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# Relationship Between Seed Size, Protein Content and Cooking Time of Mungbean [*Vigna radiata* (L.) Wilczek] Seeds

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**Abstract:** Laboratory Experiments were carried out during October 2001 to observe the relationships between seed size, protein content and cooking time of mungbean seeds. Mungbean seeds of Barimung-2, Barimung-3, Barimung-4, Barimung-5, Binamung-5 and BUmug-1 were selected for the test. Significant variation was observed in seed size, protein content and cooking time of dehulled mungbean seeds. The biggest seed (42.63 mg) was observed in Barimung-5 and the smallest (24.97 mg) in Barimung-2. There was a negative correlation ($r = -0.9586^{**}$) detected between seed size and protein content in mungbean seeds. Contrary, it was positive correlation ($r = 0.9851^{**}$) was detected between seed size and cooking time of dehulled mungbean seeds. Cooking time however showed a negative impact on protein status of mungbean seeds.

**Key words:** Correlation, seed size, protein content, cooking time, mungbean

## INTRODUCTION

Mungbean [*Vigna radiata* (L.) Wilczek] is an important and essential source of dietary protein (Lakhanpaul *et al*., 2000). It is an extensively grown pulse crop in Bangladesh, India, Pakistan, Burma, Thailand, Philippines, China and Indonesia as well as in East and Central Africa, West Indies, USA and Australia. Despite its wide adaptability, the yield of mungbean is very low as compared to many other grain legumes (Rachie and Roberts, 1974). The reason of lower yield of mungbean is recognized as less responsive to high inputs and limitation of sources (Kuo *et al*., 1978; Hamid *et al*., 1990). During the past two decades, several attempts have been made to boost up the yield of mungbean. But these efforts failed to bring any dramatic change in yield increment of mungbean. Recently, an alternative approach, like identification of bold seeded genotypes showed a new era in yield improvement of mungbean. Replacement of small seeded mungbean by bold seeded one could increase the yield of mungbean. But is there any effect of changing seed size on protein content and cooking time of dehulled mungbean? This study therefore, was undertaken to observe the relationship between seed size, protein content and cooking time of mungbean seeds.

## MATERIALS AND METHODS

Laboratory experiment was conducted at the Pulses Research Station, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh. Mungbean cultivars, namely Barimung-2, Barimung-3, Barimung-4, Barimung-5, Binamung-5 and BUmug-1, were considered for the test. Among the cultivars Barimung-2, Barimung-3, Barimung-4, Barimung-5 was released by Bangladesh Agricultural Research Institute; Binamung-5 was released by Bangladesh Institute of Nuclear Agriculture and BUmug-1 was released by BSMR Agricultural University. Mungbean was grown during summer season of 2001. One thousand seeds of each cultivar was counted by an auto counter and then its weight was determined using by an electronic balance. Nitrogen content was determined by the modified kjeldahl digestion colorimetric method (Cataldo *et al.,* 1974) and multiplied by 6.25 for determination of protein content. Cooking time was estimated as the procedure followed by Post Harvest Processing Technology Division of Bangladesh Agricultural Research Institute. Data of each parameter were obtained from three replications and were subjected to analysis of variance and means were compared using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

## RESULTS AND DISCUSSION

There was significant variation detected in seed weight, protein content and time required for cooking of dehulled mungbean seeds (Table 1). Seed size of mungbean cultivars ranged from 42.63 to 24.97 mg found in Barimung-5 and Barimung-2, respectively. The cultivar Barimung-5 was therefore 71 times bolder than Barimung-2. Seed weight of Barimung-5, BUmung-1 and Binamung-5 was similar. While intermediate seed weight was observed in Barimung-3 and Barimung-4. The result

Table 1: Varietal difference in seed size, protein content and cooking time of mungbean seeds

| Varieties | 1000 seed weight (mg) | Protein content (%) | Cooking time(min.) |
|---|---|---|---|
| Barimung-2 | 24.97C | 24.57A | 15.33B |
| Barimung-3 | 28.97B | 22.50B | 17.0B |
| Barimung-4 | 29.87B | 22.73B | 16.0B |
| Barimung-5 | 42.63A | 20.80C | 20.43A |
| Binamung-5 | 41.93A | 20.23C | 20.23A |
| BUmug-1 | 42.33A | 20.33C | 20.33A |

In a column, means followed by common letter are not significantly different at the 5% level by DMRT

Table 2: Relationship between seed size, protein content and cooking times of mungbean seeds

| Parameters | Seed weight (mg) | Protein ontent (%) | Cooking time (min.) |
|---|---|---|---|
| Seed size (mg) | - | | |
| Protein content (%) | -0.9586** | - | |
| Cooking time (min.) | 0.9851** | -0.9561** | - |

revealed that recently released varieties were bolder than the earlier released ones. In recent years, bold seeded mungbean varieties were released by different research organizations because of their major contribution to yield increment. For instance, Barimung-2 was released in 1987 and Barimung-5 was released in 1999 and the yield of Barimung-5 was about 40% higher than that of Barimung-2. This higher yield of Barimung-5 was the resultant of its higher seed size than that of Barimung-2 (Afzal *et al.*, 1999).

Protein content related inversely to seed size of mungbean. The smaller was the seed size higher was the percent protein content in mungbean seed. Barimung-2 with its smallest seed size content the highest (24.57%) proportion of protein and decreased gradually with the increase of seed size of other mungbean varieties. The highly significant negative correlation (r = -0.9586**) between seed size and protein content in mungbean seeds indicated that yield increment of mungbean through increasing seed size was possible only by sacrificing its protein content (Table 2). In fact, yield increment of crop is nothing but the allocation of more carbon towards the grain When carbon accumulation is more in grain then it reduces nitrogen content (Uprety and Bhatia, 1998) and ultimately lowers the proportion of protein in seeds.

Time required for cooking of dehulled mungbean seed is another important consideration in terms of energy use. The results revealed that bolder seeds required more time for cooking than the smaller seeds. Consequently Barimung-2 required the least time (15.33 min) and Barimung-5 took the maximum time (20.43 min) for cooking. The strong positive correlation (r = 0.9851**) between seed size and cooking time also emphasized the requirement of more energy for cooking of bold seeded mungbean. More time cooking of bold seeded mungbean however, showed a negative impact (r = - 0.9561**) on protein status of dehulled mungbean seeds (Table 2).

In conclusion, seed size increment is essential for yield improvement of mungbean. But subsequent increase in seed size, it reduced protein content and increased cooking of dehulled mungbean seeds. Therefore, breeding or other agronomic techniques should be evolved to maintain protein status of high yielding bold seeded mungbean varieties.

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