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## **Change in Moisture Content of Fresh and Infested Mungbean *Vigna radiata* (L.) Wilczek Seeds**

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### **ABSTRACT**

Four dominant fungi viz., *Alternaria alternata*, *Aspergillus niger*, *Penicillium rubrum* and *Fusarium moniliformae* were selected after isolation from mungbean seeds genotype HUM-12 and HUM-4. The seeds were infested with above dominant fungi. Moisture content of (fresh and infested both) were determined during different period of storage. Moisture content of mungbean seed was decreased due to infestation of selected dominant seed mycoflora. The results showed that *Aspergillus niger* infested mungbean seeds showed minimum moisture content followed by *Penicillium rubrum*. Highest Moisture content was recorded in freshly harvested mungbean seed genotype HUM-12 followed by HUM-4.

**Key words:** Moisture content, genotype and mungbean seeds

### **INTRODUCTION**

Pulses are rich source of vegetative protein and play an important role in nutritional security of majority of vegetarian population in India. The country is the largest producer and consumer of pulses occupying 33% of the world's area and 22% of the production. Pulse production in the country has fluctuated widely between 13 and 15 million tonnes (mt) with no significant growth trend between 1991 and 2010. The latest estimate indicates that the present production of pulses has reached 14.7 million tons (mt) with productivity of 637 kg ha<sup>-1</sup> although the projected pulse requirement by the year 2030 (32 mt) is estimated to be more than double the current production level (Anonymous, 2011). Mungbean (*Vigna radiata* (L.) Wilczek) is a short duration; herbaceous, annual, self-pollinated legume pulse crop under the family. It also has the ability to fix atmospheric nitrogen in soil which enriches the soil quality (Nadeem *et al.*, 2004). It is an excellent source of proteins considered as a "poor men's protein" (Mian, 1976). It contains 26% protein, 51% carbohydrate, 10% moisture, 4% minerals and 3% vitamins (Khan, 1981). Areas for cereals and other pulses have decreased, that for mungbean has doubled in the last two decades with an annual rate of 2.5%. The area under pulses in India is around 24.38 million ha with a production of 14.52 million tonnes. Nearly 8% of this area is occupied by mungbean which is the third important pulse crop of India in terms of area cultivated and production next to gram and pigeon pea (Sathyamoorthi *et al.*, 2008).

**MATERIALS AND METHODS**

**Determination of moisture content of fresh and stored mungbean seeds:** Seeds were infested with four dominant fungi viz., *Alternaria alternata*, *Aspergillus niger*, *Penicillium citrum* and *Fusarium moniliformae* as well as fresh seeds were used to test moisture content of Mungbean seeds. About 5 to 6 g mungbean seeds were accurately weighed in a Petri dish and kept in hot-air oven maintained at 110°C for 4 h. After cooling in a dessicator, the loss in weight was recorded in each case. This procedure was repeated till constant weight was obtained (Shah and Seth, 2010). The moisture content of seeds was determined with the help of the equation given below:

$$\text{Moisture content of seeds (\%)} = \frac{\text{Initial weight of seeds - weight of seeds after drying}}{\text{Initial weight of seeds}} \times 100$$

**RESULTS**

Present result showed that moisture content of mungbean seed was increased due to prolongation of storage period. Effect of selected dominant seed borne mycoflora on moisture content of mungbean seeds is presented in the (Table 1). The effect significantly differed from genotype to genotype. Moisture content of mungbean seed was increased due to infestation of selected dominant seed mycoflora viz., *Alternaria alternata*, *Aspergillus niger*, *Fusarium moniliformae* and *Penicillium rubrum* from 180 days to 360 days of storage. After 360 days period of storage, maximum moisture content (16.76%) was observed in seed infested with *Aspergillus niger* in genotype HUM-4 followed by (15.67%) in genotype HUM-12 and *Penicillium rubrum* infested seed showed (14.98%) in Genotype HUM-4 followed by (14.90%) in Genotype HUM-12. After 180 days period of storage maximum moisture content (14.18%) in seed infested with *Aspergillus niger* in Genotype (13.00%) followed by (11.00%) in Genotype HUM-12. Lowest moisture content (7.50%) was recorded in fresh mungbean seed Genotype HUM-12 followed by (8.35%) in Genotype HUM-4. Result revealed that due to prolongation of storage period moisture content was found to be increased and *Aspergillus niger* infested seed showed maximum moisture content followed by *Penicillium rubrum* infested seeds.

Table 1: Moisture content of fresh and infested mungbean

Treatment	Genotype					
	(HUM-4)			(HUM-12)		
	Fresh seed	Six month	Twelve method	Fresh seed	Six month	Twelve method
T <sub>1</sub>	-	10.54±0.2	12.67±0.5	-	09.97±0.3	10.89±0.6
T <sub>2</sub>	-	13.00±0.1	14.98±0.4	-	11.00±0.0	14.90±0.3
T <sub>3</sub>	-	14.18±0.1	16.76±0.4	-	13.33±0.2	15.67±0.3
T <sub>4</sub>	-	12.80±0.3	13.60±0.4	-	10.00±0.0	12.98±0.2
Control	8.35±0.5	10.30±0.3	11.36±0.4	7.50±3.33	09.34±0.1	10.98±0.3

T<sub>1</sub>: Seeds infested with *Alternaria alternata*, T<sub>2</sub>: Seeds infested with *Penicillium rubrum*, T<sub>3</sub>: Seeds infested with *Aspergillus niger*, T<sub>4</sub>: Seeds infested with *Fusarium moniliformae*

## DISCUSSION

For fungal infection, moisture content play important role in deterioration of seed (Amusa *et al.*, 2002), temperature (Abaka-Gyenin and Norman, 2000; Burrell, 1974; Kuku, 1979). High moisture content seed enhance the microbial population in stored seed and increase the rate of seed damage (Abdulsalaam and Shenge, 2011). Similar result were reported by many other workers (Christen and Kaufmann, 1965; Gupta *et al.*, 1973; Rahman *et al.*, 1985; Cook and Veseth, 1991). Clements (1988) reported that in earthen container, moisture content was found to be highest and seed germination was low. This is due to effect of length of storage period and storage conditions. It indicates that the storage fungi are also responsible for deterioration and discoloration of seeds in storage. Christen and Kaufmann (1965) clearly demonstrated that storage fungi show maximum population in stored seed at the different period of storage resulting reduce the population of field fungi and germination of seed. Similar results were also observed by Mian and Fakir (1998) in case of rice seed. On an average the mean moisture contents of the seed samples stored in plastic container in ambient environment reached 13.7 to 14.0% on both accession after six months and 14.5 and 18.5% after nine months irrespective of the storage container (Asiedu *et al.*, 1999). Who reported that stored seed in hot and humid condition tend to absorb moisture from the surrounding resulting increase in moisture content, the rate of deterioration also increases (Roberts, 1972).

## REFERENCES

- Abaka-Gyenin, A.K. and J.C. Norman, 2000. The effect of storage on fruit quality of Watermelons (*Citrullus vulgaris*) ISHS. Acta Horticulturae, 53: 305-307.
- Abdulsalaam, S. and K.C. Shenge, 2011. Seed borne pathogens on farmer-saved sorghum (*Sorghum bicolor* L.) seeds. J. Stored Prod. Postharvest Res., 2: 24-28.
- Amusa, N.A., I.A. Kehinde and O.A. Ashaye, 2002. Biodeterioration of the Africa star apple (*Artocarpus communis*) in storage and its effect on the nutrient composition. Afr. J. Biotechnol., 2: 57-60.
- Anonymous, 2011. Vision 2030. Indian Institute of Pulses Research, Kanpur, pp: 3-7.
- Asiedu, E.A., A.J.G. van Gastel, B. Greg and A. Ebert, 1999. Dehumidifying drying: A viable option for long-term seed storage in the humid tropics. Proceedings of a Regional Maize Workshop Impact, Challenges and Prospects of Maize Research and Development in West and Central Africa, May 4-7, 1999, IITA, Benin Republic, pp: 59-67.
- Burrell, N.J., 1974. Chilling. In: Storage of Cereal, Grain and their Products, Christensen, C.M. (Ed.). American Association of Cereal Chemists Inc., St. Paul MN.
- Christen, C.M. and H.H. Kaufmann, 1965. Deterioration of stored grains by fungi. Ann. Rev. Phytopathol., 3: 69-81.
- Clements, D.J., 1988. Wheat Seed Storage under Tropical Conditions. In: Wheat Production Constraints in Tropical Environments, Klatt, A.R (Ed.). CIMMYT, Mexico, DF., pp: 360-365.
- Cook, R.J. and R.J. Veseth, 1991. Wheat Health Management. APS Press, St. Paul, Minnesota, USA., ISBN: 9780890541111, Pages: 152.
- Gupta, V.K., B. Ram, L.T. Palmer and L.M. Joshi, 1973. Post-harvest fungal damage to wheat due to rains. Indian Phytopathol., 26: 156-157.
- Khan, M.R.I., 1981. Nutritional quality characters in pulses. Proceedings of National workshop on Pulses, August 18-19, 1981, BARI, Gazipur, pp: 199-206.
- Kuku, F.O., 1979. Deterioration of Melon Seeds During Storage at Various Relative Humidity. University of Ado Ekiti, Nigeria, pp: 11-36.

- Mian, A.L., 1976. Grow more pulse to keep your pulse well: An essay of Bangladesh pulse. Department of Agronomy, Bangladesh Agricultural University, Mymensingh, pp: 11-15.
- Mian, I.H. and G.A. Fakir, 1998. Effect of container and length of storage on seedborne infection of fungi in rice seed. Proceedings of the 1st National Workshop on Seed Pathology, Progress and Prospect of Seed Pathological Research in Bangladesh, June 9-12, 1998, Bangladesh Agricultural University, Mymensingh, pp: 7.
- Nadeem, M.A., A. Ali, R. Sohail and M. Maqbool, 2004. Effect of different planting pattern on growth, yield and quality of grain legumes. Pak. J. Life Soc. Sci., 2: 132-135.
- Rahman, M.S., I. Hossain, M.A. Mansur, M.A. Rahman and A.C. Barma, 1985. Effect of storage condition on the quality of wheat seed. Bangladesh J. Agri. Sci., 12: 49-54.
- Roberts, E.H., 1972. Cytological, Genetic and Metabolic Changes Associated with Loss of Viability. In: Viability of Seeds, Roberts, E.H. (Ed.). Chapman and Hall limited, London, pp: 253-306.
- Sathyamoorthi, K., M.M. Amanullah, E. Somasundaram and K. Vaiyapuri, 2008. Yield attributes and yield of greengram (*Vigna radiata* (L.) wilczek) as influenced by increased plant density and nutrient management. Int. J. Agric. Sci., 4: 719-724.
- Shah, B.N. and A.K. Seth, 2010. Pharmacognostic studies of the *Lagenaria siceraria* (Molina) standley. Int. J. Pharm. Technol. Res., 2: 121-124.