# Risk Analysys Of Homestead Maize Farm In Jabbi-Lambagirei Local Government Area of Adamawa State, Nigeria

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***Abstract*— The study examined risk associated with homestead maize farm in Jabbi-lamba, Girei Local Government of Adamawa State in Nigeria. The data was obtained from Jabbi-lamba homestead farmers using questionnaires through simple random sampling. Data used were analyzed using Perceived Composite Risk (PCR) metrics. The results indicated that herbicides has the highest Expected loss, standard deviation and PCR with ₦47,560, ₦44,712.323 and ₦59,681.785 respectively. Labour has the highest expected severe loss of ₦23,040. The study recommends that, farmers should form Jabbi- lamba Homestead Farmers Association (JHFA) and to enroll in training to mitigate risk in their farms so as to improve their yields and in turn their standard of living.**

***Index Terms*— Risk assessment, homestead maize, composite, Girei, Adamawa state, Nigeria**

## I. INTRODUCTION

Maize (Zea mays L.) and Guinea corn (Sorghum bicolor (L) Moench) are important food crops in Nigeria, widely grown in the savanna regions of the country. These crops form the staple foods for most of the population especially in areas adaptable for their production. Green maize (fresh grains) is eaten roasted or boiled on the cob. The ripe grains (of maize or sorghum) are cooked in combination with pulses or milled and boiled as porridge (Yoruba =Eko, Hausa = Kamu, Ibo = Akamu). Sorghum (Guinea Corn) uses vary from drinks to 'tuwo'. The stems are used for fuel and building of fences and local huts. Maize and guinea corn are used as basal ingredients of livestock feeds. They are rich in Carbohydrates. In spite of the importance of these cereals as sources of food for human consumption, their production is concentrated in the hands of peasant farmers whose average hectarage is very small, approximately 0.5 – 1.0 hectare per farmer.The technologies are basically traditional farming methods and systems. An estimated one million hectares of land was planted to maize in the country in 1989/1990 and over 40% of this was cultivated in the northern states (NAERLS, 1982). This figure has been increasing steadily ever since, with the help of irrigation especially in the drier parts of the north (Sahel and Sudan). Average yield per hectare in the northern savannas on peasant farms is about 0.6 metric tonnes, while commercial farms average is about 2.0 metric tonnes/ha. Guinea corn, on the other hand, is grown in an estimated 300,000 hectares of land north of the Niger and Benue rivers, especially in areas generally too dry for consistent and reliable maize production. Average yield in both peasant farms and commercial setup is 0.40 metric tonnes/ha and 1.0 metric tonnes/ha respectively. Varieties of these cereals (maize and sorghum) planted in these areas are both local, improved local and hybrids. Plant breeders inI.A.R. (Institute for Agricultural Research, AhmaduBello University, Zaria) have produced suitable varieties adapted to different ecological zones of the savanna where the crops are grown. Suitable yields of the improved crops have also been packaged. However, a number of constraints (crop protection problems) militate against the production of those crops. These are discussed below and solutions proffered on identified problem.

Weed control management is closely connected with social and economic factors. Late weed removal because of manpower shortages provokes yield losses of more than 25% (Parker and Fryer, 1975). If manual and animal work is used for weed control, than 45-60 % of total work before harvest is spent just for controlling weeds (Akobundu, 1987).Weed control management should include careful herbicide selection, use of active agent mixtures, alternation of herbicides with different modes of action, and adaptation to the cultivated crop, with the aim to improve efficiency, selectivity and persistency. Simultaneous control of Sorghum halepense, Elymusrepens, Cirsiumarvense, Abutilon theophrasti, Ambrosia spp., and other dominant weeds in maize was achieved together with the use of residuals of alachlor and metolachlor for weed control in following crops, such as soybean and sunflower (Palm et al., 1989; Marković, 1988; Marković and Marković, 1989 ). Herbicide requires a wise choice in application, because the enlargement of the spectrum of action to the dominant weed species, at same time accelerates weed resistance and harmful effect of residuals to the environment (Wrubel and Gressel, 1995). Besides, alternation of active herbicidal groups during and between seasons, delays the occurrence of resistant weeds populations. Alternative means of controlling resistant biotypes are crop rotation, mechanical cultivation, tillage and hoeing.

In order to reduce the losses incurred after harvesting, farmers take measures such as sufficiently drying maize before storage, using storage structures which are moisture proof and are adequately aired. These include the metal silos, granaries, bags, cribs, baskets or earthen pots. Farmers will also store their cereals in the living houses, which are perceived to be secure as grain losses through theft are minimized. In addition to the use of traditional storage structures, farmers' use other coping strategies aimed at reducing these post-harvest losses like the use of traditional knowledge(Nduku et *al*, 2013) . These include the use of herbs like the Mexican marigold and

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hot pepper in storage, selling grain soon after harvest and cleaning or dusting the storage structure with pesticide thoroughly before depositing the maize or acquire the new maize storage technologies (Bett and Nguyo, 2007). Storage of cereals plays an important role in evening out fluctuations in production from one season or year to the other (Kimenju and De Groote, 2010). In addition, storage is useful in crop and seed preservation, quality improvement, quantity equalization and market price stabilization of agricultural produce (Sekumade and Akinleye, 2009) and is a form of saving (Adetunji, 2007). Farmers would only store cereals if and only if their storage benefits outweigh their costs or future prices rose enough to cover storage costs (Komen et al., 2006; Fackler and Livingston, 2002).

It has been observed that some farm inputs like fertilizer, herbicides and labour is directly proportional the outputs. Poor farm inputs results to poor harvest while effective farm inputs results to bumper harvest. This study is aimed at assessing the risk associated with maize small scale farming, specifically the risk incur from fertilizer application, herbicides usage, labour and storage.

Most lenders and farmers think about potential losses when they think about risk. These losses can be in various forms, but the common denominator in most cases is a significant financial loss or setback. This focus on the consequences of risk, and particularly the adverse consequences, is a little one-sided given the history of risk. Peter Bernstein, in his best-selling book, Against the Gods, the Remarkable Story of Risk, reminds us that the word "risk" was derived from the early Italian word risicare, which means "to dare." In this context the word risk implies an element of choice and is more action-oriented, which is as it should be. It is important to not lose sight of the potential reward associated with risk and daring to farm. And, it is helpful to avoid associating risk with fate or victimization. Risk may be unavoidable for business operators due to the very nature of engaging in business, which is a risk-taking activity; but it is imminently manageable (Miller et al 2004).

Some few challenges posed to agricultural development in adamawa state are poor infrastructure, poor farm management, lack of good storage facilities and in adequate market information. The farmer is the agent that is best positioned to know the dimension, characteristics and correlations of the risks that affect his farm. He is also the best positioned to evaluate the availability of different strategies to deal with this risk. It is the farmer's responsibility as manager of his own farming business to take the appropriate decisions to manage the risk associated with his economic activity: farming. The basic principles behind the generic strategies to reduce risk (risk sharing, risk pooling and diversification) are simple and well known to economists. Furthermore, they have been, historically, extensively used by farmers.( www.oecd.org/agriculture/policies/risk.)

## II. METHODOLOGY

The data for this research were obtained from some scale farmers in Jabbi-Lamba using random sampling. The obtained data were analyzed using Perceived Composite Risk (PCR) Metrics. PCR is a model for analyzing Risk based on the perception. The methodology is as explained below.

PCR comprises of three measures this are

i. The Expected Loss (E[X])

ii. The Expected Severe Loss ( E[S])

iii. Standard Deviation $\delta$

E[X] is derived by the sum of the products of each loss with its respective probability.

E[X] = $\sum_{i=0}^{n} xP[X = x_i]$

Where $x$ is loss in Naira (₦)

$P[X = x_i]$is the probability of losing $x$,

E[S] is the loss that put the survivability of a farm at risk. In order to compute S[E] the threshold T were specified as any loss is greater than or equal to T. $E[S]$can be express mathematically as

E[S] =$\sum_{x=T}^{n} x.P[X = x_i]$

The standard deviation of loss $\delta$ is defined by

$$\delta = \sqrt{\sum_{x=0}^{n} (x - E[X])^2 * P[X = x]}$$

Standard deviation measures an additional perceived loss due to variability in predicting loss.

The PCR were presented as follows

PCR = $E[X].+\frac{B}{A}$ E[S] +$\frac{C}{A}.\delta$

Where A,B and C are weights which were determined using Analytic Hierarchy Process (AHP). A,B and C are sum to one i.e. A+B+C =1 and reflects the relative importance of the performance metrics to the decision maker. The weight A, B and C measures the emphasis that the farmer placed on the risk measures (Expected loss, Expected severe loss and the Standard deviation). Saaty9 points rating scale (1980) were used to compare the three losses in order to obtain weights A, B and C. Table 1 gives the details of the ratings.

Table 1: Saaty Rating scale

| Ratings | Description of Relative Ratings |
|---|---|
| 1 | Equal |
| 3 | Weak preference |
| 5 | Essential preference |
| 7 | Demonstrative preference |
| 9 | Obsolete preference |
| 2,4,6 and 8 | Intermediate values |

The pairwise comparison matrix was obtained as the result of comparing the three metrics as illustrate in table 2.Table 2:Pairwise comparison Matrix of Losses

| | E[X] | E[S] | $\delta$ |
|---|---|---|---|
| E[X] | $a_{11}$ | $a_{12}$ | $a_{13}$ |
| E[S] | $a_{21}$ | $a_{22}$ | $a_{33}$ |
| $\delta$ | $a_{31}$ | $a_{32}$ | $a_{33}$ |

Where

$a_{i,j}$(i,j) = the ratings the of the three losses metrics

The weight A, B and C were computed by normalizing and taking the row averages of the pairwise comparison matrix.

## III. RESULT AND DISCUSION

The three losses, Expected loss, expected severe loss and the standard deviation for fertilizer; Herbicides, Labour and Storage of maize in Jabbi-Lamba were computed using the PCR metrics and the result is given in table 3.

Table3: Perceived Composite Risk of Maize Fertilizer, Herbicides Storage and Labour in Jabbi-Lamba

| | E[X] | E[S] | $\delta$ | PCR |
|---|---|---|---|---|
| Fertilizer | ₦43,444 | ₦21,130 | ₦41,360.102 | ₦54,741.185 |
| Herbicides | ₦47,560 | ₦22,040 | ₦44,712.323 | ₦59,681.785 |
| Labour | ₦44,290 | ₦23,040 | ₦42,778.013 | ₦56,292.36 |
| Storage | ₦38,930 | ₦23,470 | ₦41,777.044 | ₦50,904.456 |

The Results in Table 3, reveals that herbicides has the highest expected loss of ₦47,560, next to it is labour ₦44,290 followed by fertilizer ₦43,444 and storage ₦38,930 is least amount. Storage ₦23,470 has highest expected severe loss, ₦44,712.323 standard deviation, next to it is labour ₦42,778.013 followed by storage ₦41,777.044 and fertilizer ₦41, 360.102 is last. Herbicides ₦59,681.785 has highest PCR this could be because most of the famers don't have proper orientation on how to apply herbicides which results to misuse and inappropriate application of herbicides causes great damage next to it is labour ₦23,040 followed by herbicides ₦22 040 and fertilizer ₦21,130 is last. Herbicides has highest to plant as stated by Meade (1977) herbicides can cause great damage to plants when misused. The knowledge to optimize the use of herbicides in relation to crops planted at different times during spring to early summer is lacking by the farmers (James et al 2007). Labour ₦56,292.360 is second, one of the major challenges of farm labour management is that the skill labourers are very few and costly and engaging the unskilled labourers may lead to the ineffective labour which may results to loss of resources. Fertilizer ₦54,741.185 is third. According to Khanna (2012), when fertilizer is used is used in proper amounts it promotes the growth of plants and boosts the crop yield. However, the excessive use of fertilizer has many serious disadvantages some of them are: it affects the alkalinity or acidity of the soil of and may adversely affect the crop production; the excessive use of nitrogenous fertilizers concentrates nitrate in soil and water. Nitrate rich water is unfit for drinking and is rather difficult to treat. Storage ₦50,904.456 is fourth, most of the subsistence farmers does not have access to good storage facilities as the results of that their maize are exposed to rats, insects and water which have the ability to damage it.

## IV. CONCLUSION AND RECOMMENDATIONS

On the basis of the results we conclude that farmers in Jabbi-lamba are not well educated in the use of fertilizer, herbicides, and farm management scheme. Therefore we recommend Jabbi-lamba Homestead farmers should form Jabbi- lamba Homestead Farmers Association (JHFA) as to enable them to contact the Local government authority and non- governmental organization to send them agricultural extension officers. These extension officers are to train them on the following: the use of herbicides, the application of fertilizer and farm management scheme

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