



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2024; 8(10): 189-193
www.biochemjournal.com
 Received: 28-07-2024
 Accepted: 02-09-2024

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Assessment of chilli genotypes and their hybrids for seed quality parameters

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i10c.2439>

Abstract

The experiment was conducted with 65 chilli genotypes to estimate 8 seed quality parameters at Department of Seed Science and Technology, AAU, Anand in *kharif-rabi* 2023-24. Perusal of results for various seed quality parameters across chilli genotypes (parents, hybrids and check GAVCH 1) revealed higher values in parameters such as germination%, seedling length, seedling fresh and dry weight and vigour indices in specific hybrids suggesting vigorous seedling performance of hybrids. Female parent ACGMS 4 followed by ACGMS 1 and male parent Anand Jwala followed by ACS 19-08 showed highest average of hybrids among all the parents while the highest performing hybrid was ACGMS 4 × Anand Jwala, which demonstrated superior performance for seed quality parameters, using these parents breeders can develop more resilient and productive chilli cultivars with strong seedlings.

Keywords: Chilli, seed quality, GMS, hybrids

Introduction

Chilli (*Capsicum annuum* L.) a key element in numerous cuisines globally is used for its strong flavour and red colour. A member of the *Solanaceae* or the nightshade family, it has chromosome number of $2n=2x=24$. In its early stages of growth, this annual plant is herbaceous or semi-woody, but it eventually turns woody. India's green chilli production stands at a staggering 4699.88 thousand tonnes with an average productivity of 11.02 tonnes per hectare and a total area under chilli cultivation being 426.56 thousand hectares (Anonymous, 2023a) ^[1]. Andhra Pradesh is the largest producer in the country with 615.95 thousand tonnes of production. Also, the area under chilli cultivation is increasing year over year due to higher returns and good export potentiality compared to other vegetable crops. Another important factor to keep in mind is seed quality as it significantly impacts the overall performance and yield of chilli crop by influencing various growth parameters and ensuring the sustainability of cultivation. High quality seeds characterized by superior germination rates, seedling vigour, genetic purity and absence of seed borne diseases lead to robust plant establishment and higher yields. Hence, analysis for such parameters can assist breeders in selection for improvement of seed quality.

Materials and Methods

The present investigation was carried at Department of Seed Science and Technology, Anand Agricultural University, Anand during *kharif-rabi* 2023-24. Four GMS lines were crossed with 12 testers to produce 48 hybrids and all the material generated along with the parents and standard check GAVCH 1 was used in the experiment to estimate the seed quality parameters *viz.*, germination %, seedling root length (cm), seedling shoot length (cm), seedling length (cm), seedling fresh weight (mg) of 10 seedlings, seedling dry weight (mg) of 10 seedlings, seedling vigour index I and seedling vigour index II. Top of paper method suggested by Brown (1941) ^[2] was used to estimate germination% and samples were kept in seed germination chamber with 16 h light and 8h dark at 25 °C. Seedling vigour index I and Seedling vigour index II were estimated using procedure suggested by Baki and Anderson (1973) ^[3]. The averages of hybrids for males and females were calculated by average the values of hybrids for a particular male or female line. The experiment was conducted using Completely Randomised Design (CRD) as suggested by Panse and Sukhatme (1978) ^[4].

Results and Discussions

Germination %

Comparison of average performance of parents to hybrids showed that hybrids (81.90%) had higher germination than parents (79.29%). Germination in parents ranged from 73.00% (ACS 20-03) to 89.33% (Anand Jwala). In female parents, ACGMS 4 (82.67%) had the maximum germination followed by ACGMS 3 (76.33%) whereas among male parents, Anand Jwala (89.33%) had the maximum germination followed by Anand Tej (88.33%). Germination % of hybrids ranged from 75.33% (ACGMS 3 × ACS 19-13) to 90.67% (ACGMS 4 × GVC 101). Maximum germination % among the hybrids was found in ACGMS 4 × GVC 101 (90.67%) followed by ACGMS 3 × Anand Tej (88.33%), ACGMS 4 × ACS 20-03 (88.00%), ACGMS 4 × Anand Jwala (88.00%) and ACGMS 2 × ACS 20-20 (86.67%). Similar findings were reported by Christinal and Tholkkappian (2012)^[5] from 69.12% to 88.30%.

Seedling Root Length (cm)

Range of seedling root length among the parents was 0.90 (ACS 19-08) to 2.64 cm (ACS 22-05). Among the female parents, highest seedling root length was observed in ACGMS 4 (2.44 cm) followed by ACGMS 1 (2.02 cm) whereas among the male parents, highest seedling root length was recorded in ACS 22-05 (2.64 cm) followed by Anand Jwala (2.57 cm) and GVC 101 (2.45 cm). Among the 48 hybrids developed, seedling root length ranged from 1.03 (ACGMS 2 × Punjab Guchedar) to 3.07 cm (ACGMS 2 × Anand Tej). Top hybrids having the highest root length were ACGMS 2 × Anand Tej (3.07 cm), ACGMS 4 × ACS 21-12 (2.90 cm), ACGMS 4 × Punjab Guchedar (2.86 cm), ACGMS 3 × ACS 20-20 (2.82 cm) and ACGMS 2 × Ujwala (2.82 cm). The mean seedling root length of standard hybrid check GAVCH 1 used in the experiment was 1.63 cm. Similar results on variability in radical length have also been reported by Dhanelappagol *et al.* (1994)^[6] from 7.88 cm to 10.18 cm, Ravihunje *et al.* (2007)^[7] from 5.86 cm to 8.76 cm, Manjunath *et al.* (2009)^[8] up to 7.85 cm and Christinal and Tholkkappian (2012)^[5] from 6.45 cm to 8.45 cm in chilli.

Seedling Shoot Length (cm)

The mean performance of the parents and hybrids revealed that hybrids (5.28 cm) had statistically equal seedling shoot length to parents (5.17 cm). The seedling shoot length among the parents ranged from 3.58 (ACS 21-12) to 6.74 cm (ACS 20-03). The mean performances of female parents revealed that ACGMS 4 (6.40 cm) had highest seedling shoot length followed by ACGMS 3 (6.04 cm) whereas, male parents having highest seedling shoot length were ACS 20-03 (6.74 cm) followed by ACS 20-20 (6.20 cm). Out of the 48 hybrids developed, the range for seedling shoot length varied from 4.13 (ACGMS 2 × Punjab Guchedar) to 7.14 cm (ACGMS 4 × Anand Tej). Highest seedling shoot length was observed in the hybrids developed from the crosses, ACGMS 4 × Anand Tej (7.14 cm) followed by ACGMS 3 × G 4 (6.84 cm), ACGMS 4 × ACS 19-08 (6.74 cm), ACGMS 2 × ACS 19-08 (6.45 cm) and ACGMS 4 × Anand Jwala (6.36 cm). The mean performance of standard check GAVCH 1 was 4.34 cm which was significantly lower than top performing hybrids. Similar finding in variability for shoot length in chilli have also been reported by Dhanelappagol *et al.* (1994)^[6] from 7.88 cm to 8.77 cm, Ravihunje *et al.* (2007)^[7] from 6.46 cm to 7.85 cm and

Christinal and Tholkkappian (2012)^[5] from 6.88 cm to 8.36 cm.

Seedling Length (cm)

Analysis of mean performance revealed that hybrids (7.39 cm) had equal seedling length to parents (7.03 cm). Seedling length among parents ranged from 4.97 (ACS 21-12) to 8.84 cm (ACGMS 4). Highest seedling length in females was found in ACGMS 4 (8.84 cm) followed by ACGMS 3 (7.59 cm). While, in male parents, Anand Jwala (8.70 cm) had highest seedling length followed by GVC 101 (8.55 cm). Seedling length among the 48 hybrids ranged from 5.16 (ACGMS 2 × Punjab Guchedar) to 9.17 cm (ACGMS 4 × Anand Jwala). Maximum seedling length was observed in hybrids developed from the crosses, ACGMS 4 × Anand Jwala (9.17 cm) followed by ACGMS 4 × ACS 19-08 (8.93 cm), ACGMS 2 × ACS 19-08 (8.78 cm), ACGMS 4 × ACS 20-20 (8.77 cm), ACGMS 3 × ACS 19-08 (8.76 cm) and ACGMS 1 × Anand Jwala (8.76 cm) which was higher than standard check GAVCH 1 which had seedling length of 5.96 cm. Variation in seedling length of chilli for different genotypes have also been reported by Vallego *et al.* (1999)^[9].

Seedling Fresh Weight (mg)

Seedling fresh weight was statistically equal in hybrids (332.12 mg) and parents (324.78 mg). The range of seedling fresh weight for the parents was 279.37 (Ujwala) to 387.09 mg (ACGMS 4). Among the female parents, seedling fresh weight was highest in ACGMS 4 (387.09 mg) followed by ACGMS 3 (328.70 mg) whereas among the male parents, best performer was Anand Jwala (379.45 mg) followed by GVC 101 (375.44 mg). Range of seedling fresh weight among the hybrids was 286.91 (ACGMS 3 × ACS 19-13) to 405.02 mg (ACGMS 4 × Anand Jwala). Highest seedling fresh weight was recorded in ACGMS 4 × Anand Jwala (405.02 mg) followed by ACGMS 4 × ACS 19-08 (392.80 mg), ACGMS 1 × Anand Jwala (386.60 mg), ACGMS 3 × ACS 19-08 (385.79 mg) and ACGMS 2 × ACS 19-08 (384.41 mg) and they were considerably higher than standard check GAVCH 1 (293.55 mg). The findings of present investigation could be correlated with that of Jolly and Ekbote (2005)^[10] who reported a range of fresh weight from 190 mg to 250 mg in chilli.

Seedling Dry Weight (mg)

Seedling dry weight among parents ranged from 13.49 (ACS 21-12) to 26.75 mg (ACGMS 4). Among the female parents, ACGMS 4 (26.75 mg) followed by ACGMS 3 (22.61 mg) had the highest seedling dry weight, while among the male parents, GVC 101 (26.43 mg) had the highest seedling dry weight followed by ACS 20-20 (26.21 mg). In the hybrid combinations, seedling dry weight ranged from 13.93 (ACGMS 2 × Punjab Guchedar) to 29.20 mg (ACGMS 4 × Anand Jwala). Hybrid ACGMS 4 × Anand Jwala (29.20 mg) had the highest seedling dry weight followed by ACGMS 1 × GVC 101 (26.19 mg), ACGMS 4 × ACS 20-20 (26.15 mg), ACGMS 2 × Anand Jwala (25.41 mg) and ACGMS 3 × Anand Jwala (25.41 mg). The check GAVCH 1 had seedling dry weight of 17.25 mg. Variability in seedling dry weight of chilli genotypes has also been reported by Natash *et al.* (2005)^[11] from 3.57 mg to 4.01 mg, Ravihunje *et al.* (2007)^[7] from 16.70 mg to 19.70 mg and Christinal and Tholkkappian (2012)^[5] from 14.50 mg to 18.40 mg.

Table 1: Mean performance of parents, their hybrids and standard check for germination (%), seedling root length (cm), seedling shoot length (cm) and seedling length (cm)

Sr. No.	Genotypes	Germination (%)	Seedling root length (cm)	Seedling shoot length (cm)	Seedling length (cm)
Hybrids					
1	ACGMS 1 × ACS 19-08	83.00	1.74	6.00	7.73
2	ACGMS 1 × ACS 19-13	79.00	1.06	6.00	7.06
3	ACGMS 1 × ACS 20-03	78.67	2.54	5.33	7.87
4	ACGMS 1 × ACS 20-20	82.33	1.27	5.13	6.40
5	ACGMS 1 × ACS 21-12	77.00	2.37	4.70	7.07
6	ACGMS 1 × ACS 22-05	83.00	2.45	4.71	7.16
7	ACGMS 1 × Anand Jwala	82.67	2.51	6.25	8.76
8	ACGMS 1 × Anand Tej	86.33	2.55	6.02	8.57
9	ACGMS 1 × GVC 101	82.67	2.76	5.78	8.54
10	ACGMS 1 × G 4	80.00	2.60	4.19	6.79
11	ACGMS 1 × Punjab Guchedar	85.67	1.26	5.05	6.30
12	ACGMS 1 × Ujwala	83.00	2.50	4.13	6.63
13	ACGMS 2 × ACS 19-08	82.00	2.33	6.45	8.78
14	ACGMS 2 × ACS 19-13	76.67	1.69	4.19	5.88
15	ACGMS 2 × ACS 20-03	80.67	1.80	4.58	6.39
16	ACGMS 2 × ACS 20-20	86.67	2.32	4.85	7.18
17	ACGMS 2 × ACS 21-12	76.33	1.10	5.83	6.93
18	ACGMS 2 × ACS 22-05	84.67	1.15	4.33	5.48
19	ACGMS 2 × Anand Jwala	85.67	2.02	6.35	8.37
20	ACGMS 2 × Anand Tej	80.67	3.07	4.85	7.91
21	ACGMS 2 × GVC 101	81.33	2.67	4.54	7.21
22	ACGMS 2 × G 4	81.67	2.26	4.41	6.67
23	ACGMS 2 × Punjab Guchedar	76.00	1.03	4.13	5.16
24	ACGMS 2 × Ujwala	85.33	2.82	4.58	7.40
25	ACGMS 3 × ACS 19-08	83.67	2.51	6.25	8.76
26	ACGMS 3 × ACS 19-13	75.33	1.55	4.87	6.42
27	ACGMS 3 × ACS 20-03	81.00	2.25	4.30	6.55
28	ACGMS 3 × ACS 20-20	82.00	2.82	5.86	8.69
29	ACGMS 3 × ACS 21-12	76.00	2.55	4.80	7.34
30	ACGMS 3 × ACS 22-05	83.67	2.74	5.14	7.87
31	ACGMS 3 × Anand Jwala	85.00	2.79	5.41	8.20
33	ACGMS 3 × GVC 101	86.00	1.63	6.12	7.75
34	ACGMS 3 × G 4	76.67	1.21	6.84	8.04
35	ACGMS 3 × Punjab Guchedar	76.00	1.85	4.33	6.18
36	ACGMS 3 × Ujwala	79.00	1.41	4.30	5.71
37	ACGMS 4 × ACS 19-08	85.00	2.18	6.74	8.93
38	ACGMS 4 × ACS 19-13	84.33	2.51	4.33	6.84
39	ACGMS 4 × ACS 20-03	88.00	2.12	5.70	7.82
40	ACGMS 4 × ACS 20-20	84.00	2.70	6.07	8.77
41	ACGMS 4 × ACS 21-12	83.67	2.90	5.50	8.40
42	ACGMS 4 × ACS 22-05	75.67	2.19	5.07	7.26
43	ACGMS 4 × Anand Jwala	88.00	2.81	6.36	9.17
44	ACGMS 4 × Anand Tej	75.33	1.05	7.14	8.20
45	ACGMS 4 × GVC 101	90.67	2.57	4.71	7.28
46	ACGMS 4 × G 4	78.00	1.36	5.20	6.56
47	ACGMS 4 × Punjab Guchedar	82.33	2.86	5.10	7.96
48	ACGMS 4 × Ujwala	81.33	2.05	5.52	7.57
Parents					
49	ACGMS 1	75.00	2.02	4.20	6.22
50	ACGMS 2	74.00	1.34	4.36	5.70
51	ACGMS 3	76.33	1.55	6.04	7.59
52	ACGMS 4	82.67	2.44	6.40	8.84
53	ACS 19-08	81.00	0.90	5.71	6.61
54	ACS 19-13	74.33	1.80	4.60	6.41
55	ACS 20-03	73.00	1.56	6.74	8.30
56	ACS 20-20	83.33	2.13	6.20	8.33
57	ACS 21-12	79.67	1.39	3.58	4.97
58	ACS 22-05	83.67	2.64	5.38	8.02
59	Anand Jwala	89.33	2.57	6.12	8.70
60	Anand Tej	88.33	2.27	4.71	6.98
61	GVC 101	80.33	2.45	6.11	8.55
62	G 4	76.67	2.06	4.54	6.60
63	Punjab Guchedar	75.67	1.16	4.24	5.40
64	Ujwala	75.33	1.44	3.77	5.20
Standard Check					
65	GAVCH 1	83.33	1.63	4.34	5.96
	Hybrid mean	81.90	2.12	5.28	7.39
	Parent mean	79.29	1.86	5.17	7.03
	Hybrid range	75.33 to 90.67	1.03 to 3.07	4.13 to 7.14	5.16 to 9.17
	Parent range	73.00 to 89.33	0.90 to 2.64	3.58 to 6.74	4.97 to 8.84
	S.Em. ±	1.87	0.09	0.17	0.19
	CD at 5%	5.24	0.26	0.49	0.52
	CV%	3.99	7.80	5.72	4.42

Table 2: Mean performance of parents, their hybrids and standard check for seedling fresh weight (mg), seedling dry weight (mg), seedling vigour index I and Seedling vigour index II

Sr. No.	Genotypes	Seedling fresh weight (mg)	Seedling dry weight (mg)	Seedling vigour index I	Seedling vigour index II
Hybrids					
1	ACGMS 1 × ACS 19-08	341.29	22.70	641.62	1889.43
2	ACGMS 1 × ACS 19-13	313.74	19.82	559.34	1565.63
3	ACGMS 1 × ACS 20-03	347.00	23.13	619.20	1818.18
4	ACGMS 1 × ACS 20-20	290.40	19.46	526.95	1599.19
5	ACGMS 1 × ACS 21-12	314.32	19.71	544.82	1522.40
6	ACGMS 1 × ACS 22-05	314.79	19.20	594.39	1593.00
7	ACGMS 1 × Anand Jwala	386.60	23.99	724.26	1982.76
8	ACGMS 1 × Anand Tej	376.06	23.94	739.34	2067.28
9	ACGMS 1 × GVC 101	376.05	26.19	706.13	2164.89
10	ACGMS 1 × G 4	298.91	20.84	543.67	1666.59
11	ACGMS 1 × Punjab Guchedar	292.30	16.49	539.05	1413.91
12	ACGMS 1 × Ujwala	296.21	18.90	550.04	1566.10
13	ACGMS 2 × ACS 19-08	384.41	25.04	720.07	2052.75
14	ACGMS 2 × ACS 19-13	290.22	16.94	450.36	1297.87
15	ACGMS 2 × ACS 20-03	287.22	18.17	515.39	1463.87
16	ACGMS 2 × ACS 20-20	316.02	22.45	622.23	1944.89
17	ACGMS 2 × ACS 21-12	306.66	19.37	528.93	1477.85
18	ACGMS 2 × ACS 22-05	288.63	14.92	463.62	1263.73
19	ACGMS 2 × Anand Jwala	363.26	25.41	715.58	2174.31
20	ACGMS 2 × Anand Tej	351.19	21.65	638.31	1746.54
21	ACGMS 2 × GVC 101	320.53	21.00	586.47	1707.32
22	ACGMS 2 × G 4	293.59	18.07	544.29	1475.64
23	ACGMS 2 × Punjab Guchedar	290.54	13.93	390.80	1060.05
24	ACGMS 2 × Ujwala	326.72	23.95	632.67	2041.57
25	ACGMS 3 × ACS 19-08	385.79	23.92	732.19	2000.55
26	ACGMS 3 × ACS 19-13	286.91	18.95	483.65	1424.57
27	ACGMS 3 × ACS 20-03	291.42	18.32	530.73	1484.27
28	ACGMS 3 × ACS 20-20	382.95	25.26	712.17	2069.79
29	ACGMS 3 × ACS 21-12	326.35	21.61	559.14	1644.39
30	ACGMS 3 × ACS 22-05	352.08	21.48	658.95	1797.43
31	ACGMS 3 × Anand Jwala	360.79	25.41	697.03	2158.26
32	ACGMS 3 × Anand Tej	349.09	22.17	691.35	1959.01
33	ACGMS 3 × GVC 101	342.34	22.18	666.58	1905.68
34	ACGMS 3 × G 4	353.92	22.86	616.73	1748.81
35	ACGMS 3 × Punjab Guchedar	290.67	19.04	469.63	1447.93
36	ACGMS 3 × Ujwala	291.53	16.28	450.78	1284.79
37	ACGMS 4 × ACS 19-08	392.80	25.09	760.15	2132.88
38	ACGMS 4 × ACS 19-13	307.48	21.30	576.69	1796.96
39	ACGMS 4 × ACS 20-03	349.98	23.42	687.75	2063.41
40	ACGMS 4 × ACS 20-20	382.28	26.15	736.23	2199.17
41	ACGMS 4 × ACS 21-12	373.05	25.16	702.38	2104.04
42	ACGMS 4 × ACS 22-05	322.95	20.81	549.32	1574.69
43	ACGMS 4 × Anand Jwala	405.02	29.20	807.23	2569.05
44	ACGMS 4 × Anand Tej	362.33	22.18	617.52	1671.45
45	ACGMS 4 × GVC 101	319.77	22.78	659.59	2064.28
46	ACGMS 4 × G 4	292.62	18.93	511.27	1477.69
47	ACGMS 4 × Punjab Guchedar	354.40	22.15	655.46	1823.65
48	ACGMS 4 × Ujwala	337.07	21.63	615.19	1761.27
Parents					
49	ACGMS 1	290.51	17.50	466.45	1310.83
50	ACGMS 2	292.58	15.90	421.24	1176.28
51	ACGMS 3	328.70	22.61	580.26	1724.50
52	ACGMS 4	387.09	26.75	729.99	2211.44
53	ACS 19-08	290.98	18.14	535.59	1467.41
54	ACS 19-13	289.46	18.83	477.51	1396.71
55	ACS 20-03	367.52	24.43	605.95	1779.42
56	ACS 20-20	369.05	26.21	694.60	2183.03
57	ACS 21-12	290.96	13.49	396.28	1074.24
58	ACS 22-05	358.48	25.40	670.23	2128.79
59	Anand Jwala	379.45	25.98	777.23	2323.61
60	Anand Tej	312.17	17.85	617.06	1574.62
61	GVC 101	375.44	26.43	686.68	2122.92
62	G 4	293.40	17.65	506.27	1351.31
63	Punjab Guchedar	291.34	16.69	408.29	1260.19
64	Ujwala	279.37	15.32	391.59	1154.50
Check					
65	GAVCH 1	293.55	17.25	496.68	1437.53
	Hybrid mean	332.12	21.40	606.98	1758.31
	Parent mean	324.78	20.57	560.33	1639.99
	Hybrid range	286.91 to 405.02	13.93 to 29.20	390.80 to 807.23	1060.05 to 2569.05
	Parent range	279.37 to 387.09	13.49 to 26.75	391.59 to 777.23	1074.24 to 2323.61
	S.Em. ±	12.47	0.73	21.03	69.99
	CD at 5%	34.89	2.04	58.84	195.80
	CV%	6.54	5.96	6.12	7.01

Seedling Vigour Index I

Range of seedling vigour index I among the parents was 391.59 (Ujwala) to 777.23 (Anand Jwala). Among the female parents, highest seedling vigour index I was observed in ACGMS 4 (729.99) followed by ACGMS 3 (580.26) whereas among the male parents, highest seedling vigour index I was recorded in Anand Jwala (777.23) followed by ACS 20-20 (694.60). Among the 48 hybrids developed, seedling vigour index I ranged from 390.8 (ACGMS 2 × Punjab Guchedar) to 807.23 (ACGMS 4 × Anand Jwala). Top hybrids for seedling root length were ACGMS 4 × Anand Jwala (807.23), ACGMS 4 × ACS 19-08 (760.15), ACGMS 1 × Anand Tej (739.34), ACGMS 4 × ACS 20-20 (736.23) and ACGMS 3 × ACS 19-08 (732.19). The mean seedling vigour index I of standard hybrid check GAVCH 1 used in the experiment was 496.68. Variation in seedling vigour index I in chilli genotypes have also been studied by Dhanelappagol *et al.* (1994)^[6] who reported a wider range of variability from 248.38 to 1735.18 however and Natesh *et al.* (2005)^[11] from 743 to 901 in chilli.

Seedling Vigour Index II

Seedling vigour index II among parents ranged from 1074.24 (ACS 21-12) to 2323.61 (Anand Jwala). Among the female parents, ACGMS 4 (2211.44) followed by ACGMS 3 (1724.50) had the highest seedling vigour index II, while among the male parents, Anand Jwala (2323.61) had the highest seedling vigour index II followed by ACS 20-20 (2183.03). In the hybrid combinations, seedling vigour index II ranged from 1060.05 (ACGMS 2 × Punjab Guchedar) to 2569.05 (ACGMS 4 × Anand Jwala). Hybrid ACGMS 4 × Anand Jwala (2569.05) had the highest seedling vigour index II followed by ACGMS 4 × ACS 20-20 (2199.17), ACGMS 2 × Anand Jwala (2174.31), ACGMS 1 × GVC 101 (2164.89) and ACGMS 3 × Anand Jwala (2158.26). The check GAVCH 1 had seedling vigour index II of 1437.53. Corresponding results on variability in seedling vigour index II in chilli genotypes have also been reported by Ravihunje *et al.* (2007)^[7] from 1005 to 1494 and Priya *et al.* (2013) from 1489 to 1513 from the above results.

Conclusion

These results provide a comprehensive understanding of the seed quality parameters across various chilli genotypes. Higher values in parameters like germination%, seedling length, fresh and dry weight and vigour indices in specific hybrids indicate robust seedling performance, which is crucial for early plant establishment and growth. Such traits are essential for breeding programs aiming to develop high yielding, disease resistant chilli cultivars with vigorous seedlings. Selecting hybrids like ACGMS 4 × Anand Jwala, which consistently showed superior performance, can lead to the development of more resilient and productive chilli cultivars with robust seedlings. This approach ensures that the chosen genotypes contribute to enhanced seedling vigour and overall plant health, ultimately benefiting chilli growers with better crop yields and reduced losses due to poor seedling performance. Also, Female parent ACGMS 4 followed by ACGMS 1 and male parent Anand Jwala followed by ACS 19-08 showed highest average of hybrids among all the parents which indicated overall improvement in seed quality parameters when these were used as parents.

References

1. Anonymous. Agricultural statistics at a glance. Ministry of Agriculture & Farmers Welfare, Government of India. 2023. Available from: https://agriwelfare.gov.in/en/Agricultural_Statistics_at_a_Glance.
2. Brown WC. The germination of seed and the behavior of the seedling. *Plant Physiology*. 1941;16(4):595-609.
3. Baki A, Anderson JD. Vigor determination in soybean seed by multiple criteria. *Crop Science*. 1973;13(6):630-33.
4. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi; c1978.
5. Christinal V, Tholkkappian P. Seed quality in chilli influenced by the different types of drying method. *International Journal of Recent Scientific Research*. 2012;3(9):766-770.
6. Dhanelappagol MS, Shashidhara SD, Kulkarni GN. Effect of stages of harvesting and method of drying of chilli fruit on seed quality. *Karnataka Journal of Agricultural Science*. 1994;7(1):36-39.
7. Ravihunje BS, Vyakarnahal, Jagadeesh RC. Influence of drying method of fruits on seed quality in chilli (*Capsicum annuum* L.). *Karnataka Journal of Agricultural Science*. 2007;20(2):269-271.
8. Manjunath SN, Deshpande VK, Sridevi O, Uppar DS, Babalad HB, Rao MSL. Influence of seed pelleting on crop growth, seed yield and quality of paprika chilli (*Capsicum annuum* L.). *Karnataka Journal of Agricultural Science*. 2009;22(4):132-136.
9. Vallejo CF, Garcia MA, Suarez D. Effect of different cultivar and fruit positions on seed production and quality in sweet pepper (*Capsicum annuum* L.). *Acta Agronomica*. 1999;12(2):26-34.
10. Jolly RB, Ekbote SD. Influence of fruit maturity and post-harvest ripening on seed quality of chilli. *Karnataka Journal of Agricultural Science*. 2005;18(3):811-813.
11. Natesh N, Vyakaranahal BS, Shekhargouda M, Deshpande VK. Effect of stratified harvesting of fruit on seed yield and quality of chilli. *Karnataka Journal of Agricultural Science*. 2005;18(2):505-507.