

Quantitative Variation in Protein Content During Storage by Fungi in Some Pulses

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Article Info	Abstract
Article History Received : 05-03-2011 Revised : 15-04-2011 Accepted : 25-04-2011	Pulses are rich sources of protein. Unfortunately the seeds of pulses are deteriorate by various fungi during storage. The present investigation was undertaken to study the quantitative variation in protein content during storage by fungi in pigeon pea, green gram and chick pea. The study reveals that there was reduction in protein content as the storage period increases. Seven fungi were found to be dominant deteriorating the seeds of above mentioned three pulses.
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Introduction

Pigeon pea (*Cajanus cajan*), Chick pea (*Cicer arietinum*) and Green gram (*Phaseolus mungo*) are important pulse crop cultivated over several parts of the World, both in the tropics and subtropics. Marathwada region of Maharashtra is a leading region in the hectareage and production. These pulses are affected by number of diseases caused by fungi, bacteria and viruses. Among these fungal diseases are more prevalent. Presence or absence of mycoflora on seed surface is one of the important aspect that determines the quality of seed.

Significant decrease in protein content due to attack of seed-borne fungi like *Aspergillus flavus* and *Fusarium semitectum* has been observed in seeds of Black gram and Green gram (Bilgrami *et. al.* 1976). Vijayakumari and Karan (1987) observed loss in protein contents of cowpea seeds caused more actively by *Aspergillus flavus*. Prasad and Pathak (1987) reported loss in protein content of cereals like Wheat, Maize and Barley seeds affected by *Fusarium oxysporum* and *Fusarium semitectum* under different storage condition.

Singh and Prasad (1988) noted loss in protein of seshamum seeds due to *Aspergillus flavus*. Neeti and Karan (1991) noted degradation of protein in sunflower and seshamum seeds caused by *Aspergillus flavus* and *Aspergillus niger*.

Prasad *et. Al.* (1988) in Radish, Kumar and Prasad (1993) in mustard seeds noted decrease in protein content due to *Aspergillus flavus*.

In the present investigation the attempts have been made for quantitative variation in protein content during storage by various fungi in pigeon pea, green gram and chick pea.

Material and Methods

The seed-borne fungi of three pulses were detected by agar plate and blotter test methods as recommended by International Seed Testing Association (1966), de Tempe (1953), Neergard (1973) and Agrawal (1976). The procedure of agar plate and blotter test methods is described as follows.

Standard Blotter Test: Seeds were equidistantly spaced on moist sterile blotters in petriplate moist chambers. 10 petriplates of 9" diameter each containing 10 seeds were incubated at 27±2° C for eight days. Observations were made for fungi appearing on seeds every 24 hours and growth was carefully transferred to PDA slants for further studies. A minimum of 200 seeds were observed in each case. Seeds disinfected externally by treating with 10% sodium hypochloride solution for 10 min. were used for internally seed infection while untreated seeds were used for external seed mycoflora.

Agar Plating: Seeds were equidistantly plated on Glucose Nitrate Agar (GNA) plates aseptically. Colonies which developed during three days were used picked up and maintained on PDA/GNA slants. External and internal seed mycoflora was seen adopting the procedure as mentioned above. Previous year harvested seeds of these three pulses were stored for a period of nine month and observed for its mycoflora using blotter test and agar plate method.

Estimation of crude protein was made by Microkjeldahl method (A. O. A., 1960). 300 mg dry powder of seeds was placed in 50 ml microkjeldahl flask. 60 mg catalyst (Copper sulphate) and 7.5 ml H₂SO₄ were added in the flasks. The flasks were heated for 6 to 8 hours. After this on cooling the

flasks, the digest was diluted with distilled water to 50 ml in a volumetric flask. 5 ml of the aliquot was introduced in markham's distillation unit through the side tube funnel to which glass stopper was fitted. 10 ml of 40% NaOH was added to the funnel of the side tube and was allowed to run into the

digest. NH_3 liberated, was collected in 50 ml conical flask containing 5 ml of 2% boric acid with indicator and distillation was titrated against 0.035 N HCl till end point was achieved. The crude protein was calculated as $\% \text{N} \times 6.25 = \% \text{ crude protein}$.

Table 1: Change in Protein content in storage pulses

Time in Days	Pigeon Pea (<i>Cajanus cajan</i>)			Green gram (<i>Phaseolus mungo</i>)			Chick pea (<i>Cicer arietinum</i>)			Dominant Fungi
	BSNR-736	BDN-703	ICPL-87119	Vijay	Vikas	Vishal	T-9	BM-2002	Kopergaon	
Initial	45.0	42.5	44.3	42	43.2	41.2	43.6	42.8	45.1	<i>Aspergillus niger</i>
30	43.8	40.1	41.3	40.3	41.8	39.8	41.8	40.3	43.5	<i>Rhizopus</i>
60	41.0	37.8	39.5	38.1	39.3	37.5	39.1	38.1	41.2	<i>stolonifer</i>
90	39.1	35.2	36.8	35.8	36.8	35.1	36.8	35.7	38.8	<i>Alternaria</i>
120	36.7	32.6	33.2	34.1	35.0	32.6	34.3	33.2	36.1	<i>terreus</i>
150	33.4	30.5	30.8	32.3	32.5	29.8	31.8	30.6	33.5	<i>Alternaria tenuis</i>
180	30.5	27.6	27.1	29.7	29.3	27.3	28.8	27.8	31.2	<i>Fusarium</i>
210	27.8	24.8	24.3	26.8	27.1	25.0	26.3	26.1	28.6	<i>oxysporum</i>
240	24.5	23.1	22.6	24.5	25.2	23.2	24.5	23.6	25.8	<i>Alternaria</i>
270	22.1	22.3	21.3	22.3	23.8	21.5	21.6	22.0	23.2	<i>alternata</i> <i>Aspergillus flavus</i>

Results and Discussion

The assessment of seeds in storage for the quantities of total protein content present in the seeds (Table 1) reveals that there was drastic reduction in total protein content in all the three pulses (three varieties of each). As there is increase in time of storage the quantity of total protein content decreased. The maximum loss of total protein content was found at the end of nine months. In Pigeon pea initial content of three varieties was BSMR-736 - 45%, BDN-703 - 42.5% and ICPL-87119 - 44.3% which decreased after 270 days upto 22.1%, 22.3% and 21.3% in three varieties respectively. In Green gram it was initially 42%, 43.2% & 41.2% in Vijay, Vikas and Vishal respectively. It was 22.3%, 23.8% and 21.5% after 270 days in Vijay, Vikas and Vishal respectively. In Chick pea it was as in T9- (initial - 43.6%, after 270 days - 21.6%), BM- (initial - 42.8%, after 270 days - 22.0%) and in Kopergaon it was (initial - 45.1% after 270 days - 23.2%).

During the storage period seven dominant fungi were found to be associated with the seeds. *Aspergillus niger*, *Rhizopus stolonifer* and *Alternaria terreus* were dominant in Pigeon pea. *Alternaria tenuis* and *Fusarium oxysporum* was found to be dominant on Green gram seeds. On Chick pea seeds *Alternaria alternata* and *Aspergillus flavus* was more dominant. Due to these Pathogens there was deterioration during storage period which results in the decrease in total protein contents of the seeds.

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