INFLUENCE OF SEED GRADING ON SEED QUALITY IN SUNFLOWER (Helianthus annuus L.) HYBRIDS AND THEIR PARENTAL LINES

H.RAMAIAH, G.V.JAGADISH, K.P.R.PRASANNA, VENKATARAMANA AND S. JAVAREGOWDA
Department of Seed Technology, UAS, GKVK, Bangalore-560065

ABSTRACT: A field experiment was conducted to study the influence of screen size on seeds of sunflower hybrids (BSH-1, KBSH-1 & APSH-11) and their parents (CMS-234A, 234B, CMS-1A, 7-1B) which were graded into three size fractions using screen size 2.9mm, 2.8mm (recommended) and 2.7mm. The influence of grading on seed index, seed recovery, seed rejection, germination per cent, field emergence, vigour index and EC of seed leachate were evaluated from the seeds produced during kharif 1992 and summer 1993.

The germination, field emergence, 1000 seed weight, EC of seed leachate, seed rejection, seed recovery of seed retained on 2.70 mm in hybrids, A and B lines showed non significant difference over the seeds retained on the recommended screen. Whereas seed recovery, vigour index of kharif and germination, 1000 seed weight, EC of seed leachate and vigour index of summer, recorded significant differences between the seeds retained over 2.80mm and 2.70mm for hybrids and A, B lines. Screen size 2.70mm gave seed recovery of 91.15% for A, B and hybrids as compared to recommended screen which gave 88%, without significant loss in seed quality.

Key words: Sunflower, screen size, germination, vigour.

Sunflower shows wide variation in seed size, this heterogenity could be observed even within a single capitulum and this will influence the uniform growth in the field crop. Hence, the optimum seed size needs to be evaluated to ensure better field performance. Modern seed production techniques recognises the importance of optimum seed size for a good seed crop. Theliterature of earlier workers also confirm that large seeds of sunflower show better seed quality (Kumar et al., 1979; Basavegowda 1988 and Hanumantharaya 1991) and blackgram (Dharmalingam and Ramakrishnan 1981) while it is small or medium seeds in case of soybean. In this study an attempt has been made to assess the influence of different seed sizes on seed quality parameters in sunflower.

MATERIALS AND METHODS

A field experiment was conducted at the NSP Field Unit U.A.S., Bangalore during Kharif 1992 and summer 1993 with ten sunflower genotypes by adopting all recommended package of practices (Anon., 1991) to raise good crop.

The seeds obtained from the field experiment were size graded into 3 size fractions using bottom slotted screens of 2.9 mm, 2.8 mm, 2.70 mm for hybrids (BSH-1, KBSH-1, APSH-11) and A and B lines (CMS 234A, 234B, CMS7-1A, 7-1B). The cleaned and graded seeds retained on respective screens were evaluated for seed recovery and rejections. 1000seed weight, germination per cent, field emergence potential, EC of seed leachage and vigour index. The per cent seed recovery was calculated as

$$\text{Per cent seed recovery} = \frac{\text{Total weight of cleaned seed}}{\text{Total weight of graded seed}} \times 100$$

The per cent seed rejection was calculated as

$$\text{Per cent seed rejection} = \frac{\text{Total weight of rejected seed}}{\text{Total weight of graded seed}} \times 100$$

Germination per cent and 1000 seed weight was conducted as per ISTA (1985). The field emergence was recorded by planting 4 x 100 seeds in a well prepared soil. Seedling that come out of the soil were considered as field emergence of seedlings on 10th day. To test EC of seed leachate 2 x 25 seeds from each grade were soaked separately in 25 ml of distilled water for 24 hours at 20°C $\pm$ 1°C and the conductivity of the seed leachate was measured using conductivity bridge and expressed as $\mu mohs/cm^2$. Jagadish & Shambulingappa (1983). Dry matter production was also recorded from ten normal seedlings, randomly selected and expressed in (mgs). The vigour index of each grade (mg) was calculated by multiplying dry matter of seedling and mean germination per cent.

RESULTS AND DISCUSSION

Seed recovery per cent increased with the decrease in the screen size from 2.90 mm to 2.7 mm and recorded mean seed recovery of 94.61 and 92.48% respectively (Table-1). These results are in conformity with the findings of Basavegowda (1988) and Hanumantharaya (1991) whereas the seed rejection showed has non-significant difference based on the average of two seasons.

The mean germination percentage of seeds increased progressively from 88 % to 94 % as the size of the seed increased from

2.7 mm to 2.9 mm. The difference in germination percentage due to seed size observed in the present study. However interaction effect was not significant which was also reported by Singh (1972) in soybean, the seed retained on screen 2.7 mm showed 88% of germination and it was well above the certification standard. Field emergence potential of seed increased with increase in size and the difference due to seed size were significant. The seed retained on 2.9 mm, 2.8 mm exhibited higher emergence potential, whereas the effect of genotype and seed size was non significant over the recommended screen size. These results are in conformity with the findings of Singh (1972) and Hanumantharaya (1991).

EC of seed leachate decreased with increase in seed size were significant. Seed retained on 2.70 mm showed higher EC as compared to recommended screen size and it was significant in summer (Table 2). Similar influence of seed size on EC of seed leachate was reported by Jagadish and Shambulingappa (1983) in sunflower.

Vigour index differed significantly based on the average of two seasons. However the seed retained on (S_1) 2.90 mm showed maximum vigour. 1509 followed by (S_2) 2.80 mm 1312 and lowest in (S_3) 2.70 mm 1123. 1000 seed weight also differed significantly and the seed retained over 2.90 mm showed maximum mean seed weight of 64.74 g (Table 2) and it was significant during summer whereas it was not significant due to poor quality of seed produced during kharif.

Considering the relative high seed recovery, germination field emergence, 1000 seed weight, vigour index, normal EC of seed leachate, less seed rejection from the seed retained on 2.70 mm screen without significant loss in seed quality may be recommended for grading of A, B and hybrid seeds of sunflower.

REFERENCES

Anonymous (1985). International Rules for Seed Testing. Seed Sci. and Technol. 13(2): 361-369.

Anonymous (1991). Improved cultivation practices for Agricultural crops. Southern dry region. Pub: Directorate of Extension, University of Agricultural Sciences, Bangalore. pp. 79-82.

Ashok Kumar, T.N., Giriraj, K., Prasad, T.G. and Vidyashankar, T.S., 1979. Influence of seed test weight on yield and growth parameters in sunflower. Seed Res. 7(2): 141-144.

Basavegowda, 1988. Performance of evaluation of threshers and air screen seed cleaner for sunflower(Helianthus annuus L.) seeds. M.Sc.(Agri.) thesis submitted to UAS, Bangalore.

Dharmalingam, C. and Ramakrishnan, V. 1981. Studies on relative performance of sized seed in peanut. Seed Res. 9(1):57-66.

Jagadish, G.V. and Shambulingappa, K.G., 1983. Relationship between seed size and seed quality attributes in sunflower. Seed Res. 11(2): 172-176.

Hanumantharaya, J.N., 1991. Performance of evaluation of air screen seed cleaner for paddy Redgram and Sunflower seeds. M.Sc.(Agri) thesis submitted to UAS, Bangalore.

Singh, V., 1972. Sunflower Cultivation. Indian Farming 12(4): 34-35.

Table 1: Seed recovery, seed rejection, germination, Field emergence percentage of Sunflower hybrids and their parents as influenced by screen size and seasons

Treatments / Seasons	Seed recovery (%)			Seed rejection (%)			Germination (%)			Field emergence (%)		
	Kharif	Summer	Mean	Kharif	Summer	Mean	Kharif	Summer	Mean	Kharif	Summer	Mean
notypes												
BSH-1	97.15	88.50	87.83	12.85	11.50	12.81	91.78	98.50	92.14	93.11	85.89	84.50
KBSH-1	89.55	89.06	89.31	10.45	10.94	10.70	91.33	95.33	93.33	93.67	86.17	84.92
APSH-11	89.22	89.61	89.42	10.78	10.39	10.39	91.56	93.44	92.50	84.00	85.17	84.59
CMS 234A	87.73	87.39	87.56	12.27	19.61	12.44	89.89	91.28	90.58	82.22	82.78	82.50
234-B	87.05	87.44	87.25	12.95	12.56	12.76	89.88	90.91	90.40	82.44	83.56	83.00
CMS 7-1A	89.16	89.06	89.11	10.84	10.95	10.90	90.00	90.28	90.14	82.11	82.88	82.50
7-1B	88.92	89.04	88.98	11.08	10.96	11.02	87.44	90.67	89.10	81.67	83.33	82.50
SEm±	0.30	0.42	-	0.29	0.40	-	0.45	0.38	-	0.38	0.35	-
CD at (0.05P)	0.93	1.17	-	0.81	2.15	-	1.25	1.04	-	1.05	0.98	-
reen size												
1 2.90 mm	83.95	85.26	84.61	16.05	14.74	15.40	93.24	95.13	94.19	85.19	86.88	86.04
2 2.80 mm*	88.03	88.36	88.20	12.00	11.24	11.62	90.67	92.86	91.78	82.67	83.86	83.27
3 2.70 mm	91.21	93.74	92.48	8.79	6.26	7.53	86.90	88.19	87.55	80.38	82.24	81.31
SEm±	0.10	0.28	-	0.29	0.26	-	0.30	0.25	-	0.25	0.23	-
CD at (0.05P)	0.54	0.77	-	0.81	0.78	-	0.82	0.69	-	0.68	0.64	-
teraction												
S1 V1	92.78	94.83	83.81	17.22	15.17	16.20	95.00	95.83	95.41	86.00	89.00	87.50
S1 V2	94.23	95.83	95.03	15.77	14.18	14.98	94.67	97.67	96.17	86.33	89.17	87.75
S1 V3	85.73	86.83	86.28	14.27	13.15	13.71	94.33	96.00	95.17	86.67	88.00	87.34
S1 V4	81.40	82.00	81.70	16.06	16.00	16.03	93.00	95.33	94.16	84.33	85.00	84.67
S1 V5	81.33	81.73	81.53	15.67	15.27	18.47	92.67	95.40	94.04	85.00	86.00	85.50
S1 V6	84.70	85.50	85.10	15.30	14.50	14.90	92.33	92.50	92.41	84.00	85.00	84.50
S1 V7	84.20	84.70	84.45	15.80	15.30	15.55	90.67	93.17	90.92	84.00	86.00	85.00
S2 V1	87.33	87.33	87.33	12.63	12.67	12.65	92.67	93.17	92.92	83.00	85.67	84.34
S2 V2	88.27	89.58	88.93	11.73	10.42	11.10	91.67	95.50	93.59	83.33	85.00	84.17
S2 V3	88.00	88.83	88.42	12.60	11.17	11.89	92.00	94.50	93.25	84.00	86.00	85.00
S2 V4	87.77	87.97	87.87	12.93	12.03	12.48	90.00	92.00	91.00	82.67	82.33	82.50
S2 V5	87.75	87.98	87.82	12.25	12.22	12.24	89.67	92.83	91.25	82.33	83.32	82.83
S2 V6	87.64	87.70	87.67	12.36	12.30	12.33	91.67	90.82	91.24	82.32	82.67	82.50
S2 V7	87.77	87.07	87.42	12.23	12.93	12.58	87.00	91.67	89.34	81.00	82.00	81.20
S3 V1	91.34	91.73	91.54	8.66	8.27	8.47	87.68	88.50	88.09	80.33	83.00	81.67
S3 V2	91.67	91.83	91.75	8.33	8.17	8.25	87.66	92.83	90.25	81.34	84.33	82.82
S3 V3	91.83	91.67	91.75	8.17	8.33	8.25	88.33	89.83	89.08	81.33	83.00	82.17
S3 V4	90.30	90.23	90.27	9.70	9.77	9.78	86.67	86.50	86.59	79.67	81.00	80.34
S3 V5	90.67	90.37	90.52	9.33	9.63	9.48	87.33	84.50	85.92	80.00	81.33	80.67
S3 V6	90.93	91.20	91.10	9.07	8.87	8.87	86.00	87.50	86.75	80.00	81.00	80.50
S3 V7	91.10	91.18	91.14	8.90	8.80	8.85	84.67	87.67	86.17	80.00	82.00	81.00
Mean	87.46	87.90	-	12.57	12.24	-	90.27	92.08	-	82.76	84.32	
F-test	*	NS	-	NS	NS	-	NS	*	-	NS	NS	
S.Em±	0.52	0.73	-	0.50	0.50	-	0.78	0.66	-	0.67	0.61	
D at (0.05P)	1.20	-	-	-	-	-	-	2.39	-	-	-	

*Note: Recommended screen size: 2.80 mm

Table 2: 1000 seed weight(g), vigour index and electrical conductivity (µmhos/cm) of sunflower hybrids, A and B lines as influenced by screen sizes and seasons

Treatments / Seasons	1000 seed weight (g) Kharif	Summer	Mean	Vigour index Kharif	Summer	Mean	Electrical conductivity (µmhos/cm) Kharif	Summer	Mean
Genotypes									
V1 BSH-1	56.35	57.85	57.10	1166	1308	1237	361	352	356
V2 KBSH-1	62.45	63.06	62.76	1543	1555	1549	332	322	327
V3 APSH-11	65.48	66.38	65.93	1590	1615	1602	423	434	429
V4 CMS 234-A	56.02	56.35	56.19	1097	1241	1169	389	370	379
V5 234-B	55.92	56.71	56.32	1181	1273	1227	377	342	359
V6 CMS 7-1A	63.19	65.59	64.39	1176	1285	1230	430	435	433
V7 7-1B	62.72	63.76	63.24	1231	1304	1267	436	414	425
Mean	60.30	61.39		1283	1369		392	381	
SEm±	0.50	0.59		17.85	21.21		5.65	3.00	
CD at (0.05P)	1.38	1.64		49.47	58.77		15.65	8.31	
Screen size									
S1 2.90 mm	64.08	65.39	64.74	1456	1563	1509	372	353	363
S2 2.80 mm	60.91	61.57	61.24	1256	1368	1312	407	360	384
S3 2.70 mm	55.50	56.90	56.20	1072	1175	1123	433	413	423
Mean	61.16	61.30		1261	1370		404	375	
SEm±	0.33	0.39		11.69	13.82		3.70	1.96	
CD at (0.05P)	0.90	1.07		32.38	38.47		10.25	5.44	
Interaction									
S1 V1	60.37	64.70	62.54	1396	1511	1454	330	296	313
S1 V2	66.97	68.40	67.69	2041	2184	2112	351	329	340
S1 V3	69.03	70.17	69.60	2124	2230	2177	442	432	437
S1 V4	59.50	60.13	59.82	1178	1366	1272	360	336	348
S1 V5	59.87	59.50	59.69	1318	1405	1362	309	290	305
S1 V6	66.97	67.83	67.40	1286	1365	1326	390	410	400
S1 V7	65.83	66.97	66.40	1349	1396	1372	414	380	397
S2 V1	58.34	58.93	58.64	1108	1307	1207	373	332	353
S2 V2	63.37	64.00	63.69	1353	1419	1386	376	350	363
S2 V3	66.63	66.80	66.71	1499	1700	1599	458	450	454
S2 V4	58.44	58.72	58.58	1113	1289	1201	393	385	389
S2 V5	57.27	57.17	57.22	1153	1298	1225	382	360	371
S2 V6	63.10	64.77	63.94	1264	1217	1241	439	433	436
S2 V7	63.20	64.47	63.85	1302	1291	1297	431	421	426
S3 V1	48.33	49.33	48.83	1095	1106	1050	391	366	374
S3 V2	57.00	56.77	56.89	1183	1241	1212	390	378	384
S3 V3	60.77	62.17	61.47	1236	1251	1244	499	481	485
S3 V4	53.13	54.27	53.70	1000	1067	1033	414	390	402
S3 V5	53.63	51.90	52.72	1071	1117	1094	431	376	403
S3 V6	59.50	64.17	61.84	877	1218	1048	463	463	463
S3 V7	55.13	59.83	59.48	1042	1223	1132	462	441	452
Mean	60.97	61.47		1280	1391		404	385	
F-test	NS	*		*	*		*	*	
S.Em±	0.86	1.02		30.92	36.73		9.78	7.34	
CD at (0.05P)	-	2.83		85.68	101.79		27.10	14.39	