



Seed Mycoflora and Seed Health of Chickpea (*Cicer Arietinum L.*) in Storage Periods and Its Cure with Different Plant Powders

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Abstract

Storage period is an important factor during post harvest life of a crop. Seed mycoflora and its effects vary according to storage periods. Seed mycoflora adversely affect the seed health i.e. seed germination seedling development. Treatment of seed with different botanicals helps to control adversities arising out of storage seed mycoflora. Powder of *Azadirachta indica* A.Juss., *Cyperus rotundus* L., *Ocimum basilicum* L. were found effective in controlling storage seed-borne fungi and seed degradation.

Introduction

Chickpea (*Cicer arietinum* L.) is an herbaceous annual plant. The leaves are pinnately compound the Papilionaceous flowers are solitary and the pods contains one or two seeds. It is cultivated in dry cool climate during Rabi season in the regions with low to moderate rainfall. It is cultivated as intercrop along with Jowar, Wheat, and Bajra etc during October-November. The crop is harvested after about 3-4 months in February – March. It is mainly cultivated in Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh, Bihar, Maharashtra, Andhra Pradesh, West Bengal, Tamil Nadu and Karnataka.

The malic and oxalic acids from the leaves of Chick pea are useful in intestinal disorders. It contains protein 20.5g/ 100g of seeds and carbohydrates 59.6 g/ 100g of seeds with thiamin (0.30mg), riboflavin (0.15mg), niacin (2.9mg), vitamin C (3mg) and phosphorous (312 mg) (Shakuntala Manay and M. Shadaksharaswamy,1987).

Materials and Method

One kilogram seed of Chickpea 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 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

The results presented in the Table clearly show that, the seeds treated with leaf powder of *Azadirachta indica* A. Juss showed considerable reduction in seed mycoflora and enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. Seed mycoflora in untreated seeds increased gradually from 55 % – 60 %, where as treated seeds showed much reduction from 20 % - 18 % with increasing storage periods from zero to 12 months. With increasing storage periods from zero to 12 months, there was an increase in seed germination. Increase in seed germination was much more in treated seeds (82 % - 100 %) than in the untreated seeds (70 % - 90 %).

The seeds treated with rhizome powder of *Cyperus rotundus* L. showed considerable reduction in seed mycoflora and enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. Increase in seed mycoflora in untreated seeds was recorded (55 % - 62 %), where as treated seeds showed remarkable decrease from 33 % to 25 % over the increasing storage periods from zero to 12 months. With increasing storage periods from zero to 12 months seed germination was increased gradually, in treated seeds (77-88%) than in untreated seeds (70-88 %).

The seeds treated with leaf powder of *Ocimum basilicum* L. showed considerable reduction in seed mycoflora and enhancement in seed germination, shoot and root length in variable degree, with minor exceptions. Seed mycoflora was increased over the storage periods from zero to 12 months in untreated seeds (45 % - 50 %), where as in treated seeds it was considerably reduced (40 % - 12 %) over the same storage periods. Seed germination was increased considerably in treated seeds (82-100 %) compared to untreated ones, with increasing storage periods from zero to 12 months.

Table : Effect of storage periods on seed mycoflora and seed health (seed mycoflora and seed germination) of Chickpea (*Cicer arietinum* 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</i> A.Juss.				<i>Ocimum basilicum</i> L.				<i>Cyperus rotundus</i> L.			
		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	00	55	20	70	82	45	40	66	82	55	33	70	77
2	03	56	20	72	86	47	36	68	85	52	31	75	82
3	06	58	19	88	90	50	20	72	88	56	32	80	89
4	09	60	18	89	96	50	18	82	92	58	27	82	92
5	12	60	18	90	100	50	12	90	100	62	25	88	98

UT = untreated, TR = Treated

Similar findings were reported by Singh and Singh (1979), they found difference in fungal flora under different storage periods in case of safflower. 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.* (1981) 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.* (2002) 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.* (2007) 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.* (2011) 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 (25 g botanical per 500 g 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.* (2012) 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 and Chavan (2012) reported negative nutritional and fatty oil alteration in soybean and safflower due to storage fungi; like *Alternaria*, *Fusarium*, *Macrophomina*, *Curvularia*, *Rhizopus*, *Penicillium* etc. Sethumadhav Rao *et al.* (2014) 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 pathogenesis adversely affecting quality of pulse. Botanicals help to control and sustain biological form of the test pulse.

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 pulse. Application of synthetic chemicals as preservatives is pernicious to consumers of the pulse during storage. Therefore, use of biologicals 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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