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Storage loss under bulk storage of Rice: A case study

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Abstract

Storage and preservation of the staple food grain is essential to ensure an uninterrupted supply to the populace for consumption. Government agencies/organizations need to store food grains to ensure food security, price stabilizations and internal/ external export. Government agency Food Corporation of India (FCI) is engaged in procurement storage and distribution of rice and wheat. Around 30% of rice and wheat produced every year is procured by the Food Corporation of India and most of it is stored in warehouse by the FCI. Study was conducted at the FCI, Chutia Ranchi. Initial moisture content of rice at time of procurement range between 13.2 and 13.7% wet basis (w.b.). After 12 months of storage the moisture content was found 12 % (w.b.). The study depicts the variation of moisture content in stored rice as a bulk. Storage loss showed increasing trend up to 12 months of storage. Maximum storage loss was recorded -1.17 % and minimum -0.56 % after 12 months and 3 months of storage respectively.

Keywords: Storage loss under bulk, Rice

Introduction

Storage and preservation of the staple food grain is essential to ensure an uninterrupted supply to the populace for consumption, government agencies/organizations need to store food grains to ensure food security, price stabilizations and internal/ external export. Grain storage is a practice which is followed worldwide. In India, grain procurement, storage and distribution is done completely by the Food Corporation of India. The storage capacity available with FCI is around 28 million tonnes, in comparison to the present requirement of approximately 60 to 70 million tonnes.

Grains can be stored indoor, outdoor or at underground level (Channal *et al.*, 2004) ^[1]. Any given time 60 to 70% of the grain is stored on the farm in traditional structure. According to, World Bank report (1999) ^[4] post harvest losses in India amount to 12 to 16 million tonnes of food grain each year. The monetary values of these losses amount to more than ₹50,000 crore per year (Singh, 2010) ^[2]. However, indigenous storage structures are not suitable for storing grains for very long periods. Scientific bulk storage is done mainly in warehouses which protect the quantity and quality of stored grains. An RTI reply has been reviewed that at least 17,546 tonnes of food grains was damaged between 2009-10 and July 2012 in Food Corporation of India (FCI) godown (Times of India, 2013) ^[3]. Hence there is need to check grain randomly to control the infestation and to take suitable measures to protect the grain from further damage.

Materials and Methods

Stacking of the rice was carried out in FCI warehouse, Chutia, Ranchi. The samples were collected from the stacks time to time for further analysis. The experiment on the grain was carried out with collaboration of FCI, Chutia Ranchi. Weight loss/gain (weight and moisture content of those stacks from stacking to liquidation) of the stored grains were determined as per the prescribed perform.

Sampling procedure of the grains

The samples were collected fortnightly, from all the four literal sites and from the top of the stack. The samples were taken in W form from the stock. The 2 kilogram sample of each stack was mixed thoroughly. The 2 kg sample was then divided into 4 samples of 500 grams with the help of sample divider (Fig.1). The moisture content of each sample was determined. The sub samples of 500 gm grains were spread on a plate and then samples were taken from the 9 random places. The total 20 gram sample was taken for analysis from the sub samples.

Selection and liquidation of stacks

The two Chambers were selected for rice storage, thus storing 8 stacks (2010 bags in each

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stack weighing 50 kg approx.) in the selected depot for 4 spell of storage period for the selected commodity. The two stacks

for each spell of 3, 6, 9 and 12 months were weighted and liquidated.



Fig 1: Different Operation at FCI

Results and Discussion

As apparent from the Table 1 that average moisture content remained at the level of 12 % (w.b.). Based on liquidation of stacks storage loss for the 12 months storage losses have been observed as follows (Table.2). From table 2, it is apparent that storage loss showed increasing trend during 12 months of storage. Maximum storage loss was -1.179 % (after 12

months) and minimum -0.56 after 3 months of storage. Loss was relatively slow from 3 to 9 month storage thereafter it again showed increasing trend. No significant changes were recorded in quality parameters (Table.1) of stored rice during 12 month storage under godown condition.

Table 1: Quality parameters during stacking and liquidation in warehouses

Days of storage		90		180		270		360	
		At the time of stacking	At the time of liquidation	At the time of stacking	At the time of liquidation	At the time of stacking	At the time of liquidation	At the time of stacking	At the time of liquidation
Initial M.C	Replication I	13.7	12.5	13.2	12.6	13.4	12.6	13.2	12
	Replication II	13.6	12.1	13.5	12.8	13.4	12.7	13.4	12
Damage	Replication I	0.64	0.62	0.64	0.2	0.64	0.28	0.7	0.22
	Replication II	0.64	0.64	0.6	0.31	0.68	0.23	0.64	0.4
Discolor	Replication I	0.7	0.82	0.64	0.52	0.64	0.3	0.7	0.58
	Replication II	0.68	0.52	0.68	0.621	0.68	0.5	0.7	0.53
Broken	Replication I	1.6	1.84	1.8	1.876	1.8	1.95	1.9	1.55
	Replication II	1.6	0.9	2	1.743	1.5	1.84	1.8	1.58
TGW	Replication I	15.287	15.144	15.098	15.285	15.31	15.514	15.387	15.45
	Replication II	15.143	15.02	15.254	15.315	15.157	15.245	15.08	14.92

Table 2: Storage Loss after 3 months during storage

State: Jharkhand (Ranchi)					
Warehouse location	Commodity	Loss/gain,% after months of storage			
		3	6	9	12
FSD Ranchi	Rice	-0.56	-0.59	-0.7	-1.17

Conclusion

Present study was carried out FCI godown at Chutia. Initial moisture content of rice at time of procurement range between 13.2 and 13.7% wet basis (w.b.). After 12 months of storage the moisture content was found 12 % (w.b.). Maximum storage loss was -1.179 % (after 12 months) and minimum -0.56 after 3 months of storage.

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