INTERNATIONAL JOURNAL OF FORESTRY AND CROP IMPROVEMENT (December, 2010); 1 (2) : 102-104

RESEARCH ARTICLE Received : Sept., 2010; Revised : Oct., 2010; Accepted : Nov., 2010

Grain quality analysis in field pea [*Pisum sativum* (L.) Var. arvenses]

P.J. PATEL AND D.K. PATEL

ABSTRACT

Forty nine field pea genotypes including 17 tall, 27 dwarf and 5 extra types were tested for ten physical characters which determine grain quality. Sufficient variation was found for the characters 100 seed weight before and after soaking, seed volume before and after soaking, hydration capacity, swelling capacity, hydration index and swelling index. Coefficient variation for seed density after soaked and swelling index was low. The extra early type genotypes DDR -64 and DDR -6 had better grain quality. The dwarf type genotypes KMPR -144, HFD-9512, KPMR-602 and KPMR-632 and tall type genotypes IPF-99-31 also had better grain quality. Use of these genotypes in breeding as source for different traits has been suggested.

KEY WORDS : Field pea, Grain quality, Variability

Patel, P.J. and Patel, D.K. (2010). Grain quality analysis in field pea [*Pisum sativum* (L.) Var. arvenses], *Internat. J. Forestry and Crop Improv.,* **1** (2) : 102-104.

INTRODUCTION

Pea [*Pisum sativum* (L.) var. arvenses] is a leguminous plant of the sub family papilionoidaea and belongs to the general class of dicotyledon. Pea is the popular pulse crop and is the second important food legume of the world. It is essentially a cold weather crop and can withstand light frost. Dry peas are used as split pea (*dal*) and *besan* for various preparations. Green pods are used as a vegetable. Both pods and grains are rich in protein content ranging from 21 to 33 % (NBPGR, 1887). Water absorption relates directly to the cooking quality. However, information on the grain quality characters in field pea is meager. The present study was conducted to determine some cooking quality and physical characters on 49 genotypes.

MATERIALS AND METHODS

Grain samples of forty nine field pea genotypes namely Rachna (ch), Ambika (ch), IPF 98-18, KPMR 615, IPF 99-25, IPF 99-26, DMR 44, IPF 99-31, VL 40, VL 41, DMR 46, DMR 47, KPMR 660, KPMR 662, KPMR 663, IPF-1-17, IPF-1-22, HFP 4, KPMR 144, KPMR 400, DDR 49, IPF 98-1, IM 9214-10, NBP 1, IPFD 99-13, HFD 9512, NBP 2, KPMR 606, KPMR 603, LFD 323, KPMR 602, Pant P 13,Pant P 14, Pant P 20, DDR 61, DDR 62, KPMR 632, KPMR 640, KPMR 641, IPFD-1-9, IPFD-1-10, HFD 98-11, HFD 9830, HFD 9833, DDR 23, DDR 55, DDR 54, DDR 63 and DDR 64 were grown in the form of variability, character association, path analysis and genetic divergence trial at Main Pulses Research Station, SDAU, Sardarkrushinagar and seed harvested was used for the present study. For chemical analysis, one hundred randomly selected seeds were weighed in grams to get 100 seed weight. The same seeds were taken to find out 100 seeds volume and seed density. The physio-chemical tests like hydration capacity and swelling indes were determined by the methods used Bhattacharya (1972) and Williams (1983). All the tests were carried out in triplicate and the mean values were used for statistical analysis.

The derived physical characters were taken as given below.

– 100 seed weight (dry) : Weight of 100 seeds taken in gram after oven drying.

– 100 seed weight after soaking : Weight of 100 seeds after soaking in water for 24 hrs.

– Average volume of 100 seeds (dry): Volume of 100 dry seeds taken in ml.

– Average volume of 100 seeds (after soaking): Volume of 100 soaked seeds taken in ml.

– Hydration capacity (per seed): 100 seed weight

Correspondence to:
P.J. PATEL, C.P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, SARDARKRUSHINAGAR (GUJARAT) INDIA

Authors' affiliations:
D.K. PATEL, C.P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, SARDARKRUSHINAGAR (GUJARAT) INDIA

after soaking (g) – 100 dry seed weight (g) / 100 (number of seeds).

– **Density (dry) = Dry seed weight (100 seeds) / Dry seed volume (100 seeds)**

– **Density (after soaking) = Soaked seed weight (100 seeds) / Soaked seed volume (100 seeds)**

– Swelling capacity: 100 seed volume after soaking – 100 seed volume before soaking (24 hrs.)/ 100 (seed).

– **Hydration Index = Hydration capacity (100 seeds) / 100 seed weight (dry)**

– **Swelling Index = Hydration capacity (100 seeds) / 100 seed weight (Soaked)**

RESULTS AND DISCUSSION

A perusal of the Table 1 revealed considerable

Table 1 : Showing the variation in different quality characters of forty nine genotypes of field pea

So. No.	Genotype	100 seed Wt dry (g)	100 seed volume (ml) before soaking	100 seed volume (ml) after soaking	100 seed wt. (g) after soaking	Hydration capacity per seed	Density dry (g/ml)	Density soaked (g/ml)	Swelling capacity per seed	Hydration index (ml/g)	Swelling index (ml/g)
1	2	3	4	5	6	7	8	9	10	11	12
1.	Rachna (ch)	17.30	13.50	35.00	38.25	0.2095	1.281	1.093	0.215	1.211	1.243
2.	Ambika (ch)	16.49	14.00	36.00	36.94	0.2045	1.178	1.026	0.220	1.240	1.334
3.	IPF 98-18	16.25	13.50	30.50	34.52	0.1827	1.202	1.132	0.170	1.124	1.046
4.	KPMR 615	16.39	13.50	35.50	36.50	0.2011	1.214	1.028	0.220	1.227	1.342
5.	IPF 99-25	15.96	13.50	35.50	36.17	0.2021	1.182	1.019	0.220	1.266	1.378
6.	IPF 99-26	17.21	14.00	34.50	37.69	0.2048	1.229	1.092	0.205	1.190	1.191
7.	DMR 44	18.09	15.00	35.00	39.51	0.2142	1.206	1.129	0.200	1.184	1.105
8.	IPF 99-31	16.04	12.50	38.00	35.80	0.1976	1.283	0.942	0.255	1.232	1.590
9.	VL 40	19.96	16.00	40.00	40.75	0.2079	1.248	1.019	0.240	1.042	1.202
10.	VL 41	17.15	14.50	39.50	38.60	0.2145	1.183	0.977	0.250	1.251	1.458
11.	DMR 46	18.14	15.50	35.50	38.22	0.2008	1.170	1.077	0.200	1.107	1.103
12.	DMR 47	17.45	11.50	30.50	37.79	0.2034	1.517	1.239	0.190	1.166	1.089
13.	KPMR 660	16.40	18.00	36.50	37.63	0.2123	0.911	1.031	0.185	1.295	1.128
14.	KPMR 662	17.16	13.00	33.00	35.68	0.1852	1.320	1.081	0.200	1.079	1.166
15.	KPMR 663	16.72	13.50	35.00	36.90	0.2018	1.239	1.054	0.215	1.207	1.286
16.	IPF-1-17	16.80	15.50	32.50	38.20	0.2140	1.084	1.175	0.170	1.274	1.012
17.	IPF-1-22	16.05	14.50	31.00	38.76	0.2271	1.107	1.250	0.165	1.415	1.028
18.	HFP 4	14.59	12.50	29.00	32.39	0.1780	1.167	1.117	0.165	1.220	1.131
19.	KPMR 144	13.79	11.50	27.50	31.34	0.1755	1.199	1.140	0.160	1.273	1.160
20.	KPMR 400	17.42	17.00	32.50	37.51	0.2009	1.025	1.156	0.155	1.153	0.890
21.	DDR 49	15.94	13.50	30.50	34.40	0.1846	1.181	1.128	0.170	1.158	1.066
22.	IPF 98-1	17.55	14.50	33.00	39.59	0.2204	1.210	1.200	0.185	2.256	1.054
23.	IM 9214-10	15.14	12.50	32.00	33.81	0.1867	1.211	1.057	0.195	2.233	1.288
24.	NBP 1	14.96	10.00	30.50	33.52	0.1856	1.496	1.099	0.205	2.241	1.370
25.	IPFD 99-13	13.78	11.50	28.00	32.15	0.1837	1.198	1.148	0.165	2.333	1.197
26.	HFD 9512	13.24	10.00	27.50	32.17	0.1893	1.324	1.170	0.175	2.430	1.322
27.	NBP 2	16.10	12.00	31.50	36.18	0.2008	1.342	1.149	0.195	2.247	1.211
28.	KPMR 606	20.01	17.50	38.00	40.77	0.2076	1.143	1.073	0.215	2.038	1.074
29.	KPMR 603	19.25	15.50	43.50	45.40	0.2615	1.242	1.044	0.180	2.358	0.935
30.	LFD 323	16.10	13.00	31.00	35.13	0.1903	1.238	1.133	0.180	2.182	1.118

Contd... Table 1

Table 1 contd....

31.	KPMR 602	14.94	13.50	28.50	32.46	0.1752	1.107	1.139	0.150	2.173	1.004
32.	Pant P 13	17.38	14.50	38.00	39.96	0.2258	1.199	1.052	0.245	2.299	1.409
33.	Pant P 14	14.91	11.50	29.00	35.64	0.2073	1.297	1.229	0.175	2.390	1.173
34.	Pant P 20	15.78	13.00	30.50	34.68	0.1908	1.214	1.143	0.175	2.209	1.109
35.	DDR 61	16.08	13.00	29.50	34.46	0.1838	1.237	1.168	0.165	2.143	1.026
36.	DDR 62	19.10	15.50	34.00	39.66	0.2056	1.232	1.166	0.185	1.076	0.969
37.	KPMR 632	15.67	10.00	26.50	33.94	0.1827	1.567	1.281	0.165	1.166	1.053
38.	KPMR 640	15.10	12.50	30.50	34.83	0.1973	1.208	1.142	0.180	1.307	1.192
39.	KPMR 641	15.41	15.00	34.00	34.61	0.1920	1.031	1.018	0.190	1.246	1.233
40.	IPFD-1-9	14.50	11.50	27.00	33.23	0.1873	1.261	1.231	0.155	1.292	1.069
41.	IPFD-1-10	16.05	12.50	34.50	37.64	0.2159	1.284	1.091	0.220	1.345	1.371
42.	HFD 98-.11	20.22	15.50	40.00	45.51	0.2529	1.304	1.138	0.245	1.251	1.212
43.	HFD 9830	15.13	12.50	34.00	34.97	0.1984	1.210	1.028	0.215	1.311	1.421
44.	HFD 9833	15.16	10.00	29.00	36.00	0.2084	1.516	1.241	0.190	1.375	1.253
45.	DDR 23	21.33	15.00	36.00	40.17	0.1884	1.422	1.116	0.210	0.883	0.985
46.	DDR 55	15.17	11.50	29.50	33.27	0.1810	1.319	1.128	0.180	1.193	1.187
47.	DDR 54	18.02	13.50	35.50	38.25	0.2023	1.335	1.077	0.220	1.123	1.221
48.	DDR 63	19.70	19.50	45.50	46.54	0.2684	1.010	1.023	0.260	1.362	1.320
49.	DDR 64	26.23	17.00	46.00	52.81	0.2658	1.542	1.148	0.290	1.013	1.106
	Range	13.24-26.23	10.00 - 19.50	26.50 – 46.00	31.34– 52.61	0.1752-0.2664	0.911-1.567	0.942-1.281	0.150-0.290	0.883-2.430	0.890-1.590
	Mean (x)	16.80	13.66	33.58	37.16	0.2036	1.241	1.113	0.198	1.506	1.180
	S.d.	2.100	2.14	4.61	4.11	0.022	0.137	0.056	0.013	0.488	0.150
	σ	2.079	2.12	4.56	4.07	0.021	0.135	0.054	0.012	0.483	0.148
	C.V./%	12.38	15.52	13.58	10.95	10.31	10.88	4.85	6.06	32.07	12.54

variation for all the characters studied. The 49 field pea genotypes taken for this experiments had 100 seed weight ranging from 13.24 g (HFD 9512) to 26.23 g (DDR 64) with mean 100 seed weight of 16.8 g. 100 seed volume (dry) varied from 10 ml (VBP 1, HFD 9512 and HFD 9833) to 19.50 ml (DDR 63) with a mean 13.66 ml. The volume increased in 100 seed weight after soaking in all the genotypes. The increase in 100 seed weight after soaking was on average of about more than 100 per cent. Hydration capacity which is measure of intake of water by the grain was the highest for the genotype DDR 63 (0.2684 ml/seed) and for KPMR 602 (0.1752 ml/seed). The seed density decreased as expected after soaking by about ten to fifteen per cent though this decreased varied with the variety. The swelling capacity of DDR 64 (0.290 ml) was the highest and it was lowest for KPMR 602 (0.150 ml). The hydration index was the highest 2.43 for HFD 9512 and lowest for DDR 23 (0.883). The swelling index was found to be the highest in the IPF 99-31 (1.59 ml/g), whereas, it was the lowest for KPMR 400 (0.89 ml/g). This result was akin with the result obtained by Kumar *et al.* (1998). They also observed grain quality variation in desi chickpea.The genotypes tested had sufficient variation for all the characters studied except the density of soaked seeds. Based on the present studies the genotypes extra early types DDR 63, DDR 64, Dwarf types HFD 9830, HFD 9512, Pant P 14 and tall types IPF-99-31 were found very good for physical and phsio-chemical characters. These genotypes had good quality characters and therefore, can be used as donor for further improvement through hybridization.

REFERENCES

Bhattacharya, K.R (1972). *J.Sci. Fdi. Agric.*, **23**: 171-186.

Kumar, Ram, Verma, B.S., Ahlawat, T.R. and Yadav, G.P.(1998). Grain quality in desi chickpea. *Legume Res.,* **21**(1) :33-36.

Williams, P.C. (1983). *J. Sci. agric.*, **34**: 472-496.

****