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SHORT COMMUNICATION

EFFECT OF DISCOLOURATION ON SEED QUALITY IN CLUSTERBEAN (*CYAMOPSIS TETRAGONOLOBA* (L.) TAUB.)

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SUMMARY

The experiment was conducted on clusterbean variety HG 2-20 during **kharif** 2016 to know the effect of discolouration on seed quality parameters. On the basis of visual discolouration, the collected seed was divided into five different categories viz., no discolouration, 0-15 per cent, 16-50 per cent, 51-100 per cent discolouration and shrivelled seeds. The results revealed that significant variation was observed among all the seed lots in all the seed quality parameters. Maximum germination (59.67%) was observed in the seed lot without discolouration but it was also below the Indian minimum seed certification standards (75%), while it was observed minimum in the shrivelled seed (8.33%). Maximum seedling length (28.10 cm), seedling dry weight (0.145 mg), vigour index-I (1676.73) and vigour index-II (8.63) were also recorded in the healthy seeds (No discolouration). In shrivelled seeds, minimum seedling length (12.60 cm), seedling dry weight (0.058 mg), vigour index-I (104.23) and vigour index-II (0.45) were recorded. Six fungi-namely *Alternaria cyamopsidis*, *Aspergillus* spp.,*Curvularia lunat*, *Fusarium* spp., *Helminthosporium* spp. *Cercospora* spp. were detected but no bacterial infection was observed in the discoloured seeds.

Key words : Seed quality, discolouration, clusterbean, fungi

Clusterbean (*Cyamopsis tetragonoloba* (L.) Taub.) is an important pulse crop of irrigated as well as rainfed areas of the world. The most important constraint that limits their production and productivity is poor quality of seed due to which proper crop stand establishment is not maintained. The quality seed not only offers the highest economic & social returns among all the inputs but also ensures the optimum utilization of all other inputs viz. fertilizers, irrigation, pesticide etc. Availability of viable and vigorous seed at planting time is important for achieving targets of agricultural production because good quality seed acts as a catalyst for realizing the full potential of other inputs. Exposure to hot and humid conditions, rainfall, photoperiod after ripening are pre-harvest factors, cause seed quality loss following physiological maturity. Among all these factors, influence of moisture on seeds during ripening appears to exert the major influence on predisposition to weathering. After physiological maturity if the seeds are retained on mother plant seeds will deteriorate, physiological changes in seed may lead to formation of rigid seeds or off color seeds in pulse crops. Harvest delays beyond optimum maturity extend field exposure and intensify seed deterioration. Timely harvesting avoids prolonged exposure to moisture, and is the best means of avoiding weathering. At the time of harvesting, rains occur which result in discoloration of the seeds. Various fungi are also considered as the cause of discolouration of seeds. Keeping in view the above, the study was undertaken to know the effect of discoloration of seed coat on seed quality.

The experiment was conducted on clusterbean variety HG 2-20 during **kharif** 2016. The seed of this variety was collected from field and the seed lot was divided into five categories on the basis of visual discolouration viz. No discolouration, 0-15 per cent, 16-51 per cent, 51-100 per cent and shrivelled seed. The study was conducted in laboratory of Department of Seed Science & Technology, CCSHAU, Hisar. All the samples were subjected to the various seed quality parameters viz., germination (%), seedling length (cm), seedling dry weight vigour index-I and vigour index-II. For determining germination percentage, one hundred seeds in three replicates were placed in between sufficient moistened rolled towel papers (BP) and kept at 25^{o}C in seed germinator. After 14 days, the seedlings were evaluated and normal seedlings were considered for percent germination according to the rules of International Seed Testing Association (ISTA,

2004). Ten normal seedlings were selected randomly at the time of final count of standard germination and seedling length was measured in centimeters. Average lengths of 10 seedlings were recorded. Seedling dry weight was assessed after the germination test. The 10 seedlings of each treatment replicated thrice were taken. Seedlings were dried in a hot air oven for 24 h at 80±1°C. The dried seedlings of each replication were weighed and average seedling dry weight was calculated. Seedling vigour indices were calculated as under :

Vigour index-I=Standard germination (%) x Seedling length (cm)

Vigour index-II=Standard germination (%) x Seedling dry weight (mg)

All the seed samples were analyzed by standard blotter method to assess the distribution of seed-borne mycoflora. Three blotters of the size of Petri-plates were dipped in sterilized water and placed in sterilized Petri-plates. Four hundred seeds were taken from each sample randomly. Out of them, 100 were used unsterilized. Twenty-five seeds were used/Petri dish and four replications were maintained for each treatment. The Petri-plates were incubated at 25^{0}C. Observations on mycoflora associated with seeds were recorded after 8 days of the incubation under stereoscopic binocular microscope and associated fungi were identified with the help of standard monograph.

The results revealed that significant variation was observed among all the seed lots in all the seed quality parameters. Maximum germination (59.67%) was observed in the seed lot without discolouration but it was also below the Indian Minimum Seed Certification Standards (75%), while it was noticed minimum in the shrivelled seed (8.33%). The same trend was also observed in the other seed quality parameters. Germination, seedling length and vigour indices decreased with the increase in seed discoloration. Maximum seedling length (28.10 cm), Seedling dry weight (0.145 mg), vigour index-I (1676.73) and vigour index-II (8.63) was recorded in the healthy seeds (with no discoloration). In shriveled seeds, minimum seedling length (12.60 cm), Seedling dry weight (0.058 mg), Vigour index-I (104.23) and vigour index-II (0.45) was recorded (Table 1). The discolouration and deterioration in the seed quality parameters may due to more humidity due to rain just after harvesting of the crop (Fig. 1). Seed coat

TABLE 1
Effect of discolouration on seed quality in clusterbean cv. HG 2-20

Seed lot	Germination (%)	Seedling length (cm)	Seedling dry weight (mg)	Vigour index-I	Vigour index-II
No discolouration	59.67	28.10	0.145	1,676.73	8.63
0-15%	54.67	26.30	0.123	1,437.73	6.71
16-50%	40.67	24.63	0.122	1,002.73	4.97
51-100%	27.67	21.23	0.096	588.40	2.67
Shrivelled	8.33	12.60	0.058	104.23	0.48
C. D. (P=0.05)	3.75	1.04	0.009	109.31	0.45

TABLE 2
Mycoflora of unsterilized seeds

Mycoflora	No. of seeds showing infection				
	Healthy	Shrivelled	Discoloured (0-15%)	Discoloured (16-50%)	Discoloured (51-100%)
Alternaria cyamopsidis	10	52	12	50	56
Aspergillus spp.	8	30	10	28	32
Curvularia lunata	0	2	1	3	2
Fusarium spp.	4	2	1	3	2
Helminthosporium spp.	0	2	1	1	2
Cercospora spp.	0	2	1	3	2
Unidentified fungus	4	10	2	12	4
No mycoflora	74	0	72	0	0
Total	100	100	100	100	100

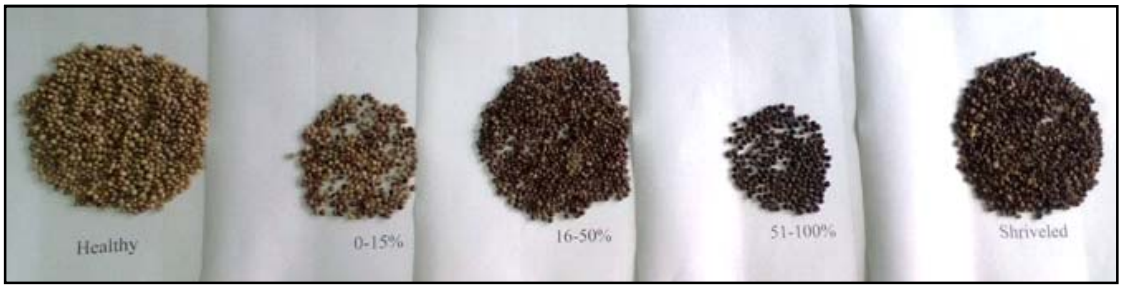

Fig. 1. Different categories of discoloured seeds.

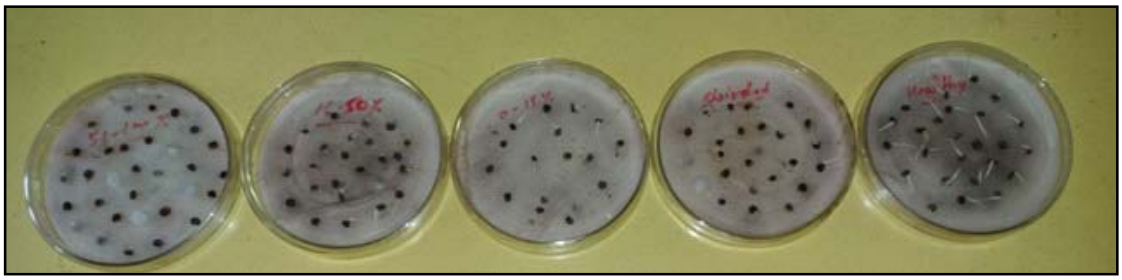

Fig. 2. Detection of various fungi in the discoloured seeds.

development is related to the maternal genotypes but seed coat colour is influenced b environmental conditions (De Souza and Macrcos-Filho, 2001). Deterioration caused by weathering is directly related to seed exposure to adverse conditions, so that the physiological quality is depending on the environmental conditions preceding harvesting (Pádua *et al.*, 2009). Adverse environmental conditions during seed filling and maturation result in forced seed maturation, which is associated with low yields, leading to a significant decrease in quality and an extensive reduction in the crop productivity (Pádua *et al.*, 2009). Ertekin and Kirdar (2010 also observed similar results in honeylocust. Six fungi namely, *Alternaria cyamopsidis*, *Aspergillus* spp.,*Curvularia lunat*, *Fusarium* spp., *Helminthosporium* spp. and *Cercospora* spp. were detected (Fig. 2 and Table 2) but no bacterial infection was observed in the discoloured seeds.

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