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Picking Times and Storage Duration Effects on Hard Seededness in Mungbean [*Vigna radiata* (L.) Wilczek]

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Abstract: An experiment was conducted to observed the picking times and storage duration effects on hard seededness and germinability of six mungbean cultivars. Six mungbean cultivars viz. Barimung-2, Barimung-3, Barimung-4 representing small seeds and Barimung-5, Binamung-5 and Bumug-1, representing bold seeds were considered for the experiment. Mungbean pods were picked three times by 15 days intervals and subjected to germination test during subsequent three months. Seedhardness or germination capacity of mungbean cultivars did not very remarkably over three months periods stored at 20°C. But both picking seeds and varieties influenced significantly on seededness and showed better germination percentage during second and third picked seeds.

Key words: Mungbean, picking times, storage duration, hard seededness

Introduction

Mungbean [*Vigna radiata* (L.) Wilczek] is an important source of vegetable protein for growing population particularly in India, Pakistan, Bangladesh, Burma, Thailand, Philippines, China, Indonesia, East and Central Africa, West Indies, USA and Australia (Jaiwal and Gulati, 1995). It can fix atmospheric nitrogen and improve soil fertility and fits well in many cropping system because of its short maturity duration. However, Plhak *et al.* (1989) identified one major defect hard seededness (water impermeable seeds) in mungbean which has two implications. One is poor germination and poor stand, which is invariably a phenomenon of poor yield. Another is quality deterioration of mungbean sprouts. The extent of hard seededness in mungbean depends on species itself as well as on climatic and other management factors. Williams *et al.* (1989) found more than 90% hard seeds in some lines of mungbean while Lawn *et al.* (1988) identified 100% hard seeds in related wild species of *Vigna radiata*. Rainfall, temperature and relative humidity are common phenomenon in the development of hard seeds but soil fertility even application of lime also influences the hard seed formation of mungbean (Hazarika and Barua, 2002). As mungbean is indeterminate crop and matures in different times, picking time may also have some impact on hard seededness. Furthermore, storage duration of seeds may also influence on hard seededness of mungbean. Therefore, the present study was made to evaluate the effect of picking times and storage duration on hard seededness in mungbean seeds.

Materials and Methods

As experiment was carried out with six mungbean varieties viz., Barimung-2, Barimung-3 and Barimung-4, Barimung-5, Binamung-5 and Bumug-1. Seed size of Barimung-2, Barimung-3 and Barimung-4, range 24.9 to 29.8 mg and that of Barimung-5, and Bumug-1 range from 41.9 to 42.6 mg. Mungbean seeds were shown on 20 January 2001 at Regional Agricultural Research Station (RARS), Rahmatpur, Barisal, Bangladesh. The crop was managed properly and mature pods were picked by three times. First picking was done at 60 days after sowing (DAS), second at 75 DAS and third at 90 DAS. Seeds of each picking were sun dried to 12% moisture content and stored at 20°C. First germination test was performed immediately after storing and another two tests were done by one month interval. For each germination test, 100 seeds were placed on moist pads in petri dishes and allowed to germinate 27°C for 96 hours. The numbers of germinated and hard seeds were then counted and expressed as a percentage of total seed tested. Rotten seeds were not taken in analysis of variance and means comparison (Gomez and Gomez, 1984).

Results and Discussion

Interaction effect between picking time and storage duration of mungbean seeds was significant and hence independent effects were not discussed here.

Picking times showed profound effects on seed hardness of mungbean cultivars (Table 1). In general, hard seeds were less at first picking, which increased to maximum at

Table 1: Picking times effects on seed hardness and germination of mungbean over times

	Picking time					
	First		Second		Third	
Varieties	Germination (%)	Hard seed (%)	Germination (%)	Hard seed (%)	Germination (%)	Hard seed (%)
First month						
Barimung-2	89.3a	0.3ab	94.7bc	1.7abc	90.0a	3.3bc
Barimung-3	97.7a	1.0ab	98.7a	0.7c	91.3a	2.7c
Barimung-4	94.7a	1.7ab	92.7bc	2.3abc	91.3a	3.3bc
Barimung-5	99.0a	0.0ab	89.3c	5.0a	88.7a	5.0abc
Binamung-5	90.0a	2.3a	97.3ab	1.0bc	76.7b	9.0a
BUmug-1	97.3a	1.0ab	93.3bc	3.0ab	82.3ab	8.0ab
Second month						
Barimung-2	98.7ab	0.3a	94.7abc	1.3ab	91.0a	2.0b
Barimung-3	96.3bc	1.0a	98.0a	0.3b	92.0a	3.0ab
Barimung-4	93.7c	1.7a	91.7bc	0.3a	92.7a	3.0ab
Barimung-5	100.0a	0.0a	89.3c	2.3ab	88.7a	7.0a
Binamung-5	93.7c	1.3a	97.3ab	0.7b	85.3a	7.3a
Bumug-1	97.0bc	0.3a	94.0abc	1.0ab	91.0a	3.0ab
Third month						
Barimung-2	98.7a	0.3a	95.3a	2.3a	93.3a	1.3b
Barimung-3	98.0a	1.3a	95.0a	1.0a	94.0a	1.7b
Barimung-4	93.0b	1.7a	94.7a	2.0a	94.3a	2.3b
Barimung-5	98.3a	0.7a	93.0a	3.0a	88.7ab	3.3ab
Binamung-5	93.3b	1.7a	82.0b	1.7a	76.7c	7.7a
Bumug-1	96.0ab	1.3a	92.0a	1.7a	82.7bc	2.0b

third picking of mungbean. Lower number of hard seeds at earlier picking consequently increased to maximum at third picking of mungbean. Lower number of hard seeds at earlier picking of mungbean. Lower number of hard seeds at earlier picking consequently increased to maximum at cultivars (Table 1). In general, hard seeds were less at first picking, which increased to maximum at third picking of mungbean. Higher percentage of germination of earlier picked mungbean might be associated with better translocation of photosynthates towards the growing grains. Khan (2000) observed that leaf photosynthesis of mungbean is highest at first pod maturity stage. Therefore, better photosynthesis coupled with better translocation of photosynthates made the mungbean seeds more vigor and hence increased germination percentage.

There was however, a vertical difference in seed hardness and germination capacity of mungbean. The cultivars Barimung-2, Barimung-3 and Barimung-4 maintained consistently better germination over Barimung-5, Binamung-5 and Bumug-1 through out the three testing months. Although a seeds of first and second picked seeds of Barimung-5, Binamung-5 and Bumug-1 showed as well germination capacity, but its germination percentage reduced drastically at third picking time. Germination percentage of third picked seeds of Binamung-5 and Bumug-1 and Barimung-5 dropped to 76.7, 82.7 and 88.7% respectively. This variation in germination percentage i.e. reversely seed hardness clearly indicated that germination capacity of mungbean depends on seed size as well as on picking time. Seed size of Barimung-2, Barimung-3 and Barimung-4 is much smaller than of Barimung-5, Binamung-5 and Bumug-1 (Afzal *et al.,* 1998). Smaller sized seed of these cultivars might posses some physical properties related to seed cost that helped easy imitation of water into the seeds. The highest germination percentage was recorded in first picked Barimung-5, which maintained 99.0, 100.0 and 98.3% germination during first second and third months respectively. Such germination results revealed that seed deterioration did not occur for short-term strong at 20°C. On the contrary, small sized seeds of either Barimung-3, or Barimung-4, showed higher germination percentage than bold seeded cultivars during second or third picking time. Therefore irrespective of seed size and variety, first picked seeds of all mungbean cultivars are better germinable than the second and third picking seeds. It is better to avoid second or third picking for seed purpose but if necessity, second and third picked seeds of small seeded variety may be used for mungbean cultivation. The experiment is limited with in the seed size 42.6 mg. Hence further study with more bold seeds is necessary to explore the effect of seed size on seed hardness of mungbean.

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