



Research Article

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Different Storage Periods, Seed-Borne Fungi of Pigeon Pea (*Cajanus cajan L.*) and its Cure With Different Plant Powders



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Abstract

Post harvest storage period is a significant aspect for a crop. Various storage periods and conditions tend to influence Seed mycoflora and viability of seed. Seed mycoflora of stored seed adversely affect the seed health i.e. seed germination and seedling development. Treatment of seed with different botanicals helps to control adversities arising out of storage seed mycoflora. In present paper, effect of powder of *Azadirachta indica A.Juss.*, *Cyperus rotundus L.*, *Ocimum basilicum L.* tried to cure storage fungal mycoflora and improve seed health of test pulse. The tested plant part powders found effective in controlling storage seed-borne fungi and seed degradation.

Introduction

Pigeon pea (*Cajanus cajan L.*) is an annual shrub of about 6-7 feet. The inflorescence is a typical axillary raceme bearing papilionaceous flowers. It is cultivated as a mixed crop with Kharif cereals in low rainfall areas. Sowing is done in June – July and harvested after 6-8 months, between January- Februarys. It is commonly cultivated in Uttar Pradesh, Orissa, Rajasthan, Maharashtra, Bihar and Tamil Nadu states of India.

Pigeon pea Seed contains protein 20.4 g/100 g of seed, carbohydrates are 60.4 g/100 g of seed suggesting it's richness of protein and carbohydrates, it contain thiamin (0.45mg), niacin (2-9mg) and riboflavin (0.19mg). It also contains better quality of fiber (7g/100g of seeds) [1].

Materials and Method

Collection of plants and preparation of plant parts powder

The test plants collected from local area of Nanded district Maharashtra, India and identified from their morphological characters using 'Flora of Marathwada. Plants were cut into different parts like stem, leaves, root, were surface sterilized with 0.1% HgCl₂ and subsequently washed to remove disinfectant; with sterile distilled water. These sterilized plant parts were kept for drying in hot air oven at 60 °C for 48hours.

The dried plant parts leaf, stem and root crushed into powder with the help of grinder. The powders thus obtained passed through sieve to get fine powder and stored in polythene bags for the study.

Effect of plant part powder on seed health

One-kilogram seed of Pigeon pea dusted with ten gram of leaf powder of *Azadirachta indica A. Juss.*, *Ocimum basilicum L.* and rhizome powder of *Cyperus rotundus L.* These treated seeds of the test pulse were stored for different periods like, 00, 03, 06, 09 and 12 months respectively in gunny bag. After storage for respective periods, the seeds of test pulse were incubated on moist blotters for ten days at room temperature. On eleventh day seed health in terms of seed mycoflora, seed germination was recorded. Seed without dusting of any plant powders served as control.

Results and Discussion

It is clear from the results that, the seeds treated with leaf powder of *Azadirachta indica A. Juss.* showed considerable reduction in storage seed mycoflora, enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. It was observed that, seed mycoflora in untreated seeds increased steadily from 48% - 60%, where as in treated seeds it was reduced considerably from 35%-27% over a storage

periods from zero to 12 months. Seed germination in treated seeds was increased markedly (88%-100%) than untreated seeds (60%-80 %) over a storage period from zero to 12 months.

The seeds treated with rhizome powder of *Cyperus rotundus L.* showed considerable reduction in storage seed mycoflora, enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. With increase in storage periods from zero to 12 months, increase in seed mycoflora was noticed, more being in untreated seeds (56%-63%) and much reduced in treated seeds (30%-25%). Seed germination was increased in treated seeds from 90% to 100%, where as it was 58% to 82% in untreated seeds, over the increasing storage periods from zero to 12 months.

The seeds treated with leaf powder of *Ocimum basilicum L.* showed considerable reduction in storage seed mycoflora, enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. There was increase in seed mycoflora of untreated seeds and considerable decrease in treated ones with increasing storage periods from zero to 12 months. There was enhancement in seed germination in the seeds of the pulse. It was considerably more in treated seeds (85%-100%) and much less in untreated seeds (57%-90%) over the increasing storage periods of zero to 12 months.

Similar finding were reported in safflower by Singh & Singh [2], they found difference in fungal flora under different storage periods, four months stored seeds nurtured *Chaetomium globosum*, *C. spirata*, *Rhizopus arrhizus* and *Penicillium spp.* and eight month stored seeds nurtured mainly *Aspergillus fumigatus*, *A. sydowii*, *A. flavus* and *A. niger*. Chandra et al. [3] while studying mycoflora of mustard, linseed, sunflower, safflower, soybean, sesame and groundnut recorded that, the fungi like *Alternaria*, *Cladosporium*, *Curvularia*, *Fusarium* and *Helminthosporium* decreased gradually during storage period and disappeared after three years and were succeeded by storage fungi like *Aspergillus spp.*, *Penicillium spp.* and *Rhizopus spp.*

Bhattacharya et al. [4] studied fungal infection, moisture content, germinability and deterioration of seeds of maize,

groundnut and soybean in storage at the locality of Santiniketan, West Bengal, India under natural condition for one year. Dominant fungi recorded from stored seeds were *Aspergillus candidus*, *A. flavus*, *A. niger*, *A. terreus*, *A. ruber*, *Rhizopus spp.*, *Penicillium spp.*, *Curvularia spp.*, *Fusarium spp.*, *Alternaria spp.* etc. Carbohydrates and protein content of the test seeds were found to be declined. Zeljko Jurjevic et al. [5] studied changes in fungi and mycotoxins in pearl millet under controlled storage conditions; they reported that, predominant fungi showed fluctuation in their incidence with changes in storage temperature, moisture and humidity.

Khatun et al. [6] used botanicals, such as whole leaf powder of neem (*Azadirachta indica*), Dholkalmi (*Ipomoea sepiara*) and Bishkatali (*Polygonum hydropiper*) at a dose of 5% w/w (25g botanical per 500g of lentil seeds), *Azadirachta indica A. Juss.* In addition, *Polygonum hydropiper L.* were effective in preserving seed germination and seed vigor capacity of lentil. Khalequzzman et al. [7] reported moisture content, seed weight, abnormal seedlings, seed rot, and fungal association of French bean increased, but germination and normal seedlings growth decreased with increase in storage period.

Kakade & Chavan [8] reported negative nutritional and fatty oil alteration in soybean and safflower due to storage fungi; like *Alternaria*, *Fusarium*, *Macrophomina sp.*, *Curvularia sp.*, *Rhizopus Sp.*, *Penicillium sp.* etc. Sethumadhav Rao et al. [9] found that storage fungi like *Aspergillus flavus*, *A. niger*, *A. fumigatus*, *Cladosporium cladosporioides* etc found to reduce carbohydrates, amino acids and phenols in the vegetables, increased storage period abnormally increased phenols and amount of reducing sugar.

The study indicates that natural nutritional and textural content of the pulse seed tend to degrade along with alterations in seed mycoflora due to variability in storage periods.

Seed mycoflora cause parthenogenesis adversely affecting quality of pulse. Botanicals like leaf powder of *Azadirachta indica A. Juss.*, *Ocimum basilicum L.* and rhizome of *Cyperus rotundus L.* help to control and sustain biological form of the test pulse (Table 1).

Table 1: Effect of storage periods on seed mycoflora and seed health (seed mycoflora and seed germination) of Pigeon pea (*Cajanus cajan L.*) seeds treated with leaf powder of *Azadirachta indica A. Juss.*, *Ocimum basilicum L.* and rhizome of *Cyperus rotundus L.* (After ten days of incubation).

Sr.No	Storage Period (Months)	<i>Azadirachta indica A. Juss.</i>				<i>Ocimum basilicum L.</i>				<i>Cyperus rotundus L.</i>			
		Seed Mycoflora (%)		Seed Germination (%)		Seed Mycoflora (%)		Seed Germination (%)		Seed Mycoflora (%)		Seed Germination (%)	
		UT	TR	UT	TR	UT	TR	UT	TR	UT	TR	UT	TR
1	0	48	35	60	88	58	18	57	85	56	30	58	90
2	3	50	32	66	89	59	17	59	88	57	28	62	93
3	6	55	30	68	93	62	15	63	89	59	27	67	97
4	9	58	28	72	96	63	14	68	92	62	25	72	100
5	12	60	27	80	100	65	13	90	100	63	25	82	100

Conclusion

It is observed that post harvest storage period is potentially pro-infective period for seed. Storage methods and environmental factors are predisposing situations that may damage the texture, content, viability of the test pulse. Application of synthetic chemicals as preservatives is pernicious to consumers of the pulse applied during storage. Therefore, use of biological like leaf powder of *Azadirachta indica* A. Juss, *Ocimum basilicum* L. and rhizome of *Cyperus rotundus* L. were found to be effective to control seed mycoflora and helped enhancement of seed germination.

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