Bulletin of SAN Vol. 26 (2005): 10 – 14

AN EVALUATION OF ONION STORAGE LOSSES AND IMPLICATION FOR FOOD SECURITY IN SOKOTO METROPOLIS

[1]DOGON-DAJI, S.D.; [2]BABA, K.M.; [2]MOHAMMED, I. AND [3]MAGAJI, M.D.

[1]Department of Agricultural Science, Shehu Shagari College of Education, Sokoto.
[2]Department of Agricultural Economics and Extension, Usmanu Danfodiyo University, Sokoto.
[3]Department of Crop Science, Usmanu Danfodiyo University, Sokoto.

ABSTRACT

Causes of onion storage losses and price fluctuations were investigated. A storage trial was conducted from May 2003 to March 2004 for the collection of primary data on causes of onion storage losses. Data on onion prices were collected fortnightly from the Sokoto central market. Results of the study revealed that dehydration, rotting and sprouting were the main causes of losses in stored onion. Losses due to dehydration accounted for up to 59.15% of the quantity of onion stored. As the storage period progressed, retail and wholesale prices of onion also increased, with the highest prices obtained between the month of October and December. As the demand/supply gap widens, the price of the product also increase, thus making it difficult for many households to afford the commodity. This has implication on food security. To minimize the problem, the development of high temperature storage (at ambient temperature) which is a cheaper technology than the low temperature storage is advocated.

Key words: Onion; Storage losses; Price fluctuation

INTRODUCTION

Commercial onion production in Nigeria, is mainly in the north (Ayodele, 1996). According to Hussaini *et al* (2000), onion ranks second in importance after tomato among vegetables in Nigeria, where it is grown for its bulb which is used almost daily in every home. Awurum (1999) observed that onion is a valuable ingredient of the diet due to its vitamin and mineral contents. Despite its importance, a wide supply-demand gap for onion is created few months after harvest. This is particularly as a result of the high storage losses, which result in increasing scarcity and prices as the storage season progresses. Maduekwe *et al*., (2002) reported that in northern Nigeria, adequate attention has not been paid to the huge economic losses suffered by farmers and this passes down to consumers, who sometimes have to pay up to 700% the cost at harvest times, just few months after. The increasing scarcity and prices, affect the quantity and quality of the product households could afford.

Jones and Mann (1963), listed dehydration, rot, sprouting and rooting as the most common causes of onion storage losses. Sokoto State is one of the northern states, where considerable quantity of onion is produced and stored annually. The study analyzed the major causes of onion storage losses and the nature of onion price fluctuations in Sokoto central market. Findings of the study will be useful to farmers, consumers and other stakeholders. Sokoto central market was used for the study because of its central location and the fact that trading in onion is an all-year round activity in the market.

METHODOLOGY

The onion storage trail was conducted between April, 2003 to March, 2004. The trial was conducted to monitor the level of storage loss attributable to each of the major causes of onion storage losses (dehydration, rot, sprouting and rooting). One hundred and twenty three kilograms of onion was used for the storage trial with *bukka/kutubi* (Cone shaped storage structure constructed with guineacorn stalks and thatch) as the storage structure. The storage structure was raised about one metre above the ground level and the trial lasted from April 2003 to March 2004. The stored onion was checked for losses and weighed monthly, starting from the second month.

Wholesale and retail onion prices were collected fortnightly at the Sokoto Central market from June 2002 to May 2003. The retail price data was collected on naira per kilograme basis where as wholesale price data was collected on naira per bag and converted into naira per kilogram for the analysis.

RESULTS AND DISCUSSION

Onion Storage Loss

Results obtained at the end of the storage trail experiment showed that 3kg (2.4%) of the onion stored was left (Table 1). The remaining 120kg was lost to various causes.

Dehydration

Dehydration was the single most important, responsible for 59.2% of the losses recorded (Table 1). Results of the study revealed that up to 22.7% of the onion stored was lost after the first two months of storage due largely to dehydration. Despite the level of weight loss recorded, the local variety stored at ambient temperature had better storage ability. Nabos (1976) reported that the imported varieties lose 65-70% of their original weight after only three months of storage. Jones and Mann (1963) noted that onion bulbs continually lose water and dry matter under all storage conditions. Currah and Practor (1990) reported storage temperature and timing of harvest as important factors that can affect the keeping quality of onion.

Rotting and Sprouting

Sprouting accounted for 33.54% and rotting 4.9%. Similar findings were reported by Ogbadu (1983), who listed sprouting, rotting, loss in weight (dehydration) and post harvest chemical and biochemical changes as serious problems of onion storage. However, rooting as one of the causes reported by Jones and Mann (1963), did not account for any loss, probably because the onion was not heaped on the ground.

Where as 4.9% of the quantity stored were lost through rotting only, most of the bulbs that sprouted also had rots on them. For convenience, therefore, the causes of loss were grouped into dehydration, accounting for 59.2% and rotting and sprouting accounting for 38.44% (Table 1) of the onion stored. Rotting as a single factor accounted for less loss probably because the quantity of onion was small, resulting in less heat build up in the onion bulbs due to better aeration.

Table 1: Onion storage losses by month

Month	Weight loss by causes			
	Dehydration		Rotting and sprouting	
	Quantity (kg)	% of total	Quantity(kg)	% of total
May	0.00	0.00	0.00	0.00
June	24.50	19.91	3.50	2.84
July	5.00	4.00	0.50	0.40
August	8.50	6.90	2.00	1.60
September	4.00	3.25	4.00	3.25
October	4.00	3.25	2.50	2.03
November	7.25	5.90	9.25	7.50
December	7.75	6.30	12.75	9.00
January	7.00	5.70	11.00	8.90
February	2.50	3.01	1.00	0.80
March	2.25	3.03	0.75	0.61
Total	72.75	59.15	47.25	38.44

Rotting and sprouting were particularly important between November 2003 and January 2004(figure 1). This period coincided with the harmattan season, thus low temperature prevailing during this period might be responsible for the increase in sprouting.

Onion Price Variation

Price increase per unit weight was recorded as the storage season prologs/extends. The magnitude of storage loss increased with the period of storage. Highest onion prices (wholesale and retail) were recorded between October and December 2002 (Figure 2). Scarcity of the commodity reaches its peak within this period which usually preceeds the arrival of the new harvest. Currah and Proctor (1990) observed that onion storage under ambient conditions may become a gamble for the producer, who has to balance the cost of storage, the loss in weight incurred during the drying process, and the likely losses through deterioration in store, as against the possible rise in price if marketing the crop is deferred for some weeks or months. The trend of onion price movement in Sokoto central market is presented in Figure 2.

Because of the scarcity experienced, average onion retail price at the Sokoto central market was as high as ₦84.5/kg in October 2002. highest wholesale price of ₦62.94/kg of onion was recorded in November, 2002 at the same market. As a result of the high price, only few households could afford the commodity during this period. This affects the quantity and quality of food affordable by many households, thus affecting their food security.

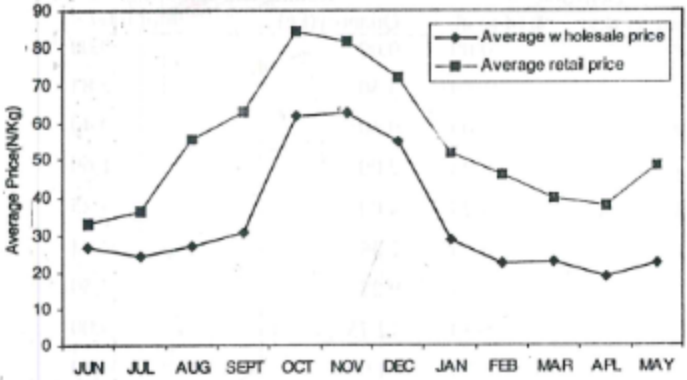

Figure 2. Average wholesale and retail prices of onion at the sokoto Central Market(2002 - 2003)

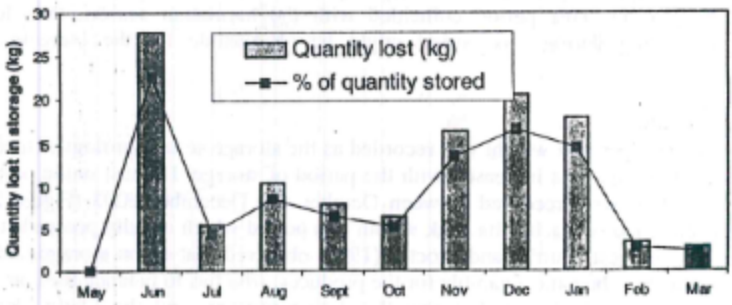

Figure 1. Onion Storage losses by months (2002-2003)

CONCLUSION

Onion is an important item in the diet of many Nigerians. But its all year round availability is affected by the high storage losses caused by dehydration, rotting and sprouting. The retail and wholesale prices were as high as ₦84.5/kg and ₦62.94/kg respectively during the scarcity period. This limits the quantity and quality house holds could afford.

The major causes of storage losses were identified as dehydration, rotting and sprouting. The effect of these causes may be reduced through the development of appropriate storage technologies such as the low and high temperature storage methods.

In Nigeria, however, apart from the technical problems, there are a number of limitations to the use of refrigeration (low temperature storage) as means of storing vegetables. The high temperature storage (at ambient temperature) is a cheaper system

based on high temperature storage and natural ventilation. In this method, the traditional systems already in use in many parts of the tropics might be modified by adding forced ventilation capacity, so that the moisture generated by the drying and respiration of stored onion could be blown out of the store. In very hot climates, cooler air could be drawn in at night with the aim of lowering the store temperature and raising the humidity to a level which could maintain skin quality, without being high enough to encourage mould growth. The optimum storage condition under high temperature storage is 25-30^{0}C (65-75% RH).

REFERENCES

Awurum, A.N. (1998). Evaluation of onion (*Allium cepa* L) cultivars under rain fed and irrigated conditions in the humid tropics. *Journal of Sustainable Agriculture and Environment* 1:56-60.

Ayodele V.I. (1996). Onion *Allium Cepa L.* and *Allium cepa L.* Var aggregatum production in Ibadan, southwest Nigeria; prospects and limitation. Paper presented at the 11th annual conference of the Horticultural society of Nigeria. Ogun state University, Ayo-Iwoye, 1-4 April.

Currah L. and Proctor, F.J. (1990). Onions in Tropical Regions. *National Resources Institute Bulletin* No. 35, 232 pp.

Hussaini, M. A., Amans, E.B. and Ramalan, A.A. (2000). Yield, bulb size distribution and storability of onion (*Allium cepa* L.) under different levels of fertilization and irrigation regime. *Tropical Agricultural (Trinidad).* 77 (3): 145 – 149.

Jones, H.A. and Mann, L.K. (1963) *Onions and their Allies: Botany, Cultivation and utilization.* Leonard Hill Ltd London pp. 1 - 209.

Maduekwe, A.A.L.; Balogun, W. and Garba, B. (2002). Controlling the periodic flux of solar radiation into an adobe storage system for onions: part I – slab and foam roof combination. *Nigerian Journal of Renewable Energy.* **10** (1 and 2): 108-116.

Nabos, J. (1976). L'amelistration de l'oignon (*Allium cepa L*) au Niger. L'Agronomic Tropicale. 31:87-97.

Ogbadu, G.H. (1983). Preliminary study on the preservation of onions by gamma irradiation. *Noma News Magazine* **1** (1): 1 - 24.