NATURE, CAUSES AND STAGES OF POST-HARVEST LOSSES IN RICE PRODUCTION IN KURFI LOCAL GOVERNMENT AREA OF KATSINA STATE.

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ABSTRACT

The study investigated the nature, causes and stages of postharvest losses in rice production in Kurfi LGA of Katsina state. A multistage sampling procedure was used to select 135 rice farmers in the LGA who were interviewed with the aid of a well structured questionnaire. The Study revealed that at least 98% of the respondents agreed to have experienced PHL at one point or the other and 73% of them rated their experiences of PHL as serious. About 81% of the losses were due to breakages. A most notable cause of losses is at the storage stage and caused by rodent attack (93%). The quantity of loses estimated varied at different stages. The Study concluded that PHL significantly affects the what is available to the consumers in the study area. The study recommends trainings on PHL for farmers and other actors on the rice value chain in the study area.

INTRODUCTION

Rice is one of the most cultivated crops in the world. It is the staple food for over half of the world's population, most of who live in developing countries such as the countless millions in Asia who depend mostly on rice as their main dish. Rice is a staple food for more than 3.5 billion people worldwide, around half of the world's population (Babatunde *et al.,* 2016). Rice constitutes over 20 of total food expenditure among urban and rural households and the demand for rice has grown significantly over the last 40 years due to changing consumer dietary patterns and population growth. In 2014, the annual rice demand in Nigeria was estimated at 5.9 million MT. However, only an estimated 2.7 million MT of milled rice was produced locally, leading to a demand supply deficit that was filled by imports (Sahel, 2015). Post-harvest losses occurs between harvest and the moment of human consumption and includes on-farm losses, such as when grain is threshed, winnowed and dried, as well as losses along the chain during transportation, storage and processing (Wikipedia, 2016).

The global population is predicted to grow substantially until 2050, requiring enormous increases in food production as well as reductions in food waste (Fedoroff, 2015). Nigeria is the largest consumer of rice in Africa with estimated annual demand for milled rice is 6.7 million tons and an average National production of 5 million tons leaving a gap of 1.7 million tons to be bridged by importation in 2021 (Enegi, News Agency, 2021). According to the World Bank, food loss accounts for 40 percent of all food produced in Nigeria (Inter Press Service, 2021) and

Nigeria was ranked fifth with a score of 74.1 for food loss and waste on the FSI 2018 results for middle income countries (Food and Agricultural Organization, 2018). One way out is for stakeholders to help farmers have to look inwards to see how to increase yield and reduces losses. The studied examined the cause, stages of postharvest losses in rice production in the study area and estimated the quantity of rice lost at the stages of rice loss

METHODOLOGY

Kurfi Local Government area is in Katsina state, North-west Nigeria and has its headquarters in Kurfi town. The LGA is estimated to have a population of 204,417 at the 2021 based on 2006 census. Fufulde language is commonly spoken in the area while the religion of Islam is mostly practiced in the LGA.

Notable landmarks in Kurfi LGA include the Government Science Secondary School, Kurfi. The LGA is located on latitude and longitude $12^0 39' N \; and \; 7^0 28' E$ respectively and covers a total area of 572 square kilometers and has an average temperature of 34 degrees centigrade. The area hosts the Gada River and has an average humidity level of 19% . The average wind speed in Kurfi LGA is put at 12 km/h. Trade is an important feature of the economic life of the people in the LGA thereby explaining the reason why the area hosts several markets which provide platforms for the exchange of a variety of goods and services. The area also has a rich agricultural heritage with crops such as millet, sorghum, maize, groundnut and rice are also grown in the area. A number of farm animals such as cattle. Sheep and goats as well as horses are reared and sold in Kurfi LGA. Other important economic activities in Kurfi LGA include hunting and pottery.

Sampling Procedure

A multi-stage sampling technique was used to select farmers interviewed for this study. In the first stage, two wards were purposely selected based on their prominence in rice production. In the second stage two villages were equally randomly selected from each of the wards selected to make four Villages from the LGA and the final stage of the sampling involved the selection of one hundred and thirty-five (135) rice farmers from the villages using the list of rice farmers provided by the farmers' cooperative society using the technique of proportionate sampling. The expression below was used for the process while the sampling frame and the sample sizes are presented in the Table below:

$$N = \frac{x}{X} \text{ x n}$$

Where;

n = Number of respondents selected/Village
x = Number of registered farmers in a Village
X = Total Number of farmers in the selected Villages
N = Sample (135).

Sampling Frame and Sample Size

Village	Number of Registered Farmers	Number of Farmers Sampled
Kaware	62	41.0
Kayyar laya	40	26.0
Tamawa	61	40.0
Sayawa	43	28.0
Total	206	135.0

RESULTS AND DISCUSSION

The result in table 1 indicates that (8.1%) of PHL in the study area were due to seed breakage, 3.7% of PHL occurred as a result of mold formation, while 88.1% of PHL in rice production in the study area was due to factors such as theft, over drying etc. The result further shows that 97% of the rice farmers in the study area were aware of post-harvest losses. The Table also revealed that 98.5% of the respondents experienced PHL in the study area, while only 1.5% of them did not experience PHL. This implies that PHL losses seriously affects rice farmers in the study area.

Similarly, the Table revealed that 72.6% of the respondents agreed that the PHL in the area was serious while 27.4% did not see it as too serious. This implies that the issue of PHL in the study area is high, therefore has to be dealt with because rice is one of the important staple crop nationwide. The result of the

finding equally shows that 92.59% of rice farmers in the study area experience PHL, at harvesting stage, while 0.74%, 5.93% and 0.74%) of PHL happens at processing, storage and PH handling stages respectively.

For the causes of PHL, at post-harvest handling, 36.3 of PHL occurs due to spillage, 54.8% of losses were due breakage while 8.15% of losses occurs due to other factors. This implies that more losses at post-harvest handling stage occurs as a result of breakage.

The major causes of PHL at processing stage is spillage accounting for 64.44%, other causes at this stage are theft, mechanical damage, breakage due to over drying, others which accounted for 2.22%, 5.19%, 22.22%, 5.19% respectively.

For the causes of PHL at storage stage, the most notable cause revealed in the study area was the loss due rodent attack as acknowledged by 92.6% of the respondent. Storage rodent are noted to cause a lot of damage in rice during storage. About 3.7% of losses at this stage was due to insect pest attack in the store.

At marketing stage, the most reported cause of PHL at marketing stage was none other factors which constitute (87.4%), (8.1%) of PHL at this stage reported losses due to theft incident at the marketing process, while fire outbreak accounted (1.5%) and (3%) other factors respectively.

According to the Table, the causes of PHL at transportation stage are not so much as 86.7% of them reported no cause at this stage, others reported fire 6.7%), (4.4%) spoilage due to poor packaging materials and (2,2%) were due to theft incident respectively.

Table 1 shows the distribution of the respondents according to the estimate of PHL at harvesting stage. Majority (58.562%) of the respondent lost between 0.2-0.5kg, while others (8.89%) lost between 0.6-0.9kg, (19.26%) lost between 1.0-1.3kg, (2.96%) lost between 1.4-1.7kg and (10.37%) lost between 1.8kg and above per every 10kg respectively. The Table represented the distribution of the respondents according to estimate of PHL at threshing stage. (84.44%) of the respondents were estimated their losses between 0.2-0.5kg, (0.74%) lost between 1.4-1.8kg and (0.74%) lost between 1.8kg and above respectively. The distribution of the respondents according to estimate of PHL at transportation stage. The most notable estimation of PHL at this stage is (98.52%) which lost about 0.2-1.0kg in the production season, (0.74%) lost between 2.0-2.9kg and (0.74%) lost between 4.0 and above respectively. The result shows the estimation of PHL at marketing stage, in this case (97.4%) of the respondents accounted about 0.2lkg lost, (0.74%) lost 0.3kg and (2.22%) of the respondents lost about 0.5kg respectively. Based on the result in Table shows the estimation of PHL at milling stage was zero. This implies that the respondents in the study area do not used milling machine.

CONCLUSION AND RECOMMENDATION

The study shows that postharvest loss in rice production is high in the study area and it is therefore recommended that trainings on handling postharvest losses should be conducted for the farmers and other actors along the rice value chain.

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Table 1: Nature, Causes and Stages of PHL in Rice Production in the study area.

Variables	Frequencies	Percentages
Aware of PHL		
Yes	131	97.00
No	4	3.00
Nature of PHL		
Breakage of seed	11	8.10
Mold formation	5	3.70
Others	119	88.10
Do you experience PHL		
Yes	133	98.50
No	2	1.50
How serious is PHL		
High	98	72.60
Not much	37	27.40
Stage does PHL occur		
Harvesting Stage	125	92.59
Processing Stage	1	0.74
Storage Stage	8	5.93
PH handling	1	0.74
Causes at PH handling		
None	1	0.75
Spillage	49	36.30
Breakage	74	54.80
Others	11	8.15
Causes at processing Stage		
None	1	0.74
Theft	3	2.22
Mechanical damage	7	5.19
Spillage	87	64.44
Breakage due over drying	30	22.22
Others	7	5.19
Causes at storage stage		
None	2	1.48
Insect pest attack	5	3.70
Rodent	125	92.60
Theft	2	1.48
Rottenning due moist condition	1	0.74
Causes at the marketing stage		
None	118	87.40
Theft	11	8.10
Fire outbreak	2	1.50
Others	4	3.00
Causes of PHL at transport stage		
None	117	86.70
Theft	3	2.20
Fire	9	6.70
Spoilage due to poor packaging	6	4.40
Estimate of PHL at harvesting stage		
0.2-0.5	79	58.52
0.6-0.9	12	8.89
1.0-1.3	26	19.26
1.4-1.7	4	2.96
≥1.8	14	10.37
Estimate of PHL at threshing stage		
0.2-0.5	114	84.44
0.6-0.9	4	2.96
1.0-1.3	15	11.11
1.4-1.7	1	0.74
≥1.8	1	0.74
Estimate of PHL at transport stage		
0.1-0.2	132	97.78
0.3-0.4	1	0.74
0.5 and above	2	1.48
Estimate of PHL at Storage stage		
0.2-1.0	133	98.52
1.1-1.9	0	0.00
2.0-2.9	1	0.74
3.0	0	0.00
4.0 and above	1	0.74
Estimate of PHL at marketing stage		
0.2	131	97.04
0.3	1	0.74
0.4	0	0.00
0.5	3	2.22
Estimate of PHL at milling stage		
0	135	100.0