International Journal of Agriculture, Environment and Bioresearch

Vol. 07, No. 05; 2022

ISSN: 2456-8643

EFFECTS OF RAINFALL VARIABILITY ON GROUNDNUT PRODUCTION IN THE COMMUNE OF OUESSE IN BENIN

CHABI Ayédêguê Biaou Philippe
School of Agribusiness and Agricultural Policy (EAPA), National University of Agriculture (UNA);
Laboratory of Rural Economics and Social Sciences for Sustainable Development (LERSSoDD)
Pierre PAGNEY Laboratory, Climate, Water, Ecosystem and Development (LACEEDE)

https://doi.org/10.35410/IJAEB.2022.5766

ABSTRACT

The present study therefore aims to contribute to a better understanding of the effects of rainfall variability on groundnut production in the Commune of Ouèssè. The methodological approach used is based on observation and data collection. This approach made it possible to obtain quantitative and qualitative agricultural data. Descriptive statistics were used to process and analyze the results. The results reveal that rainfall trends are decreasing. These rainfall fluctuations reduce peanut yields and require producers to develop strategies to adapt to the adverse effects of rainfall variability.

Keywords: Ouèssè, Benin, rainfall variability, production, groundnut.

1. INTRODUCTION

It is highly dependent on water resources and climatic conditions, particularly in certain regions sensitive to climate change (IPCC, 2007). This agriculture has remained dependent on climatic conditions and faced with water control problems, the ultimate condition for improving agricultural yields (Issa, 2012).

Beninese agriculture remains almost exclusively rain-fed (agricultural calendars are based on the rhythms of rainfall events) and therefore dependent on climatic uncertainties (Afouda, 1990). As a result, it is affected by climate variability, including precipitation, temperatures, etc. (Ogouwalé, 2001).

For three decades Benin has been experiencing climatic disturbances characterized by irregularity, late arrival and early or late end of rains. There has also been a decrease in rainfall and rainy days in most parts of the country (IPCC, 2014). These climatic disturbances result in lower yields of agricultural production. However, the issue of the environment has continued to grow in importance over the past thirty years (Boko, 1988). The research environment between 8°10′ and 8°45′ north latitude and 2°10′ and 2°45′ east longitude (Figure 1).

Vol. 07, No. 05; 2022

ISSN: 2456-8643

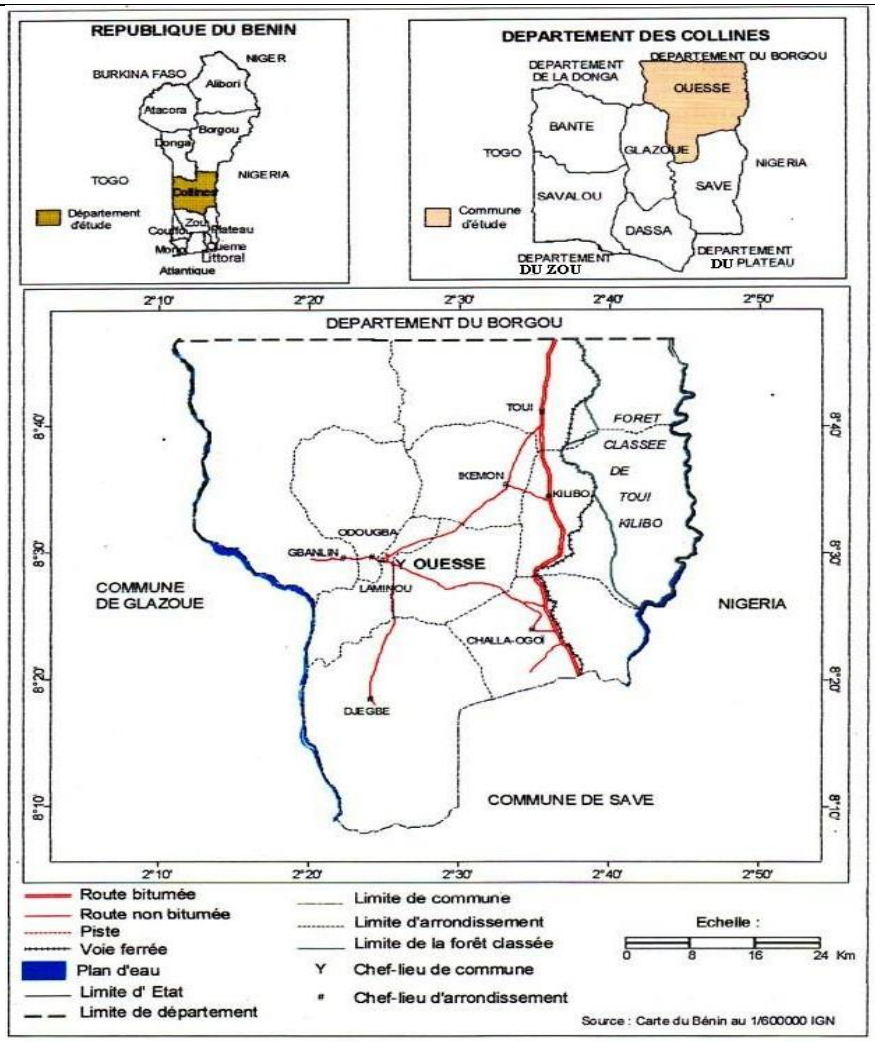

Figure 1: Geographic Location of the Research Community

2. DATA AND METHODS

The data used in this research are the rainfall heights of 1985-2015 that were collected at Météo-Bénin on the one hand and the agricultural statistics relating to groundnut production obtained at CADER. They made it possible to analyse the evolution of groundnut production over the period 1985-2015 given the unavailability of data over a long period.

The arithmetic mean $M = \frac{1}{n_{i=1}} \sum (x)i$ was used for data processing.

3.RESULTS AND DISCUSSION

3.1 Rainfall regime of the research environment

Figure 2 illustrates the rainfall regime of the research environment.

Vol. 07, No. 05; 2022

ISSN: 2456-8643

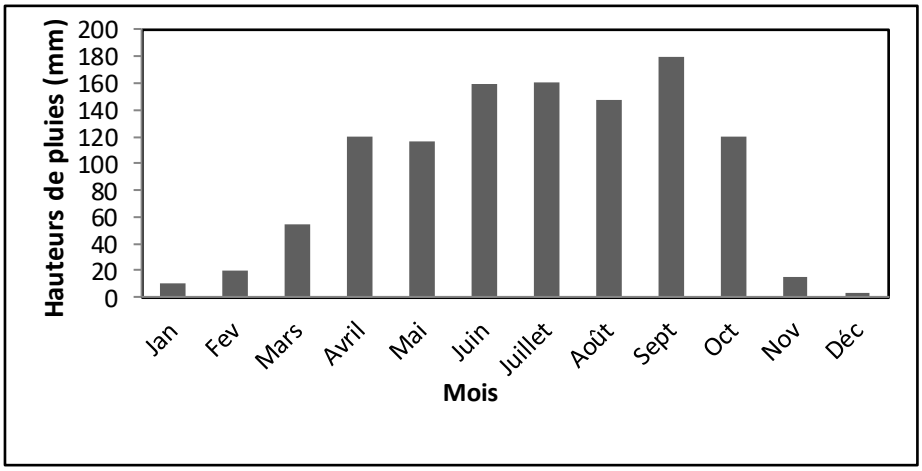

Figure 2: Rainfall regime of the research environment

From the observation of Figure 2, the rainfall regime of the research environment is of the bimodal type which experiences two rainy seasons and two dry seasons. Thus, the distribution is made as follows: from March to July the great rainy season with the maximum rainfall heights; from July to August the small dry season characterized by high relative humidity; from September to November the small rainy season; from November to March the great dry season characterized by excruciating heat and the almost total absence of rain. It is possible to question the effects of rainfall variability on the production of the arrachide.

3.2 Effects of rainfall variability on groundnut production in the Commune of Ouèssè

3.2.1 Evolution of groundnut yield in relation to rainfall in the commune of Ouessè

Figure 3 illustrates the evolution of groundnut yield in relation to rainfall heights during the first season over the period from 2011 to 2015 in the study area.

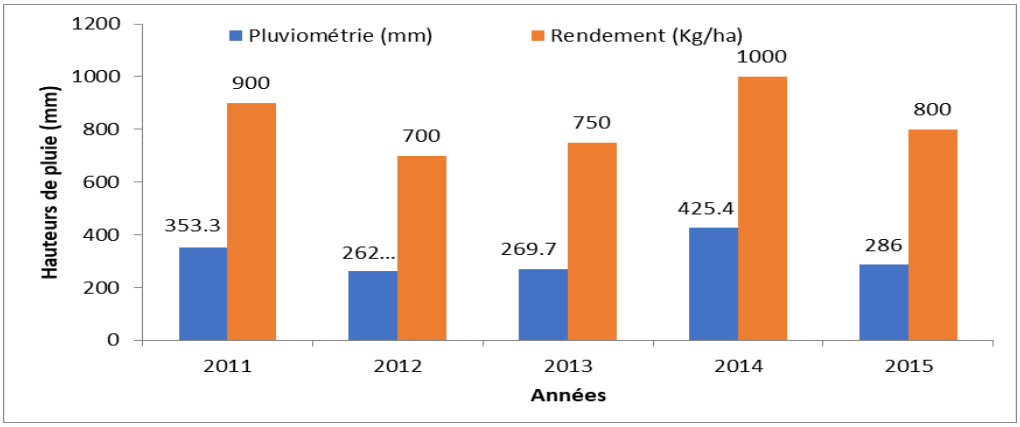

Figure 3: Groundnut yield in relation to rainfall heights (1st cycle)

From the observation of Figure 3, it appears that the highest yield during the five years is obtained in 2014 with a cumulative rainfall height of 425.4 mm and the lowest yield is recorded

Vol. 07, No. 05; 2022

ISSN: 2456-8643

in 2012 with a cumulative rainfall height of 262.6mm. It should be remembered that the yield of groundnuts during the first cycle evolves according to the rainfall heights.

Figure 4 shows the evolution of groundnut yields as a function of rainfall heights during the second rainy season over the period from 2011 to 2015 in the research community.

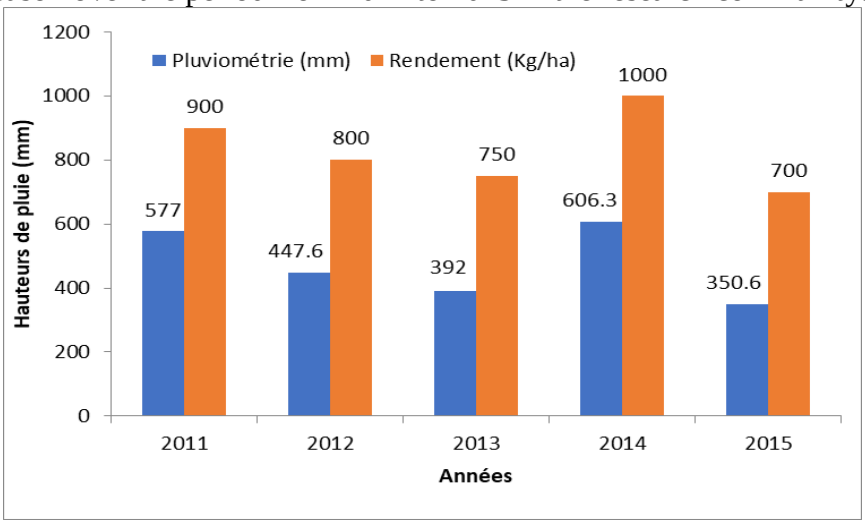

Figure 4: Evolution of groundnut yield as a function of rainfall (2nd Cycle) during the second season from 2011 to 2015

The analysis of Figure 4 reveals that the highest yield of the second season is obtained in 2014 with a rainfall of 606.3 mm and that the lowest yield is obtained in 2015 with a rainfall of 350.6mm. As a result, the yield of groundnuts is all the higher the higher the rainfall. The yield is therefore a function of rainfall.

In short, it can be seen that the highest yield is obtained in 2014 and during the second rainy season. This can be explained by the abundance of rains during the second season, especially the frequency of night rains which are likely to promote strong flowering and therefore the expansion of buds leading to the formation of groundnut seeds in the research environment.

3.2.2 Effects of rainfall deficits on groundnut production

Rainfall deficits occur at different stages of production development because crops were not grown at the same time by producers. Among the consequences of seasonal breaks or rainfall deficits that occur on groundnut cultivation, depending on their stage of development, it is worth noting the reduction in plant growth (90% of respondents), wilting and or yellowing of leaves (85% of respondents).

In addition, it should be noted that consequences such as: unsprouted seeds caused by rotting of these in the ridges by the effect of drought and temperature. The reduction in growth is manifested by a stop in the formation of flowers.

3.3 Strategies used by producers in the face of rainfall constraints

For the first crop, the normal sowing time is in April while that of the second crop is in August.

To avoid the risk of the consequences of seasonal breaks or excess rainfall on the crop, some producers sow late during the month of May. Given the intra-seasonal variability of the rains,

Vol. 07, No. 05; 2022

ISSN: 2456-8643

some producers comply with climatic hazards to make early sowing at the beginning of March for the first crop and at the beginning of July for the second crop (photo 1).

Photo 1 : Groundnut field from an early sowing in early March for the first crop

Shooting: CHABI, May 2021

Photo 2 shows early sowing at the beginning of March. It should be noted that to compensate for the delays in the rains, producers in the research community produce early in March. According to 85% of producers, early production in March allows producers to avoid the effects of abrupt interruption of rainfall.

Photo 2: Groundnut field from an early sowing at the beginning of July for the second crop.

Shooting: CHABI, May 2021

All in all, the analysis of the rainfall height regime reveals a great variability around the regime defined by the averages. There are three-week periods without rain during the second crop cycle at the time of seed growth, and the plants suffer from drought. Water control is essential for

Vol. 07, No. 05; 2022

ISSN: 2456-8643

groundnut production according to 80% of respondents. Better, in the first crop cycle, the appearance of the small dry season is very variable because the harvest is sometimes done with soil moisture.

4. CONCLUSION

At the end of this research, it must be remembered that rainfall deficits occur at different stages of production development because crops were not grown at the same time by producers. Among the consequences of seasonal breaks or rainfall deficits that occur on groundnut cultivation, depending on their stage of development, it is worth noting the reduction in plant growth (90% of respondents), wilting and or yellowing of leaves (85% of respondents). In addition, the highest yield during the five years is obtained in 2014 with a cumulative rainfall height of 425.4 mm and the lowest yield is recorded in 2012 with a cumulative rainfall height of 262.6mm. It should be remembered that the yield of groundnuts during the first cycle evolves according to the rainfall heights.

REFERENCES

Afouda Fulgence (1990): Water and crops in central and northern Benin: a study of the variability of water balances in their relations with the rural environment of the African savannah. Thèse de Doctorat nouveau régime, Paris IV Sorbonne, France, 520 p.

Boko Michel. (1988): Climate and Rural Communities of Benin: Climate Rhythms and Pace of Development. Thèse d'Etat ès lettres, Dijon, 607 p.

IPCC [(Intergovernmental Panel on Climate Change)]: (2014): Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the fifth. In: Assessment report of the Intergovernmental Panel on Climate Change [led by the lead editorial team, R.K. Pachauri and L.A. Meyer]. Geneva, Switzerland, 161 p.

IPCC (2007): « Climate change impacts adaptation and vulnérability » In : Parry ML, canziani OF, Palutikof JP, van der linden PJ, UK Hanson CE,eds.

Issa M. S. (2012):Climate Change and Agrosystems in Middle Benin: Impacts and Adaptation Strategies. Single doctoral thesis, EDP/FLASH/ UAC, 273 p.

OGOUWALEE. (2001): Vulnerability/adaptation of agriculture to climate change in the hills department. Master's thesis in geography, UAC/FLASH, 117p