

Power Source Availability as a Means of Reducing Agricultural Post Harvest Losses

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Abstract- Over the years, high post-harvest food crops losses, arising from limited food-processing and preservation capacity, are a major hindrance to food and nutrition security in developing countries of West Africa, where seasonal food shortages and nutritional deficiency are still a major concern. It is known fact that most of the customer service interruptions are caused by the dynamic nature of the public utility companies. A stable and reliable electric power supply system is an inevitable pre-requisite for the technological and economic growth of any nation. Therefore, it has been observed that this irregular supply of power has hindered the preservation of post-harvest crops. This paper discussed the effect of irregular power supply and other factors affecting post-harvest losses and how to preserve them. Other sources to augment power supply are solar, wind mills and generators. But in this paper, the following methods were adopted to salvage these effects;- alternative power supply, early harvest, padding of the raffia basket with soft materials to reduce pressure on the package or the stored items, building a packing house and so on.

Keywords: Post-Harvest Losses, Public Utility Companies, Alternative Power Supply, Power Reliability, Food Security.

I. INTRODUCTION

Electric energy occupies the top grade in energy hierarchy. It finds innumerable uses in homes, industry, agriculture, defence and of course in some nations, transportation. The fact that electricity can be transported practically instantaneously and the fact that it is almost pollution free at the consumer end makes it attractive as compared to other forms of energy [1]. The per capital consumption of electricity in any country is an index of the standard of living of the people in that country. Most perishable agricultural products especially fruits and vegetables requires constant electrical power supply in order to reduce the postharvest losses. Postharvest loss can be defined as the degradation in both quantity and quality of a food production from harvest to consumption. Quality losses include those that affect the nutrient/caloric composition, the acceptability, and the edibility of a given product. These losses are generally more common in developed countries. Quantity losses refer to those that result in the loss of the amount of a product. Loss of quantity is more common in developing countries [2]. In the sub-Saharan West African state of Nigeria with a population of approximately

178.5million people and tropical weather conditions, availability and reliability of electricity supply is a major concern. The country is blessed with vast natural resources requisite for electricity generation such as the conventional fossil fuels of crude oil, natural gas, coal and lignite; renewable like wind, large hydropower, strong solar radiation, biomass (fuel-wood, plant and animal waste), municipal solid waste (MSW) as well as other sources of energy such as niobium and nuclear. Yet the sector is dogged by frequent and prolonged power outages with neither apology nor explanation to the customers. This unreliability in availability of electricity supply has greatly hindered the development of economic activities in the country especially in the area of post-harvest farm produce [3]. Addressing the issue of food loss is of high importance in the efforts to combat hunger, raise income and improve food security in developing countries such as Nigeria. This is because food losses have adverse impact on food security for poor people, on food quality and safety, on economic development and on the environment. Post-harvest food loss is perceived as a measurable quantitative and qualitative loss in a given produce which can occur during any of the various phases of post-harvest system. As agricultural products and commodities produced have to undergo series of operations such as harvesting, threshing, winnowing, drying, bagging, transportation, storage, processing, marketing and exchange before they reach the final consumers. There are considerable losses in crop output at every stage especially in the area of food processing. Each of these activities accounts for some degree of post-harvest food crop losses [4].

II. EFFECT OF IRREGULAR POWER SUPPLY ON POST HARVEST

Electricity supply determines the economic strength of nations and hence in the absence of this electricity, then weaknesses are felt around the developmental growth of the nations. There are few effects of unstable power supply on a nation as Nigeria especially in the area of agricultural sector. Post harvest losses is making Nigeria farmers poorer. For a very long time, Nigerian farmers have lamented the situation without getting meaningful assistance [5]. Some of these effects are as follows:

A. Loss of farm produce:- Significant quantities of farm produce in developing countries are lost after harvest due to interruption of power supply, escalating conditions of hunger and resulting in expensive input such as fertilizer, irrigation facilities and human labour, being wasted. During post-harvest operations, there may be losses in terms of food quantity and quality.

B. Inflation:- Most farms in Nigeria run on standby generators this days because of the irregularity in the supply of electricity and whatever the goods and services delivered by these farms the money would pass down to the consumers of such goods and services. And this has led to unprecedented inflation in our nation today. Because the fuels for running some of these generators bought at exorbitant prices unlike electricity that sells cheaper per kilowatt.

C. Air Pollution:- Pollution caused by the fumes and noxious gases emitted by these standby generators can cause serious degradation to the environment and death to those who inhale them, many lives have been lost to this hazard. Noise pollution from hundreds of generators cannot be overlooked and most times the fumes produced by these generators (diesel engine) changes the colour of the post-harvest crops especially when the store house is within the farm area and the generator. This may also lead to loss of farm produce as many customers may not want to buy the defected crops.

III. REMEDIES TO THE FACTORS AFFECTING POST-HARVEST

Alternative power supply: This method is used in the absence of public utility supply, it is reliable but expensive. Examples of such alternative power supply that can be used for post-harvest include diesel driven generators, petrol driven alternators and solar powered inverters. The later is pollution free and effective as it will save the loss of most of the post-harvest and will also aid processing and preservations for those crops that requires preservations. For this paper, a solar powered inverter is considered as it requires no fuel, noiseless and does cause any air pollution. This solar powered inverter is very reliable as there is continuity in power supply and has almost zero maintenance and with a life span of 25 years continuously. The major setback is in the area of its initial cost which is somewhat expensive.

A. Adoption of early harvest:- The enzymes naturally present in food, are responsible for the ripening process in fruits and vegetables. Enzymes are responsible for texture, colour and flavor changes. For example, as a banana turns from green to yellow and then to brown, not only does the colour change, there is also a change in the fruit's texture. The change in colour and texture is an indication of ripening, making the fruit tender and prone to damage due the absence of electricity for storage. Therefore one approach to guard against softening of fruits and its eventual damage is to educate farmers on early harvesting. To reduce damage to vegetables, a way of grading the tomatoes from farm through collection centre to packing houses can be introduced. Here grouping system is adopted. The process of grouping the products is referred to as product differentiation. In addition, this method

ensures that the fruits are able to withstand the touching, washing, sorting and grading into categories before transport, coupled with easy pricing based on grades [6].

B. Padding of the raffia basket with soft materials to reduce pressure on the package or the stored items:- Since electric energy is barely stable, the business of tomato haulage using raffia basket reduces the volume of wholesome tomatoes that get to the end primary market. The damage incurred is so bad that most of the volume of tomatoes a truck carries are lost during haulage simply because public utility companies are dynamic in nature and as such preservation becomes difficult. Marketers are still able to sell them but at a much reduced price compared to what they would have sold if all the tomatoes get to the market in good condition. The loss in profit affects all stakeholders including the farmer, wholesalers and retailers. The loss can be prevented if wholesalers and retailers can make use of more conventional packaging material that has proved to be effective in reducing damage to vegetables during haulage. Padding the raffia basket both in and out to convey the tomatoes over long distance. Padding will ensure that when tomatoes are transported, at least a higher percentage of them in good condition will get to their primary end market. The advantage of padding the raffia in and out is that when arranged into trucks, the upper basket don't rest directly on the tomatoes below. They are easily moved with the way they are arranged. Eventually, the wholesalers and retailers receive improved quality wholesome tomato and they will not be under pressure to sell immediately due to extended shelf life of the produce and as a result, they are able to negotiate for higher prices at points of sale between themselves and finally unto consumers. The consumers know quality comes at a cost and naturally they will be willing to pay. This for them is more value for their money and safe consumption of food to their health [6].

C. Building a packing house:-In the packing house, the sorting, washing, grading, selection, cleaning, sizing and packaging into crates or specialized branded products depending on target end primary market will be done. The opportunity the packing house offers includes employment generation for unemployed youths and women on a daily basis. In addition, it can be run as a business and as a service to the perishable produce sector which all investors should take advantage of [6]. The disadvantage of irregular power supplies in turns makes provision for employment. If power supply is regular there may be no need for construction of packing house and the idea of employing more labourers will be eliminated as well. Employing more labourers will lead to incurring more cost on the post harvest crops but it is better than the lost of the farm produce.

D. Zero energy cool chamber (ZECC): is an on-farm rural oriented storage structure which operates on the principle of evaporative cooling (see figure 3). It requires small amount of energy from a stored energy (batteries) or solar cells to power it, since this type of pump is mainly a DC pumps. It consists of a single layer of bricks as floor, the side wall with double layers of bricks having 7.5 cm space between the two layers

which is filled with sand and the top is covered with bamboo and/or gunny cloth structure. The chamber wall should be kept by continuous sprinkling of water for evaporative cooling to reduce the temperature by 17 – 18 OC. It is used mainly for storing of fruits, vegetables and as well as flowers. This system is used for small scale production and the materials required to make this chamber are cheap and easily available [7].

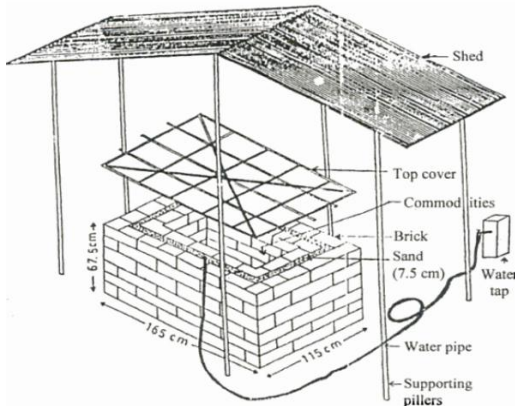


Figure 3: Zero Energy Cool Chamber [7].

IV. RECOMMENDATIONS

A. The issue of irregular power supply has been a recurring problem which came up prominently in the findings of the study. Thus it deserved adequate attention. The solution to problem are firstly, the government should encourage farmers by providing constant electric supply. In addition to the above, the federal government and individual states should partner with the private sector and agricultural institutions/agencies to provide portable alternative power supply and mass produce affordable facilities adaptable to local situation.

B. With respect to insect infestation and rodents, agricultural extension operatives in the various Agricultural Development Programs/Agencies at federal and state level should be mobilized and encouraged to enlighten farmers on effective methods of addressing the problem of insect infestation and rodents. Where use of chemicals is involved, local entrepreneurs should be encouraged in the manufacturing of such chemicals at affordable rate to the famers. The possibility of adopting indigenou knowledge to address this problem should also be explored by investigating into such practices and encouraging famers to adopt them. All the above should be done with respect to all the three stages (on-farm, processing and marketing stages).

C. Poor transportation was also revealed as one of the causes of loss of post-harvest crops. This has been another recurring constraint in the agricultural business. There are two aspects of the required attention here. One is the provision of adequate rural roads in quantity and quality. The other is provision of appropriate means of transportation for carrying crop produce from farm sites, to storage facilities and processing zones and to the market, as well as from processing zones to storage facilities and then to the market. With respect to provision and rehabilitation of rural feeder

roads, the Rural Access Mobility Programme (RAMP) of the Department of Agriculture which has offices in almost all the States should be adequately funded to construct more rural feeder roads and rehabilitate existing ones with priority for various forms of transportation needs of farmers, processors and marketers in the rural areas. In the same fashion, Famers' Unions and Community-Based Associations should be encouraged to undertake self-help rural road rehabilitation activities. With respect to provision of means of transport, the use of tricycles which are moderate and could be used to access areas difficult for regular vehicles have been recommended in the past. This should be looked into and local manufacturers should be encouraged to mass produce these. This can be achieved through Public-Private Partnership arrangement and farmers could access them at subsidized rate.

D. To reduce the length of time crops are kept after harvest, farmstead processing points have been established in some areas. Some of these are available in Ekiti state, specifically for cassava. Similar points should be provided for other crops and in all the states of the federation.

V. CONCLUSIONS

This study set out to achieve four specific objectives which were to: identify the major causes of food crop losses; determine the extent and factors of food crop losses; estimate the determinants of post-harvest food losses; and identify post-harvest management techniques for minimizing food crop losses. To a very large extent, these objectives have been actualized, based on the findings summarized in the preceding section. Based on the findings of this study, it is concluded that there are various causes of post-harvest food losses and these causes vary along the food value chain and across the crops. The implication of this is that cognizance has to be given to the causes for different types of crop and at different aspect of the food value chain in order to have comprehensive and effective policy response. This notwithstanding, there are some causes of post-harvest food losses that are common across on-farm, processing and marketing stages, these are poor storage, mould, insect infestation, and rodent attack. Again this shows that all policy response should not single out one or two of these causes; they all have to be addressed in order to achieve the much desired goal of reducing food loss. With respect to extent of food crop losses, it appears, there is the need to see on-farm stage as very critical in addressing post-harvest food crop losses because, as revealed by the study, it is the stage at which the proportion of food crop losses is highest. Again of all the on-farm activities, harvesting and on-farm storage are very critical as they contribute more to food crops losses at this stage. This suggests that harvesting methods, storage issues and power supply problems have to be addressed, among others at this stage. The issue of power supply is also germane at the processing stage while transportation becomes an issue at marketing stage.

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