TNRH-16 and TNRH-17 and 1.6 mm sieve for CORH-1 hybrid rice seeds.

Since grading based on size normally fails to express the reality of seed quality, many scientists rely on weight of seed for separation of good seeds. The results revealed that proportion of light seed was more compared to heavy, medium and very light in CORH-1 hybrid followed by TNRH-16 and TNRH-17 and the thousand seed weight of heavier seeds was more than the other grades (Table 3). In all the three hybrids, heavy, medium and light fractions recorded higher germination of above 80 per cent. The very light seeds registered lower germination (51%). The higher germination percentage in high density seeds are due to well developed embryos and good filling of seeds. The dry matter production was higher in heavy and medium density fractions (Table 4).

Heavy seeds recorded higher vigour index value than light seed. Production of more dry matter and increased vigour index of seedlings from heavy and medium seeds might be due to the efficient utilization of large food reserves accumulated in the endosperm. The results are in confirmity with the findings of Amaral and Dos (1979) and Tomar and Prasad (1993) in rice and McDaniel (1969) in barley. The superiority of heavy and medium seeds over light seeds in expressing the seedling vigour may be primarily due to the availability of greater food reproves like protein, lipids and minerals and more supply of energy from cotyledons of heavy seed (Tupper *et al.* 1970). Among the three hybrids, CORH-1 showed superiority in respect of all the seed quality parameters *viz.* germination, dry matter production and vigour index over TNRH-16 and TNRH-17.

Table 1. Effect of size grading on seed recovery and thousand seed weight in the rice hybrid seeds

Hybrid (H)	Seed recovery (%)			(%) 1000 seed weight (g)			
	1.7 mm R	1.6 mm R	1.6 mm P	1.7 mm R	1.6 mm R	1.6 mm P	Mean
CORH-1	44.32	55.44	0.20	18.30	16.76	15.20	16.75
TNRH-16	94.31	5.33	0.36	17.86	16.53	14.80	16.40
TNRH-17	91.21	8.44	0.39	19.43	14.30	12.80	15.51
Mean	76.61	23.07	0.31	18.53	15.86	14.26	16.22
	SEd	CD (P=0.05)			SEd	CD (P=0.05)	
H	NS	NS			0.06	0.13	
G	0.71	1.51			0.06	0.13	
HG	1.24	2.61			0.10	0.23	

Table 2. Effect of size grading on germination, dry matter production and vigour index in rice hybrid seeds

Hybrid (H)	Germination (%)				Dry matter production (mg 10 seedling^{-1})				Vigour Index			
	1.7 mmR	1.6 mmR	1.6 mmP	Mean	1.7 mmR	1.6 mmP	1.6 mmP	Mean	1.7 mm R	1.6 mm P	1.6 mmP	Mean
CORH-1	92 (73.57)	84 (66.46)	42 (40.78)	73 (59.59)	132.0	129.0	36.0	99.2	12176	10836	1533	8182
TNRH-16	88 (69.79)	57 (49.22)	34 (36.06)	60 (50.76)	114.0	67.0	22.6	68.0	10032	3248	1520	4933
TNRH-17	86 (68.07)	58 (49.99)	28 (31.94)	57 (46.95)	74.0	55.6	19.0	49.5	6364	3248	820	3477
Mean	89 (70.70)	66 (54.85)	35 (36.26)	63 (52.53)	107.0	55.6	19.0	72.2	9524	5777	1291	5531
	SEd	CD (P=0.05)			SEd	CD (P=0.05)			SEd	CD (P=0.05)		
H	0.96	2.01			0.74	1.56			86.9	182.7		
G	0.96	2.01			0.74	1.56			86.9	182.7		
HG	1.66	3.49			1.28	2.70			150.6	316.5		

Figures in parenthesis indicates arc sine values.

Table 4. Effect of density grading on germination, dry matter production and vigour index in rice hybrid seeds

Hybrid(H)	Germination (%)					Dry matter production mg 10 seedling^{-1})					Vigour Index				
	Heavy	Medium	Light	Very light	Mean	Heavy	Medium	Light	Very light	Mean	Heavy	Medium	Light	Very light	Mean
CORH-1	91 (73.95)	88 (69.79)	82 (68.91)	66 (54.85)	82 (65.98)	52	124	114	78	117	13445	10912	9348	5154	9715
TNRH-16	88 (69.79)	85 (67.31)	80 (63.46)	60 (50.77)	78 (62.02)	85	83	85	72	81	7480	7055	6800	4233	6392
TNRH-17	90 (71.65)	88 (69.79)	83 (65.73)	27 (31.49)	72 (58.05)	129	95	52	31	76	11610	8360	4316	772	6265
Mean	90 (71.65)	87 (68.99)	82 (64.89)	51 (46.60)	77 (61.60)	122	100	83	60	-	10845	8776	6821	3386	7457
	SEd	CD (P=0.05)				SEd	CD (P=0.05)				SEd	CD (P=0.05)			
H	1.87	3.86				0.86	1.79				181	373			
G	2.16	4.45				4.00	2.07				209	431			
HG	3.74	7.72				1.73	3.58				362	747			

Figures in parenthesis indicates sine values.

Table 3. Effect of density grading on seed recovery and thousand seed weight in the rice hybrid seeds

Hybrid	Seed recovery (%)				1000 seed weight (g)				
	Heavy	Medium	Light	Very light	Heavy	Medium	Light	Very light	Mean
CORH-1	16.75	32.68	41.02	9.04	19.6	19.2	18.4	17.2	18.6
TNRH-16	30.86	15.61	43.80	9.96	18.4	18.5	18.2	16.2	17.8
TNRH-17	17.96	33.29	38.49	8.32	18.2	18.0	18.0	15.2	17.3
Mean	21.86	27.19	41.10	9.10	18.7	18.5	18.2	16.2	17.9

	SEd	CD (P=0.05)	SEd	CD (P=0.05)
H	NS	NS	0.035	0.073
G	0.46	0.96	0.041	0.843
HG	0.80	1.66	0.071	0.146

From this study, it could be concluded that specific gravity separation upgrade the seed quality and for getting better quality seeds in hybrid rice, the size graded seeds may be upgraded by density grading using gravity separator and density grades namely heavy, medium and light seeds may be used for seed purpose and the last grade namely very light seeds may be eliminated.

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