Management of Storage Pest and Pathogens of Oat Seeds Using Low Input and Ecofriendly Methods

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The 23rd International Grassland Congress (Sustainable use of Grassland Resources for Forage Production, Biodiversity and Environmental Protection) took place in New Delhi, India from November 20 through November 24, 2015.

Proceedings Editors: M. M. Roy, D. R. Malaviya, V. K. Yadav, Tejveer Singh, R. P. Sah, D. Vijay, and A. Radhakrishna

Published by Range Management Society of India

Paper ID: 1457
Theme 2. Grassland production and utilization
Sub-theme 2.7. Seed production, storage, availability and quality

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Keywords: Ecofriendly, Fungi, Indigenous, Seed storage, Traditional knowledge

Introduction

Indigenous Traditional knowledge (ITK) is the local knowledge unique to a given culture or society. It is the basis for local-level decision making in agriculture, health care, food preparation, natural-resource management and a host of other activities in rural communities. Storage structures and locally available plant products were used to store seeds and to ward off seed pests and pathogens. In different parts of India, different types of containers are used locally to store different crop seeds, according to the availability and climatic conditions. Sundaramari *et. al*. (2011) advocated the importance of indigenous storage structures for safe storage of grains in South Tamil Nadu, which can be applied to other parts of the country. Among forages, oat is an important crop during Rabi season particularly in Northern India. This crop is characterized by its quick growth, high forage and grain yield, more dry matter content, leafiness, better palatability as well as suitable for excellent silage. The storage of oat seed is influenced by biotic factors *viz*., insect-pest and pathogens. In the present study seeds of oat were stored after their treatment with different types of locally available plant products/botanicalsin different types of locally available storage containers and are compared with the chemical treatments and modern storage.

Materials and Methods

Fodder seeds of Oat (variety: JHO 822), were procured from seed store of IGFRI, Jhansi. The seed was stored in four different containers *viz*. (i) Polylined bags, (ii) Earthen/clay pots treated with cow urine and cow dung, (iii) Bamboo made structures plastered with cow dung and (iv) gunny bags. Seeds were treated with chemicals, Bavistin @ 2.5 g/kg seed and Malathion @1.5 g/kg seed, Botanicals (Eucalyptus and Neem leaves) and Ash @ 3kg/100kg seed. One untreated set in each container was kept as control. The pre storage moisture content of seeds was recorded by standard hot air oven drying method. Observations for moisture content, seed germination, mycoflora and insect-pest were taken at 9, 18 and 24 months of storage.The experiment was conducted in a completely randomized design following standard protocols.

Results and Discussion

The bench marks for pre storage *viz*., germination (94.3%) and seed vigor index (1610.45) for Oat (JHO-822) seeds were recorded and were maintained up to 9 months in all treatments and containers, except in untreated, where germination got reduced to 82.6% with increased fungal infection of 4.2%. The fungi recorded in stored seeds were *Aspergillus niger, A. flavus, Alternaria alternata, A. tenuis, Curvularia lunata, Drechslera avanae, F. oxysporum, F. equiseti, F. semitectum, Penicillium* sp., *Phoma sorghina, Rhizopus nigricans* and *R. arrhizus*, which is in agreement with Bahukhandi *et al*., (2010), where they recorded similar mycoflora in cowpea seeds. Thus, up to 9 months the traditional storage structures as well as seed treatments are equally effective as chemical treatments and modern storage. Insect infestation was recorded in gunny bags in untreated as well as treated seeds after 9 months. Marginal fungal infection of 2-3% and germination above 80% (Minimum certification standard) was recorded in all treatments and structures. After 18 months of storage, among structures, maximum germination was observed in polylined bags (88.8%) and among treatments Carbendazim was best (89.1%)(Table 1). However after 24 months of storage Malathion treatment was found to be best irrespective of storage structure (Fig.1). This is mainly due to increased insect infestation after 18 months of storage in all the containers. Even though the least insect and fungal infestation was recorded in polylined bags, still the germination was reduced below minimum seed certification standards in all treatments. This indicated the loss of efficacy of the insecticides under fluctuating humidity and temperature conditions of Jhansi after two years of storage. Similar pattern was observed with seed vigour. The moisture content in the containers increased during July- September and later reduced. Similarly in summer temperature of seed environment increased adversely effecting seed health. The increased moisture under high humid and temperature conditions encouraged insect-pest and fungal growth leading to reduced seed viability. Similar results were recorded by Malaker *et al*., (2008) in his study on effect of storage containers and storage period on wheat.

Thus, storage after two years is not possible with any treatment under fluctuating humidity and temperature conditions of Jhansi.

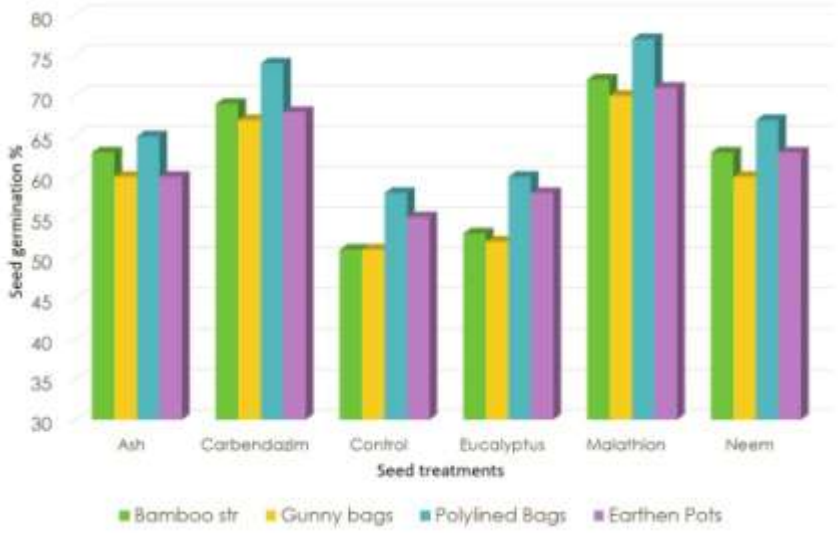

Fig. 1: Oat seed germination after 24 months of storage under ambient conditions

Table 1: Germination percentage of oat seeds under ambient conditions after 18 months of storage

Germination percentage of oat seeds							
Structure	**Ash**	**Carbendazim**	**control**	**Eucalyptus leaves**	**Malathion**	**Neem leaves**	**Mean**
Bamboo Structure	92.0	90.0	81.3	88.7	87.3	85.3	87.4
Gunny bag	81.3	89.3	83.0	86.3	89.7	85.7	87.2
Poly Lined Bags	88.7	90.3	84.7	89.0	92.0	88.3	88.8
Earthen Pots	81.3	86.7	79.3	84.4	87.0	84.3	83.8
Mean	87.8	89.1	82.1	87.0	89.0	85.9	86.8

EFFECT	**SEM±**	**L.S.D. ($p \leq 0.05$)**
Structure (S)	0.65	1.86
Treatment (T)	0.80	2.28
S x T	1.60	NS

Conclusion

It can be concluded that by use of traditional knowledge and with available low cost ecofriendly materials for seed treatment as well as storage, we can store oat seeds healthy with good germination up to 9 months. The chemical treatments and modern storage units can protect the seed from insect and pathogens up to 18 months and afterwards the efficacy of these chemicals reduces.

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