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Effect of Planting Season on Hard seededness in Mungbean [*Vigna radiata* (L.) Wilczek]

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A B S T R A C T

The present study was conducted on 15 genotypes of mungbean viz., MH 318, MH 565, MH 709, MH 729, MH 1-25, MH 534, MH 805, MH 810, MH 735, MH 736, MH 539-1, MH 919, MH 560, MH 421 and MH 2-15 to assess the effect of planting season on hard seededness. All the fifteen genotypes were grown in two seasons viz. summer and kharif. The results revealed that seed obtained from the crop raised during kharif season showed maximum number of hard seeds ranging from 11.00 to 33.00 as compared to summer raised crop (2.67-14.00). Maximum hard seed were recorded in genotype MH421 (22.00) followed by MH125 (19.33) and the lowest hard seed were found in genotype MH810 (8.00) followed by MH560 (9.67) indicating that presence of hard seededness is more of a genetic character.

Introduction

Mungbean [*Vigna radiata* (L.) Wilczek] is an important grain legume in many Asian countries including China, India and Pakistan. Mungbean known as Green gram is predominantly rainy season crop but can also be grown in summer season. It is grown mainly for its protein rich edible seed. Mungbean, being high in protein and easily digestible, constitutes a balanced diet in combination with cereals. Due to short duration and wide adaptability it is grown throughout the year in double and multiple cropping systems in entire Indo-Gangetic plains. It also helps in maintaining the soil fertility and health by symbiotic fixation of atmospheric nitrogen.

In India, it is cultivated on 3019 thousand hectare and production is 1503 thousand tones, with an average yield of 498kg/ha during 2015 (Anonymous 2015).

Hard seededness is a type of seed dormancy resulting from reduces permeability of the seed coat to water. Hard seeds do not readily imbibe water when soaked, even for prolonged periods thereby limiting the germination. Such seeds remain ungerminated as the moisture to the embryo is not available. This affects seed quality by lowering germination and ability of seeds to produce rapid and uniform crop stand. On the other hand, hard seededness may benefits planting

nature by preserving a seed stock for several years (Tyler 1997) but with adverse effects on the quality of cooked dishes. Transient hard seedness is common in mungbean cultivars, with levels usually in the range of 0-70% (Lawn and Rebetzke 2006). Williams (1989) found more than 90% hardseeds in some mungbean lines, Moreover, many small-seeded mungbean genotypes are hardseeded but no large seed varieties have persistent hard seedness (Imrie *et al.,* 1991). The extent of hard seedness in mungbean depends on the species itself as well as on climatic and other management factors. Temperature and relative humidity are common phenomena relating to the development of hard seed (Hazarika and Barua, 2002).

Materials and Methods

The study was conducted on 15 genotypes viz., MH 318, MH 565, MH 709, MH 729, MH 1-25, MH 534, MH 805, MH 810, MH 735, MH 736, MH 539-1, MH 919, MH 560, MH 421 and MH 2-15 collected from Pulses Section, Department of Seed Science and Technology, CCS Haryana Agricultural University Hisar. All the fifteen genotypes were grown in two different seasons viz. summer and kharif. Seed harvested from both the season were evaluated for hard seededness and germination per cent in laboratories of Seed Science and Technology Section, CCS Haryana Agricultural University, Hisar. Three replications with 100 seeds per replication for each genotype were placed on sufficiently moistened rolled papers (BP) at 25° temperature with 90-95% relative humidity in the seed germinator. Final count was recorded on 8^{th} day (ISTA, 2004). At the time of final seedling evaluation seeds were classified as normal seedling, abnormal seedling, dead and hard seeds and hard seed were recorded as percent hard seed. Normal seedlings including hard seeds were expressed as percent germination.

Whether condition

The meteorological data were obtained from Department of Agrometeorology, CCS Haryana Agricultural University, Hisar which is situated at Latitude: $29^0$10N, Longitude $73^0$43E, and at an elevation of 210 m above mean sea level. Meteorological data on temperature (^{0}C), relative humidity (%), rainfall (mm) during the crop seasons are given in table 1.

Results and Discussion

The mean values and range of hard seeds are given in (Table 2). The results revealed that seed obtained from the crop raised during kharif season showed maximum number of hard seeds ranging from 11.00 to 33.00 as compared to summer raised crop (2.67-14.00).

In kharif season, maximum hard seed were recorded in genotype MH125 (33.00) followed by MH421 (30.00%) and the lowest hard seed were found in genotype MH810 (11.00%) followed by MH560 (15%) while in summer season maximum hard seeds were recorded in MH421 (14.00%) followed by MH736 (11.67%) and the lowest hard seed were found in MH318 (2.67%) followed by MH560 (3.67%)

This was attributed to low temperature and high humidity in the environment during the time of seed maturation. This may also be attributed to high temperature during summer which may affect the thin waxy cuticle layer responsible for inhibiting the water uptake. Argel and Panton (1999) stated that the thickness of the cuticle and the suberization and cutinisation of the malpighia caps has also been associated with the degree of hard seededness. Abrams and Hand (1956) reported that at lower temperature dormancy is more pronounce than at higher one.

Table.1 Average weather data of Hisar during the experimentation season (2012)

MONTH	MAX TEMP (°C)	MIN TEMP()°C	RH (%)(M)	RH (%)(E)	RAINFALL (mm)
FEB 2012	21.1	5.3	87	40	0.0
MAR2012	28.7	10.6	83	32	0.0
APR 2012	34.2	18.1	74	38	33.3
MAY2012	39.9	22.3	51	24	29.8
JUN 2012	41.6	27.8	53	27	26.5
JUL 2012	38.1	28.0	76	51	76.6
AUG 2012	33.5	26.1	90	69	282.5
SEP 2012	33.5	23.7	87	57	32.9
OCT 2012	32.4	15.1	85	37	5.4
NOV 2012	27.4	9.2	92	38	0.0

Table.2 Effect of planting season on hard seededness in mungbean

Sr. No.	Genotypes	Hard seed (%)		
		Summer season	Kharif season	Mean
1	MH 565	8.67 (17.09)	20.00 (26.54)	14.33 (21.81)
2	MH 729	5.67 (13.75)	18.00 (25.09)	11.83 (19.42)
3	MH 709	4.00 (11.27)	17.33 (24.59)	10.67 (17.93)
4	MH 736	11.67 (19.95)	25.33 (30.21)	18.50 (25.08)
5	MH534	7.33 (15.69)	21.33 (27.50)	14.33 (21.60)
6	MH919	7.00 (15.31)	21.00 (27.26)	14.00 (21.29)
7	MH 810	5.00 (12.87)	11.00 (19.35)	8.00 (16.12)
8	MH539-1	8.00 (16.40)	17.00 (24.33)	12.50 (20.37)
9	MH 735	10.00 (18.41)	22.33 (28.19)	16.17 (13.33)
10	MH 805	9.67 (18.10)	17.00 (24.33)	13.33 (21.22)
11	MH125	6.67 (14.95)	33.00 (35.04)	19.83 (24.99)
12	MH318	2.67 (9.26)	18.00 (25.07)	10.33 (17.17)
13	MH560	3.67 (10.95)	15.67 (23.28)	9.67 (17.12)
14	MH2-15	10.33 (18.74)	19.33 (26.04)	14.83 (22.39)
15	MH421	14.00 (21.96)	30.00 (33.20)	22.00 (27.58z)
Mean		7.62 (15.65)	20.42 (26.67)	
Range		2.67-14.00	11.00-33.00	
CD at 5% Genotype(G)		1.386		
Season (S)		0.506		
Interaction (G X S)		1.960		

Table.3 Effect of planting season on standard germination in mungbean

Sr. No.	Genotypes	Germination (%)		
		Summer	**Kharif**	**Mean**
1	MH 565	91.00 (72.530)	81.33(64.388)	86.17(68.459)
2	MH 729	94.33 (76.210)	89.33(70.913)	91.83 (73.562)
3	MH 709	89.00(70.640)	82.00(64.875)	85.50 (67.758)
4	MH 736	92.33 (73.903)	87.00(68.847)	89.67 (71.375)
5	MH534	84.33 (66.659)	74.67(59.760)	79.50 (63.209)
6	MH919	90.00(71.550)	83.00(65.629)	86.50 (68.590)
7	MH 810	89.00(70.651)	82.67(65.372)	85.83 (68.012)
8	MH539-1	86.33(68.312)	83.00(65.629)	84.67 (66.971)
9	MH 735	89.00(70.614)	84.67(66.937)	86.83 (68.775)
10	MH 805	92.00(73.561)	81.67(64.634)	86.83 (69.097)
11	MH125	91.00(72.530)	82.67(65.384)	86.83 (68.957)
12	MH318	89.33(70.913)	83.67(66.150)	86.50 (68.532)
13	MH560	90.33(71.862)	82.33(65.121)	86.33 (68.491)
14	MH2-15	93.00(74.653)	85.00(67.194)	89.00 (70.923)
15	MH421	91.00(72.530)	84.33(66.685)	87.67 (69.608)
Mean		90.13 (71.808)	83.16(65.835)	
Range		66.65 -76.21	59.76-70.91	
CD at 5%				
Genotype (G)		1.197		
Season (S)		0.437		
Interaction (G X S)		1.693		

Similar results of higher percentage of hard seed in kharif were earlier reported by, Promila *et al.,* (1990), Brar and Singh (2002), Deswal *et al.,* (1996) and Saha *et al.,* (2004) in mugbean, Promila and Tomer (1990) also reported similar trend in urdbean. The mean values and range of germination percentage are given in (Table 3). The results of standard germination indicated significant difference due to genotypes, seasons and interaction. Among the genotypes tested, MH-729 had the highest germination (91.83) followed by MH-736(89.67) and the lowest germination was recorded in MH-534(79.50). The fifteen genotypes compared differed significantly from one another. Comparing the season germination was significantly higher in the seeds obtained from summer season crop with overall mean (90.13) compared to kharif season (83.16). The interaction between genotypes and season were also significant indicating the differential behavior of genotypes tested in different seasons with respect to standard germination. Among the treatment combination highest germination was recorded in MH-729(94.33) followed by MH2-15(93.00) grown in summer and lowest germination was recorded in MH-534(74.67) grown in kharif. This might be due to different genetic makeup of different genotypes. Higher value of germination percentage was recorded in summer crop as compared to kharif. Among the two seasons, the summer season crop showed superiority

over kharif season for almost all the parameters. This could be due to accumulation of required growing degree days in shorter period of time owing to increased temperature. The improved seed quality may also be due to availability of adequate moisture during vegetative phase and a dry period at crop maturity. Similar results of difference in genotypes and seasons with respect to different vigour and viability tests have earlier been reported in mungbean by Barua and Barua (2000), Deswal *et al.*, (1996), Yadav and Nagarajan (1995), Rahman *et al.*, (2004), Saha *et al.*, (2004) and Umesh *et al.*, (2007) in sunflower.

It can be concluded that summer produce seed had good quality with higher germination percentage and less number of hard seed as compared to kharif season and thus can be considered as a better option for production of basic seed.

References

Anonymous, 2015. Department of agriculture and cooperation. *Ministry of agriculture.* Government of India.

Argel, P.J., and Parton, C.J. 1999. Overcoming legume hard seededness. *Forage Seed Production*, Volume 2: Tropical and Subtropical Species (eds DS Loch and JE Ferguson) CAB international. 247-259.

Barua, M., and Barua, P.K. 2000. Seasonal effect on seed yield and quality in greengram. *Seed Research Vol.* 28(2): 153-157.

Brar, J.S., Shanmugasundaram and Singh, G. 2002. Hard seededness in mungbean-Variablity studies and season and ageing effect on stored seeds. *Report.AVRDC, Shanhua, Taiwan.*

Deswal, D. P., Sharma, S. and Dahiya, B. N. 1996. Seasonal effect on hard seed development and seed quality of green gram (*Vigna radiata* (L.) Wilczek). *Crop-Research*. 12(2): 200-206.

Hazarika, R., and Barua, P.K. 2002. Effect of fertilization and liming on hard seededness in green gram (*Vigna radiata* (L.) Wilczek). *Euphytica* 86: 167-181.

Imrie, B.C., Lawn, R.J. and Yeates, S.J. 1991. Mungbean breeding and cultivar development in Australia. In: Proceedings of the first Australian Mungbean Workshop, CSIRO Division of Tropical Crops and Pastures, Brisbane, Australia. pp 14-20.

ISTA. 2004. Informational rules for seed testing. *International Seed Testing Association* Zurich. Switzerland.

Lawn, R.J., and Rebetzke, G.J. 2006. Variation among Australian accessions of the wild mungbean (*Vigna radiata* ssp. *sublobta*) for traits of agronomic, adaptive, or taxonomic interest. *Aust. J. Agric. Res*. 57: 119-132.

Rahman, M.H., Haque, M.M., Hamid, A., Roknuzzaman, M. and Huq, M. 2004. Effect of sowing times on seed quality of mungbean. *Journal-of-Subtropical-Agricultural-Research-and-Development*. 2(2): 42-46.

Saha, R.R., Hamid, A. and Haque, M.M. 2004. Seasonal variation in seed quality of two improved mungbean varieties. Improving-income-and-nutrition-by-incorporating-mungbean in cereal fallow in the Indo-Gangetic Plains of South Asia DFID Mungbean Project for 2002-2004 *Proceedings of the final workshop and planning meeting*, Punjab Agricultural University, Ludhiana, Punjab. pp. 35-43.

Taylor, G.B., 1997. Effect of the environment in which seed are grown and softened on the incidence of autumn seed softening in two species of annual medics. *Aust J Agric Res*. 47: 141-159.

Tomar, R.P.S., and Kumari. P. 1991. Hard

seed studies in black gram (*Vigna Mungo* L.) *Seed Sci. Technol*. 19(6): 79-83.

Umesh, V.C., Ravi hunje, T.A., Malabasari, H.L., Nadaf and Vyakarnahal, B.S. 2007. Influence of Provenance on Seed Quality in Sunflower Hybrid RFHS-1. *Karnataka J. Agric. Sci.* 20(2): 265-268.

Von, Abrams, Hand, G.J. and M.E. 1956. *Am. J. Bot.* 43: 7-12

Williams, R.W., 1989. A study of the cause of and selection for resistance to weather damage in mungbean (*Vigna radiate* (L.) Wilczek; V. *mungo* (L.) Hepper). Ph.D. thesis, University of Queensland, Brisbane, Australia.

Yadav, R.N., and Shantha-Nagarajan. 1995. Seed yield and quality of greengram in relation to sowing time and variety under spring-summer conditions. *Seed-Research*. 23(1): 43-46.

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