Quality Parameters of Different Varieties of Paddy Rice Grown In Kano State, Nigeria

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Abstract—The quality parameters of four varieties of paddy rice grown in Kano state, Nigeria were looked into. The samples were obtained from Rice Farmers Association of Nigeria, Kano state chapter. They were analyzed for Crack percentage, Moisture content, percentage Purity, percentage varietal purity, percentage, percentage Immature grains, percentage Damaged grains, and percentage Discolored/fermented grains. The results showed that there was no significant difference between the moisture content of the four varieties of paddy collected. The level of admixture variety is quite negligible. Dockage in paddy is relatively high in Jamila variety as compared to other varieties. The level of cracked grain shows no significant difference in all varieties with the highest recorded in Yardas and the least in seppi. The level of cracked grain shows no significant difference in all varieties with the highest recorded in Yardas and the least in seppi. The level of damaged kernels and discolored kernels were relatively low and showed no significant difference. The yardas variety recorded a high percentage of weeviled infested grain. It was therefore concluded that all the varieties have one defects or the other and needs to be improved on to meet international standard.

Keywords — Farmers, Paddy, Quality, Rice.

I. INTRODUCTION

All types of rice begin life as paddy rice. Paddy rice is the individual rice kernels that are in their natural, unprocessed state. Sometimes referred to as rough rice, paddy rice is harvested directly from rice fields or rice paddies and transported to a processing site. As part of the processing, the protective hull is removed, leaving only the actual rice kernel for consumption [1]. Paddy farming is a direct source of income for the majority of the rural farmers as well as an indirect source of income for the providers of support services, paddy processors, paddy millers and traders of paddy and rice [2].

Paddy is a crop grown in almost all parts of Nigeria now. One challenge to increasing local rice production and consumption is the poor quality of paddy supplies that results in poor quality milled rice production. The process of reversing this trend will go a long way to creating improved competitiveness of locally produced rice and reduction in rice imports [3].

A large array of cash crops and food are being cultivated in Nigeria among which rice has emerged as the fastest growing sector and staple food for both the poor and the rich and especially for the urban dwellers. Rice is cultivated in virtually all of Nigeria’s agro-ecological zones, from the mangrove and swampy ecologies of the River Niger delta to the coastal areas to the dry zones of the Sahel in the north [4]. Many rice varieties are being grown presently in these different ecologies. These include traditional varieties and improved varieties.

The land mass used for rice cultivation increased from 150,000 hectares in the 1960s to about 1.8 million hectares currently [4]. Anambra, Edo and Delta states constitute the main producing areas in Nigeria in the 60’s. Today the story is different; Kano state has joined the leading rice producers. The position occupied by rice in the Nigerian diet changed about two and a half decades ago with rice now assuming a stable status.

Promotion of standardization and grading of agricultural commodities is an important aspect of agricultural marketing. The agricultural commodities are heterogeneous and hence it is very essential to grade these commodities as per standards to command better price either at domestic or international market. Sale of Paddy is offered on the basis of variety, wholesomeness, appearance, colour, presence of foreign matter, damaged grains, broken grains, admixture of inferior variety, moisture, harmful contaminants, etc. Grading also ensures that agricultural commodities move through the market faster and without obstructions. This also facilitates transactions without physical verifications by the distant buyers.

Quality is not always easy to define as it depends on the consumer and the intended end use for the grain. A quality grain is that which meets the end user specifications with respect to range of pre-determined Quality and Safety standards. In addition, rice production and marketing in the country contribute to food security, job creation, poverty reduction and national productivity [4]. In order to add to the growing body of knowledge on physical quality of paddy and processed rice produced in Kano state, this research was initiated.

II. MATERIALS AND METHOD

2.1. Survey and collection of samples
Agriculture Development Programme (ADP) and Rice Farmers Association of Nigeria (RIFAN) offices, Kano were visited to get the common and technical names and varieties of paddy grown in Kano State, Nigeria. Each of the varieties were collected for analysis which are Crack percentage, Moisture content, percentage Purity, percentage varietal purity, percentage, percentage Immature grains, percentage Damaged grains, and percentage Discolored/fermented grains.

2.2 Analysis
Cracked grain percentage
Using the Paddy Crack Detector, the number of cracked grains in a 100 grain sample was counted, and then the percentage cracked grains was computed using the equation:
Percentage cracked grains = \( \frac{\text{Number of cracked grains}}{100 \text{ grains}} \times 100 \)

Grain Dimensions
Using a caliper, twenty (20) paddy samples were selected at random from each replicate and the dimensions measured to obtain the average length and width of the paddy grains. To obtain the paddy shape, the following equation was used:

Length to width ratio (L/W) = \( \frac{\text{average paddy length, mm}}{\text{average paddy width, mm}} \)

Percentage Immature and chalky grains
Immature Grains: (Chalky and immature kernels are combined and treated as one component)
A 25 gm grain sample was measured, selected and segregated and the immature grains in sample were weighed. The percentage immature grains in the sample were calculated using the formula:

\% \text{ immature grains} = \left( \frac{\text{Weight of immature grains}}{\text{Weight of total paddy}} \right) \times 100

Dockage in Paddy
The light foreign matter, stones, weed and seeds from a 100gm sample were removed. The total weight was obtained and then the dockage percentage was calculated as follows:

\% \text{ Dockage} = \left( \frac{\text{Weight of dockage}}{\text{Total weight of sample}} \right) \times 100

Percentage discolored kernels
25 gm paddy was measured using a measuring scale. The discolored paddy were separated and then computed as following:

\% \text{ discolored grains} = \left( \frac{\text{Weight of discolored grains}}{\text{Weight of total paddy}} \right) \times 100

Percentage damaged kernels
A known weight of paddy was measured, while the damaged paddy is removed and measured then computed as below:

\% \text{ damaged paddy} = \left( \frac{\text{Weight of damaged grains}}{\text{Weight of total paddy}} \right) \times 100

III. RESULT AND DISCUSSION

The main qualities, farmers preferred for paddy were brown hull in color, long and slender in shape. Grain quality cannot be defined specifically for a particular grain. Several factors such as uniformity and soundness of the kernels, test weight, amount of foreign material in grain, breakage susceptibility are used to characterize grain quality for a particular end use of a grain type [5].

There was no significant difference between the moisture content of the four varieties of paddy collected. Moisture content has a marked influence on all aspects of paddy and rice quality and it is essential that paddy be milled at the proper moisture content to obtain the highest head rice yield. Grains with high moisture content are too soft to withstand hulling pressure without undue breakage and may be pulverized [5]. Grain that is too dry becomes brittle and has greater breakage. Moisture content and temperature during the drying process is also critical as it determines whether fissures and/or full cracks are introduced into the grain structure [6].

The level of admixture variety is quite negligible and so may be said to be of purely the main variety as a mixture of varieties cause difficulties at milling and usually result in reduced capacity, excessive breakage, lower milled rice recovery and reduced rice production [7]. Admixture variety is the presence of a variety of the same grain other than the variety in consideration. Different sizes and shaped grains make it more difficult to adjust the hullers and polishers to produce whole grains. These results in low initial de-hulling efficiencies, a higher percentage of re-circulated paddy, non-uniform whitening, and lower grade of milled rice [7]. Dockage in paddy is relatively high in Jamila variety as compared to other varieties, making it unfit for international export except further cleaning will be done. There was no significant difference in other varieties. Dockage in paddy is the Foreign Matter which Includes inorganic and organic matter. The inorganic matter shall include sand, gravel, dirt, pebbles, stones, glass and metallic pieces, lumps of earth, clay and mud. Organic matter shall include husk, chaff, straw, weed seeds and other inedible grains [7].

The level of cracked grain shows no significant difference in all varieties with the highest recorded in Yardas and the least in seppi. Overexposure of mature paddy to fluctuating temperature and moisture conditions leads to development of fissures and cracks in individual kernel [8]. Cracks in the kernel are the most important factor contributing to rice breakage during milling thereby resulting in reduced milled rice recovery and head rice yields[9].

The level of damaged kernels and discolored kernels were relatively low and showed no significant difference. Damaged Kernels are kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, moisture, weather or microbes while discolored Kernels are kernels or pieces of kernels that have changed the colour as a result of deteriorative changes [9]. Paddy deteriorates through biochemical change in the grain, the development of off-odors and changes in physical appearance. These types of damage are caused from water, insects, and heat exposure.

The yardas variety recorded a high percentage of weeviled infested grain which will make highly unfit for processing and international exports. There was no significant difference in the other varieties as they were either minute or negligible. Weeviled grains are grain kernels that are partially or wholly bored by insects injurious to grain but do not include germ-eaten grains and egg-spotted grains [7].

IV. CONCLUSION

It can therefore be said that each variety have its own peculiarity and characteristics which needs to be worked on so that it can meet international standard.
REFERENCES


AUTHOR’S PROFILE

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