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EVALUATION AND ANALYSIS OF LOW COST ONION STORAGE STRUCTURE

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ABSTRACT

Onion produced in Kharif and Late Kharif season is not suitable for storage while onion produced in summer season can be stored upto 5-6 months and it can be brought in the during market rainy season i.e., from June to Oct. There are certain problems which arise during conventional storage of onion viz. loss in weight, sprouting and rotting of bulb. There are three types onion storage structure developed by NHRDF and domestic onion storage structure located at Kalwan.The construction cost per sq.ft. of this structure ie.Traditional onion storage structure, Dindigul onion storage structure, Improved low cost onion storage structure developed by NHRDF, and Low cost onion storage structure (Kalwan) are Rs.2.79 ,1.59,1.28 and 1.03 respectively. The quantity of onions were stored in different onion storage structure during the last week of May is about 1000kg .There are some losses such as weight losses ,rotting losses and sprouting losses were found to be in storage.This losses were found high in storage structure developed by NHRDF as compared to domestic onion storage structure (Kalwan). Thus this structure is proved to be best. The losses are very less, quality and quantity of produce is maintained. The Cost per sq.ft (Rs) and per kg storage cost against construction cost (Rs) of domestic onion storage structure is less as compare to onion storage structures in NHRDF.

Keywords: NHRDF- National Horticultural Research Development Foundation.

INTRODUCTION

Onion is a term used for many plants in the genus Alliums. They are known by the common name "onion" but, used without qualifiers; it usually refers to Alliums cepa. Alliums cepa is also known as the "garden onion" or "bulb" onion. It is grown underground by the plant as a vertical shoot that is used for food storage, leading to the possibility of confusion with a tuber, which it is not. Onions, one of the oldest vegetables, are found in a large number

of recipes and preparations spanning almost the totality of the world's cultures. They are now available in fresh, frozen, canned, pickled, powdered, chopped, and dehydrated forms. Onions can be used, usually chopped or sliced, in almost every type of food including cooked foods and fresh salads and as a spicy garnish. They are rarely eaten on their own but usually act as accompaniment to the main course. Depending on the variety, an onion can be sharp, spicy, tangy and pungent or mild and sweet.

There is an annual production of approximately 58-60 lakh mt of onions in the country. Out of this about 26-28%, approximately 16 lakh mt onions are produced in Maharashtra. Last year 8.26 lakh mt onions have been exported from the country, out of which 5.40 lakh mt has been produced in Maharashtra. For this purpose continuous export quota and stable onion prices in domestic market are necessary.

To mitigate the effect of gluts and poor harvests on prices and also to prevent excessively high post harvest storage losses in onion, the MSAMB is actively promoting the construction of Improved Onion Storage structures by APMCs, Co-operatives and individual farmers in the State. The Commissioner of Agriculture is implementing a scheme for granting of subsidy for the construction of improved onion storage structures and has issued a G.R. dated-15/01/2005, for giving subsidy of Rs 800 per mt in total. Out of this the agricultural department is giving Rs 500 per mt subsidy while MSAMB is providing financial assistance of Rs 300 per mt as well as technical support in the setting up of Improved Onion Storage Structures in the State. Objective of this subsidy scheme is to see that maximum farmers come forward to set up scientific onion storage structures and thereby ensure stable market price and consistent export of onions from the state.

Storage temperature and humidity affect loss in weight, respiration rate, sprouting, rotting and quality of bulbs in storage. The dormancy in onion bulbs is the main factor to determine as how long the bulbs can be stored. Inherent characters of dormancy based on equilibrium of inhibitors in onion bulbs also gets affected by temperature where lower (0^0C) and higher (30^0C) temperature increase the dormant state of onion bulbs and moderate (10-15^0C) temperature enhance the sprouting losses by breaking dormancy. Higher temperature, however, increases the rottage if accompanied with high humidity and desiccation/water loss is reduced at higher humidity but it increases the rooting and rotting.

STORAGE CAPACITIES OF DIFFERENT STATES IN INDIA

State	Type of onion stored	Period of storage	Present Storage Capacity(lakh MT)	Projected Storage Capacity(lakh MT)
Maharashtra	Big light red and whites	June-oct Nov.	3.15	4.5
Gujarat	Big light red and whites and sets	May-Sept	1.5	2.5
Bihar	Big light red	July-Sept	0.1	0.25
Andhra Pradesh	Big light red	May-Sept	0.05	0.1
Uttar Pradesh	Big light red	July-Sept	0.2	0.5
Orissa	Big light red	July-Sept	0.1	0.25
Hariyana	Big light red	June-Oct	0.4	0.6

Objective

Maharashtra state produces 25-30% onion of the total production of the country. Maharashtra state contributes about 80-85% in the total onion export. Out of the total onion production in the State, 10-15% onion production is in Kharif season, 30-40% production is in Late Kharif and 50-60% production is in Rabi/Summer season. It is estimated that about 6 lakh MT onions are stored annually in different states in so to say stores meant for onion. The storage capacity however need to be increased to extent of 9.5 to 10 lakh MT to meet the increasing demand of domestic and export markets so as to bring the stability in prices of onion particularly in kharif season where adverse weather condition do not allow assured production of kharif onion crop. So considering above problems we are interested in this research.

1. Evaluation of low cost onion storage structure.
2. Analysis of low cost onion storage structure.
3. To compare losses in high cost and low cost onion storage structure.

MATERIALS AND METHODS

STORAGE STRUCTRE

Material used for construction of onion storage structure

1. Cement

Cement is used for purpose of construction work; it is also used to bind the stone, sand, bricks etc.

2. Concrete

It is carefully mixture of cement, fine aggregates, sand and water. It is used for construction of storage structure.

3. Bamboos

It is flexible, very strong, durable and abundantly. So it is used for construction of storage structure.

4. Leaves of sugarcane and coconut

It is one of the waste material and available easily in the field. So it is used for roofing purpose. Coconut leaves are strong yet flexible .The leaves are actually fronds composed of numerous leaflets, which have a flat and a thin midrib.

5. Gunny cloth

Gunny cloth is used at inner lining of roof to check the leakage of rain water. The gunny cloth also reduces the temperature inside the storage structure.

6. Iron angle

Iron angle is used support to side wall. It provides stability to the structure and increases the life of the structure .It also provides rigid support to the side wall of the onion storage structure.

Cost estimation of onion storage Structure developed by NHRDF

Traditional onion storage structure:-Size=20`*15`,Life -8 years

Material	Size(ft)	Quantity	Rate(Rs.)	Total(Rs)
Bamboo	6	240	6	1440
Wooden block	15	8	100	800
Wooden strip	6	240	6	1440
Iron angle	10	4	150	600
Shelter material	-	80	15	1200
Cement	-	2(bags)	150	300
Labour	-	9(person)	100	900

TOTAL COST:-Rs.6680
Cost per sq.ft:- Total cost/size of structure/life
= 6680/300/8
= Rs.2.78
Per kg storage cost against construction cost:- x/1000
=6680/1000
= Rs. 6.68

Dindigul onion storage structure:-Size=20`*15`, Life-8years

Material	Size(ft)	Quantity	Rate(Rs.)	Total(Rs)
Bamboo	1) 6 2) 8 3) 12 4) 20	32 72 36 5	6 8 12 20	1300
Wooden block	1)20 2)15	8 2	100 80	960
Wooden strip	1)6 2)8 3)12	4 4 4	6 8 12	104
Polythene	-	1 kg	110	110
Cement	-	3(bags)	150	450
Labour	-	9(person)	100	900

TOTAL COST:-Rs.3824

Cost per sq.ft:- 3824/300/8

=Rs.1.59

Per kg storage cost against construction cost:- 3824/1000

=Rs.3.824

Improved low cost onion storage structure developed by NHRDF :-Size=20`*15`, Life-8 years

Material	Size(ft)	Quantity	Rate(Rs.)	Total(Rs)
Bamboo	1) 6 2) 8 3) 10	54 84 8	6 8 10	1076
Wooden strip	1) 6 2) 8	6 6	6 8	84
Shelter material	-	28	15	420
Cement	-	4(bags)	150	600
Labour	-	9(person)	100	900

TOTAL COST:-Rs 3080
Cost per sq.ft:- =3080/300/8
= Rs. 1.28
Per kg storage cost against construction cost: - x /1000
=3080/1000
= Rs.3.080

Low cost onion storage structure (Kalwan):-Size=20`*15`, Life-4 years

Material	Size(ft)	Quantity	Rate(Rs.)	Total(Rs)
Bamboo	8	40	8	320
Wooden block	1) 6 2) 12 3) 20	6 3 3	30 60 100	660
Polythene	-	3kg	110	330
Labour	-	5(person)	100	500
Tur waste	-	-	-	nil
Sugarcane trash	-	-	-	nil

As this structure have life span 4 years. After 4 years this structure is reconstructed and its cost of construction is Rs.1000 this is due to reuse of bamboo and wooden block. Thus total cost =Rs.1810+Rs.1000=Rs.2810
Cost per sq.ft.=2810/300/(4+4)= Rs.1.17
Per kg storage cost against construction cost: - x/1000
=Rs.2810/1000
=Rs.2.81

METHODS

1. Unmarketable

In this bulb which is less than 20mm in size are excluded. Also the bulbs which are rotten, decayed are not considered. If we considered 100kgs of onion bulbs around 5% are unmarketable.

2. Spoilage
This losses is depends upon temperature variation .As the temperature increases spoilage loss increases .They are around 2-3%

3. Double splitted
These losses are due to temperature variation during the bulb development period these splitted bulb are strictly avoided .These losses are around 2.57%

4. Off Coloured bulbs
Generally the kharif onion is dark red colour and rabbi onion is light red in colour. According to the onion which is not resembling to this colour should be avoided.

5. Bolting losses
These losses depends upon temperature variation .As the temperature increases spoilage increases .They are around 1.29%

6 Mis shaped
The bulbs which are nearly round are considered .The bulb which are flat, globular are avoided .These losses are around 1.5%.

7. Other losses
Other losses are microbial decay losses, damage in transport are negligible.

LOSSES

Traditional onion storage structure

Quantity of onion stored in Traditional onion storage structure developed by NHRDF during last week of May is about 1000kg and then after 4-5 month the quantity of onion obtained is about 777.54kg.Thus the weight losses calculated as 222.46 kg.According to weight losses Rotting losses and Sprouting losses were calculated as 13.34 kg and 8.898 kg respectively.

There are some sub losses such as unmarketable; Spoilage, Double splitted, bolting and mis shaped which were calculated as 38.87 kg, 23.32 kg, 19.98 kg, 10.03 kg and 11.66 kg respectively. These calculations were done by using formula as shown in appendix.

Dindigul type onion storage structure

Quantity of onion stored in Dindigul type onion storage structure during last week of May is about 1000kg and then after 4-5 month the quantity of onion obtained is about 658.62 kg.Thus the weight losses calculated as 341.38 kg.According to weight losses Rotting losses and Sprouting losses were calculated as 20.48 kg and 13.65 kg respectively.

There are some sub losses such as unmarketable; Spoilage, Double splitted, bolting and mis shaped which were calculated as 32.93 kg, 19.75 kg, 16.92 kg, 8.49 kg and 9.87kg respectively. These calculations were done by using formula as shown in appendix.

Improved low cost onion storage structure developed by NHRDF

Quantity of onion stored in Improved low cost onion storage structure developed by NHRDF during last week of May is about 1000kg and then after 4-5 month the quantity of onion obtained is about 560 kg.Thus the weight losses calculated as 440 kg.According to weight losses Rotting losses and Sprouting losses were calculated as 26.4 kg and 17.6 kg respectively. There are some sub losses such as unmarketable; Spoilage, Double splitted, bolting and mis shaped which were calculated as 28 kg, 16.80 kg, 14.39 kg, 7.22 kg and 8.40 kg respectively. These calculations were done by using formula as shown in appendix.

Low cost domestic onion storage structure

Quantity of onion stored in Low cost domestic onion storage structure during last week of May is about 1000kg and then after 4-5 month the quantity of onion obtained is about 800 kg.Thus the weight losses calculated as 200 kg.According to weight losses Rotting losses and Sprouting losses were calculated as 12 kg and 08 kg respectively.

There are some sub losses such as unmarketable; Spoilage, Double splitted, bolting and mis shaped which were calculated as 40 kg, 24 kg, 20.56 kg, 10.32 kg and 12 kg respectively. These calculations were done by using formula as shown in appendix.

RESULT AND DISCUSSION

Comparison between different Onion Storage structure

Name of onion storage structure	Cost per sq.ft(Rs)	Per kg storage cost against construction cost(Rs)
Traditional onion storage structure	2.79	6.68
Dindigul type onion storage structure	1.59	3.824
Improved low cost onion storage structure developed by NHRDF	1.28	3.080
Low cost domestic onion storage structure	1.17	2.81

Losses in onion storage structure

Comparison between losses of different Onion Storage Structure

Sr.No.	Particulars	Traditional onion storage structure	Dindigul type onion storage structure	Improved low cost onion storage structure developed by NHRDF	Low cost domestic onion storage structure
1.	Weight losses	222.46 kg	341.38 kg	440kg	200kg
2.	Rotting losses	13.34 kg	20.48 kg	26.4 kg	12 kg
3.	Sprouting losses	8.898 kg	13.65kg	17.6kg	8kg

SUMMARY AND CONCLUSION

Based on the results of experiment conducted on onion storage structures in NHRDF and domestic onion storage structure (Kalwan), losses were found to be highest in storage structures in NHRDF. But these losses may be varies according to climate, and location.

Result and discussion reveals that the domestic onion storage structure is proved to be best. The losses are very less, quality and quantity of produce is maintained. The Cost per sq.ft (Rs) and per kg storage cost against construction cost (Rs) of domestic onion storage structure is less as compare to onion storage structures in NHRDF.

The low cost domestic onion storage structure may be beneficial to small growers. This may profitable to those growers who are growing onion at two or three year's interval due to shortage of irrigation water and inclusion of rotation of crops.

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APPENDIX

Domestic onion storage structure (Kalwan) is developed by
Mr.Sanjay S. Gurjar
Gurjar mala,
At.Post.Kalwan
Tal.Kalwan Dist.Nasik

Onion storage structure developed by NHRDF
Add-NHRDF,Chitegaon phata,
Dist.Nasik

COST OF CONSTRUCTION

Construction cost per sq.ft. is calculated by following formula
=Total cost/size of structure/life (Rs)

LOSSES-

Sample calculation-

Quantity of onion stored (x) =1000 kg
Quantity of onion obtained (y) =777.54 kg
Then weight losses =x –y
= 1000 kg -777.54 kg
= 222.46 kg