

Rainfed agriculture evolution in a climate variability context of West Africa sudano- sahelian zone

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Introduction

The rural populations of Western Africa sudano-sahelian zone have an important indigenous knowledge related to rainfed agriculture. So it has been possible for them to survive under particularly variable conditions.

Currently all this expertise seems to be compromised by the great climatic variability observed after the Sixties.

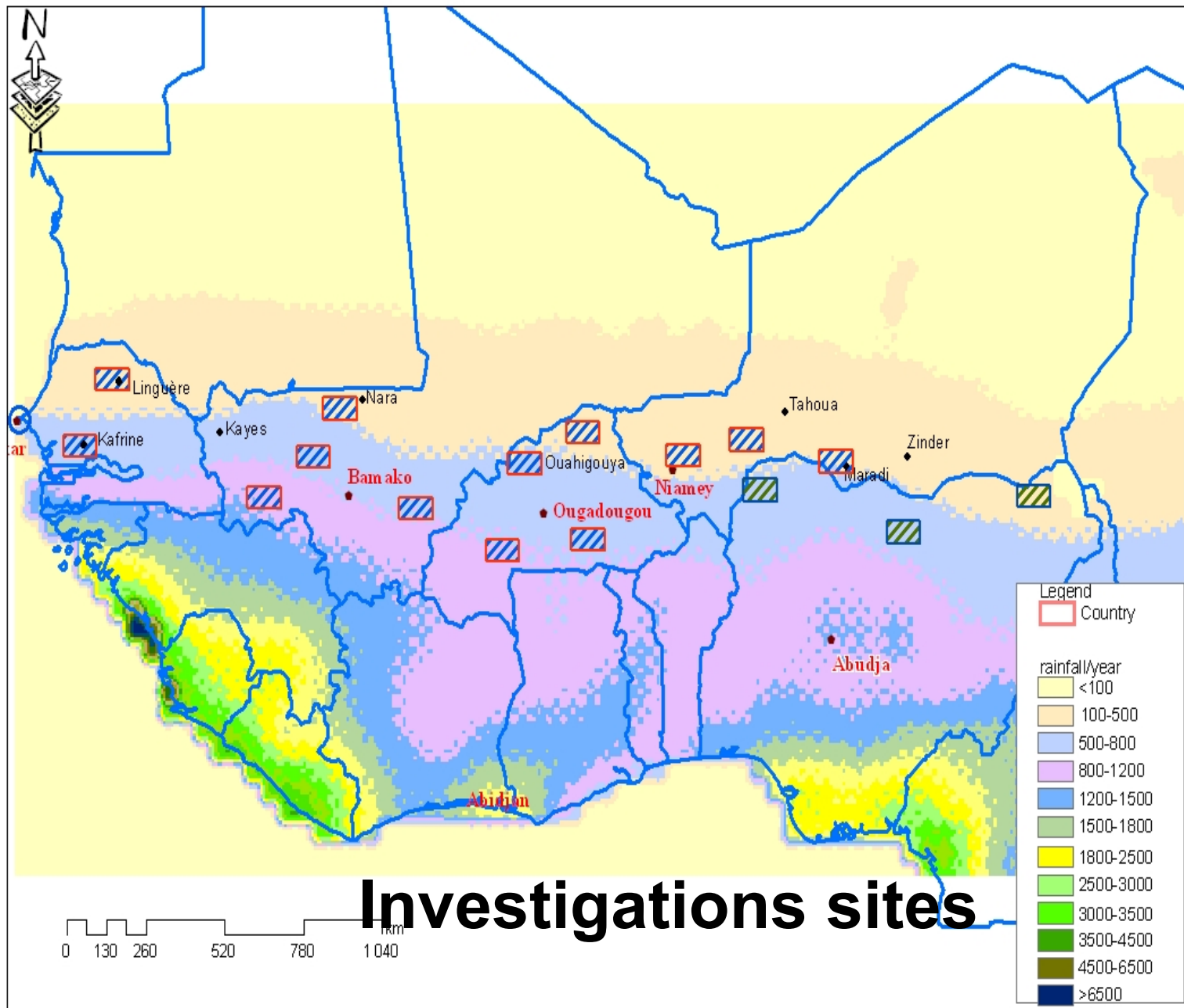
The need of a better understanding of this new situation was taken into account by the AMMA-Impact project, in particular the WP3.2 concerned with the impacts of climatic variability on rural societies.

The present study aimed to understand the evolution undergone by rainfed agriculture in the whole soudano-sahelian region.

Study sites

The study was conducted in the Sudano-Sahelian belt of West Africa at different sites distributed between five countries (Burkina Faso, Mali, Niger, Nigeria and Senegal)

All the sites are characterized by high spatio-temporal variability of rainfall as known in West Africa.



Rainfed agriculture, mainly cereal (millet and sorghum), occupies an important surface in this area. It is practiced, in many cases, on soils with low storage capacity of water, accentuating the negative effects of rainfall irregularities.

Investigations in villages and data analysis

These surveys have been focused on 1350 production units (PU). The questionnaire used was designed to fulfill the scientific objectives of the Working Group AMMA WP3.2-Impact. So, it referred, beyond the rainfed agriculture, understanding the perceptions of people about Sudano-Sahelian climate change, socio economic problems in the current context of Climate change and variability, as well as strategies developed.

It should be noted that during the field investigations, many questions were directed on rainfed agriculture in order to be able to characterize, in particular, its evolution over the last 20 years.

Data analysis was made from descriptive statistics including frequency analysis, inferential statistics from Statistics KHI-2. The p-value obtained from this indicator will determine whether or not to reject the hypothesis of independence denoted H_0 . If it is below the level of significance usually 5% we reject H_0 that is to say, our assumption of independence between the rainfall gradient and the variable of Interest.

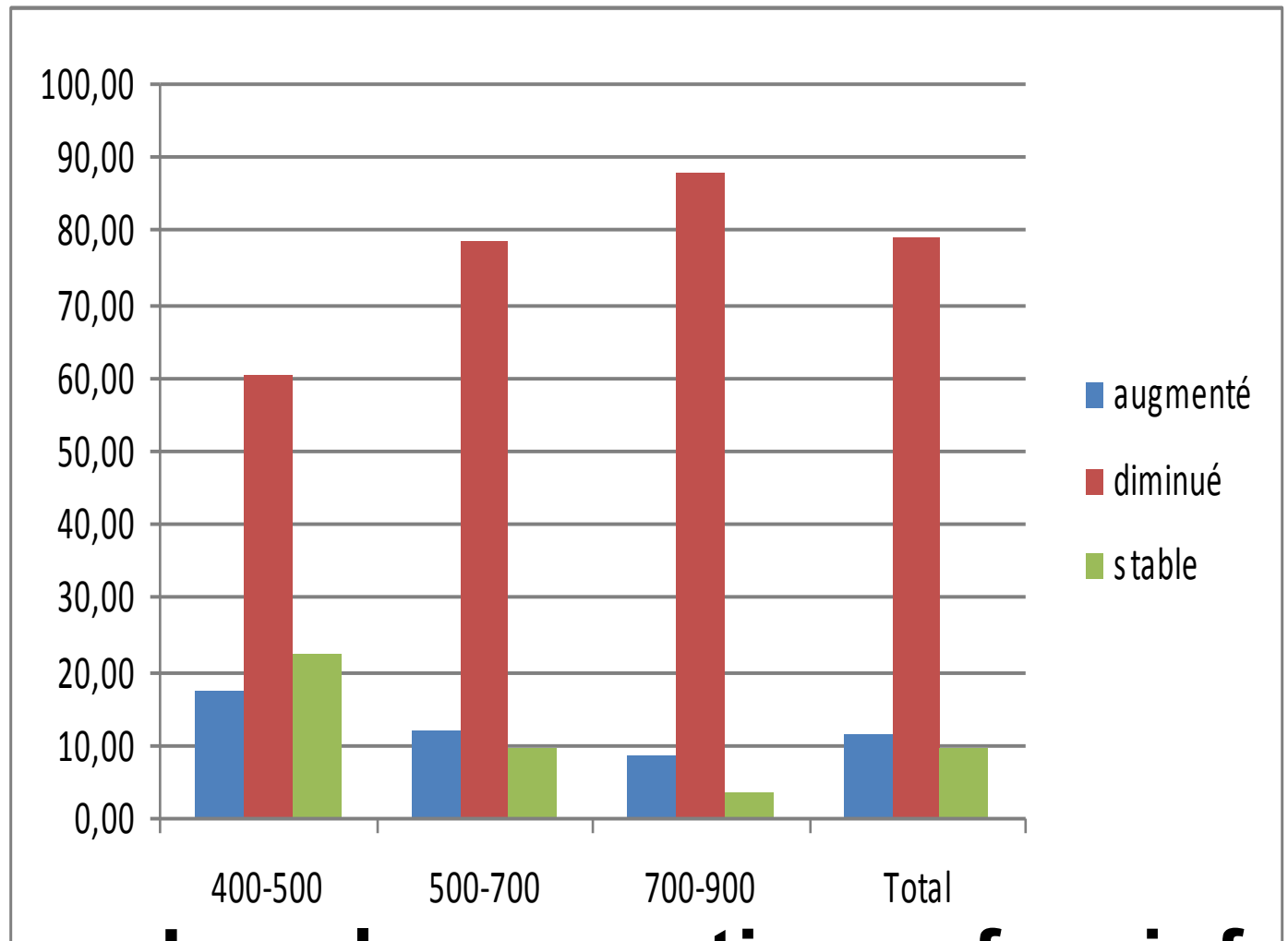
Local perception of rainfall change

The vast majority of people feel that the quantities of rain fell in their land, during the last 20 years. The distribution of responses between increasing, decreasing and stable rainfall varies slightly according to the three rainfall classes considered in the study :

400 to 500 mm

500 to 700 mm

700 to 900 mm



**Local perception of rainfall
situation during the past 20**

years

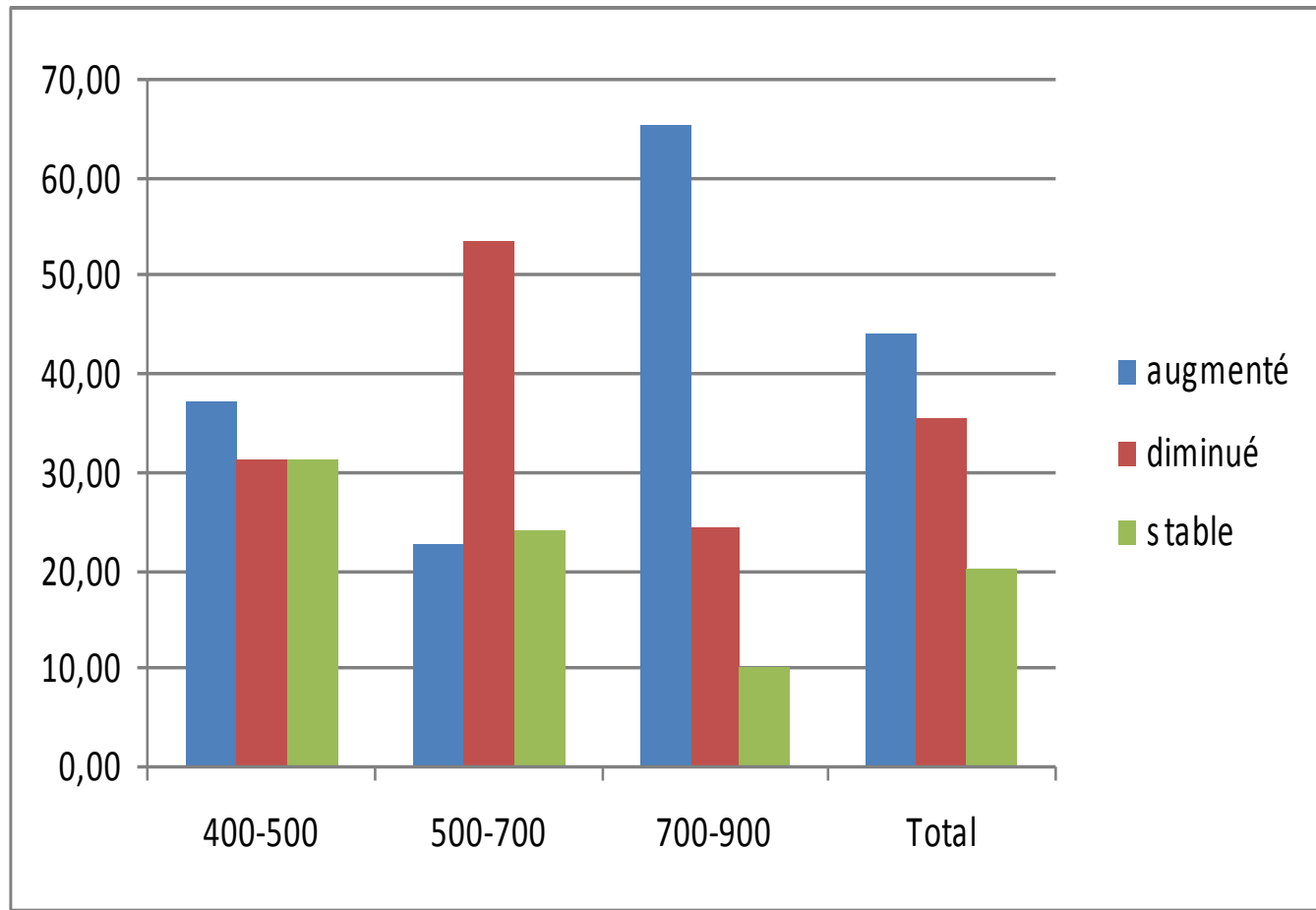
The perception of less rainfall is displayed in the 700 to 900 mm area and rainfall stability is reported in the area of 400 to 500 mm

Local perception of non climatic factors evolution in rainfed agriculture

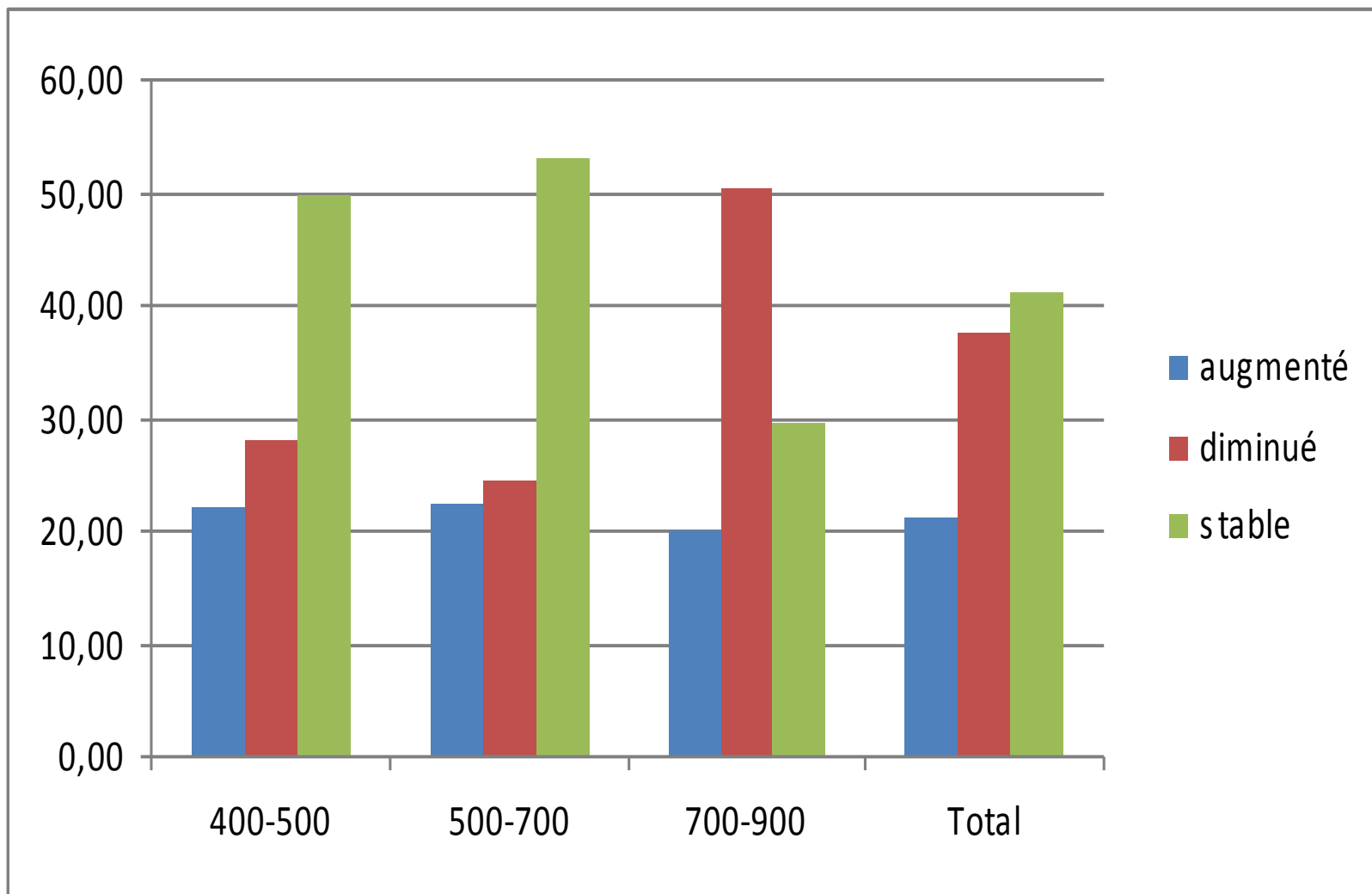
In this study the non climatic factors considered are :

- labor disponibility,
- agricultural equipment disponibility
- land accessibility,
- soil fertility and fertilizers accessibility,
- seed acces

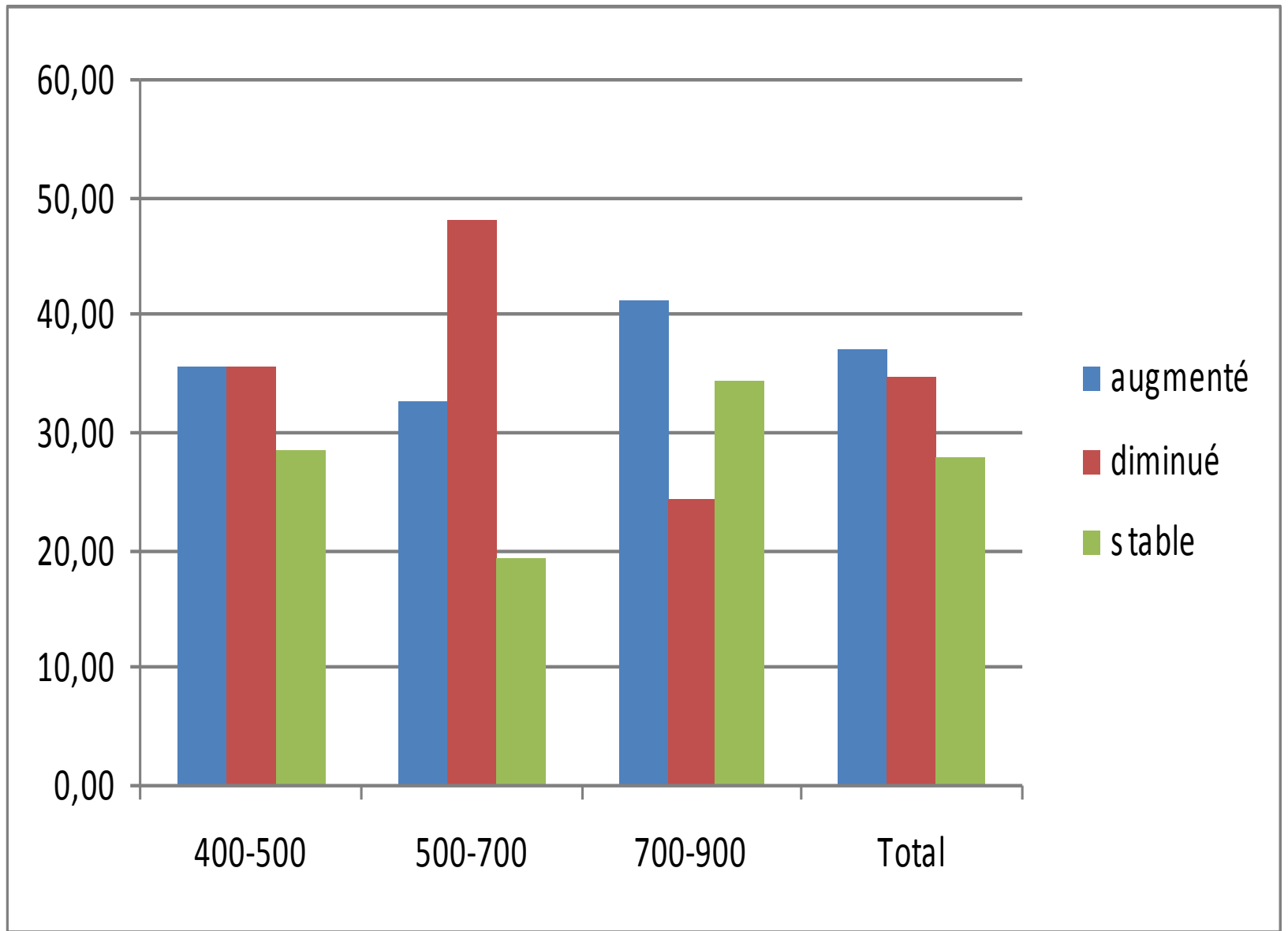
Labor disponibility and land accessibility



Labor disponibility evolution during the past 20 years



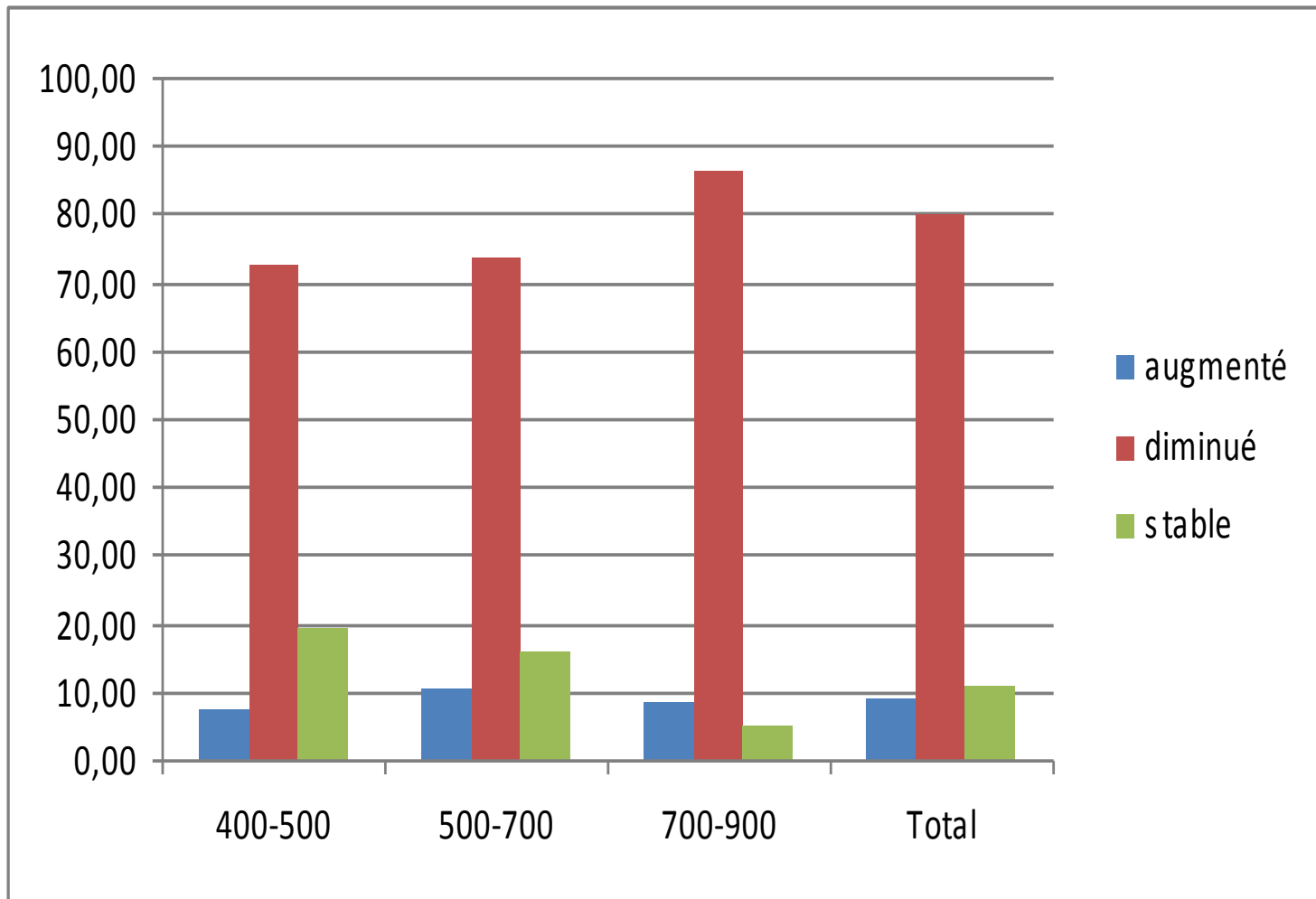
**Land accessibility evolution during
the past 20 years**



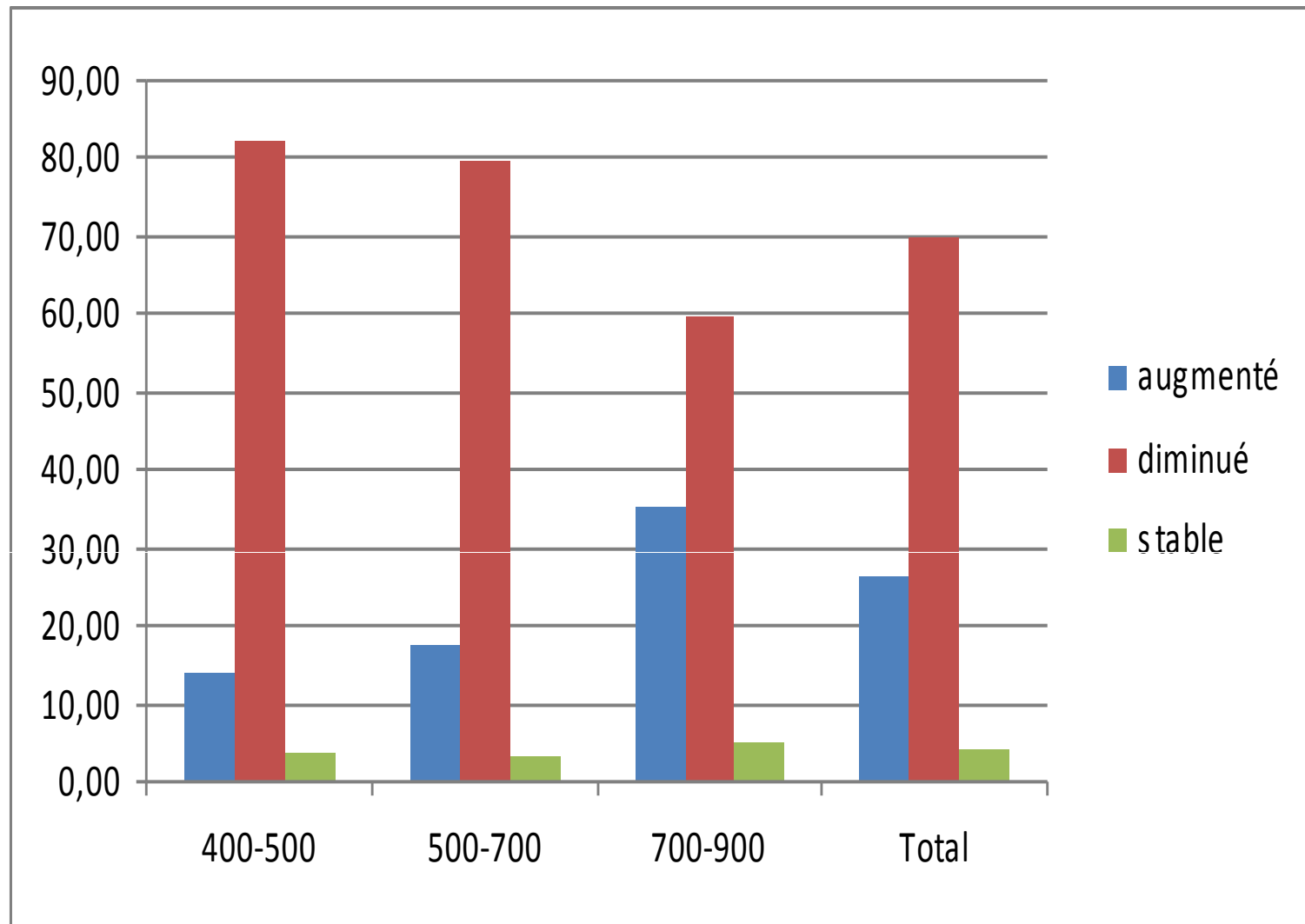
Agricultural equipment disponibility evolution during the past 20 years

Perception of soil fertility evolution and the access to fertilizers

The level of soil fertility and the access to fertilizers knew an unfavourable evolution : 60 to 80% of the answers, according to the factor considered.



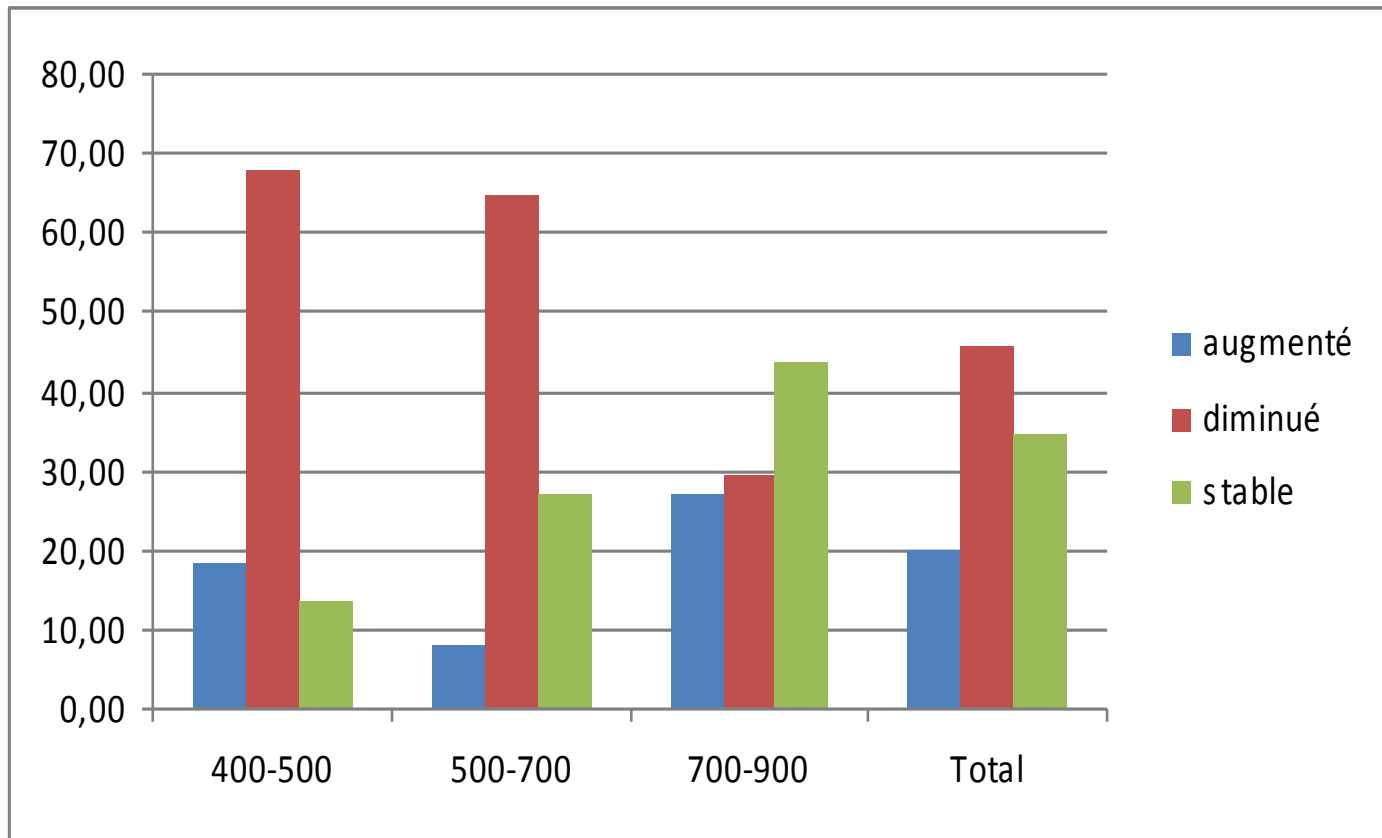
**Cultivated land fertility evolution
during the past 20 years**



**Chemical fertiliser accessibility
evolution during the past 20 years**

Seed access evolution

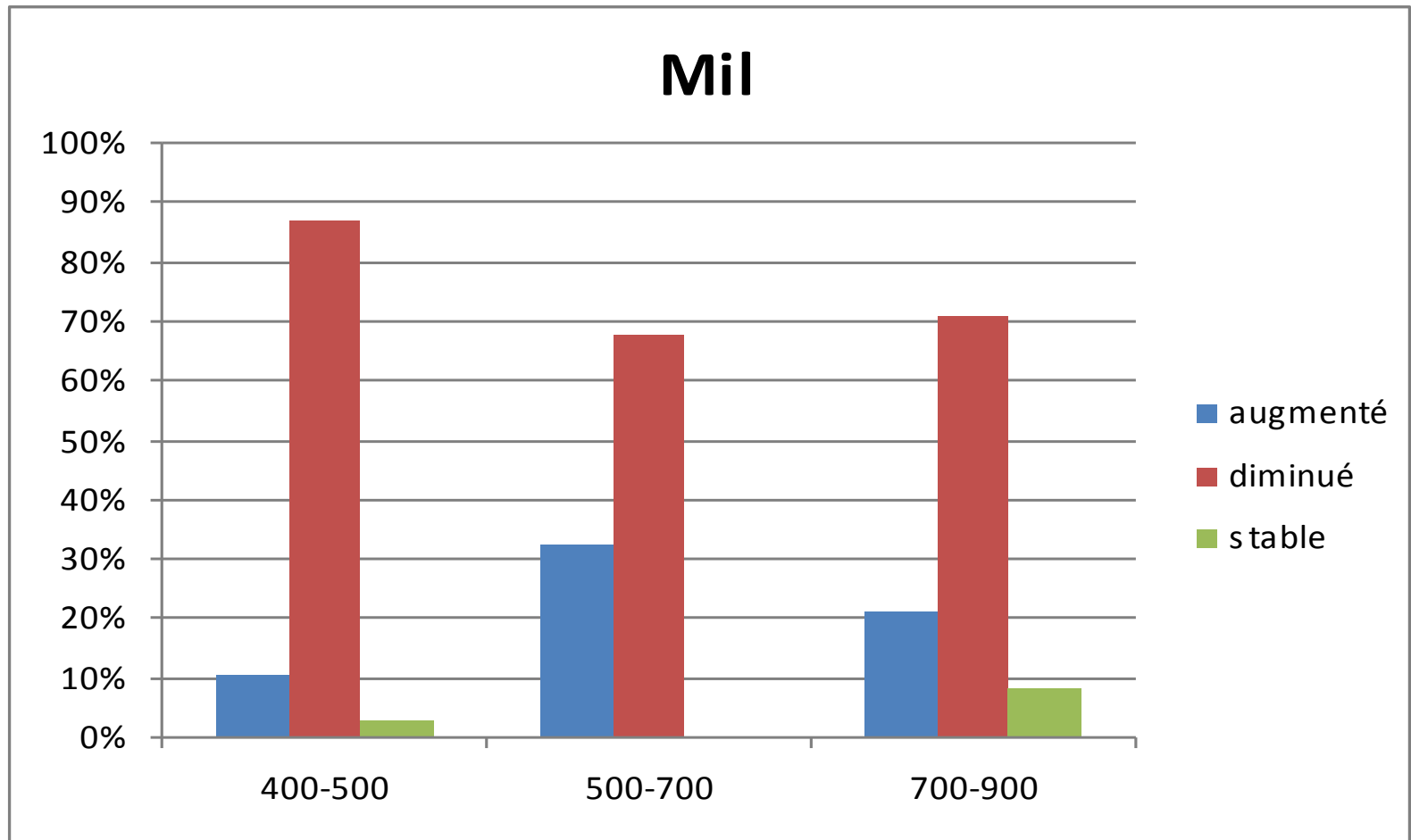
Seed access evolution is only negative in the more humid zone (700 – 900 mm). In the other zones this evolution is positive (more than 60% of answers).



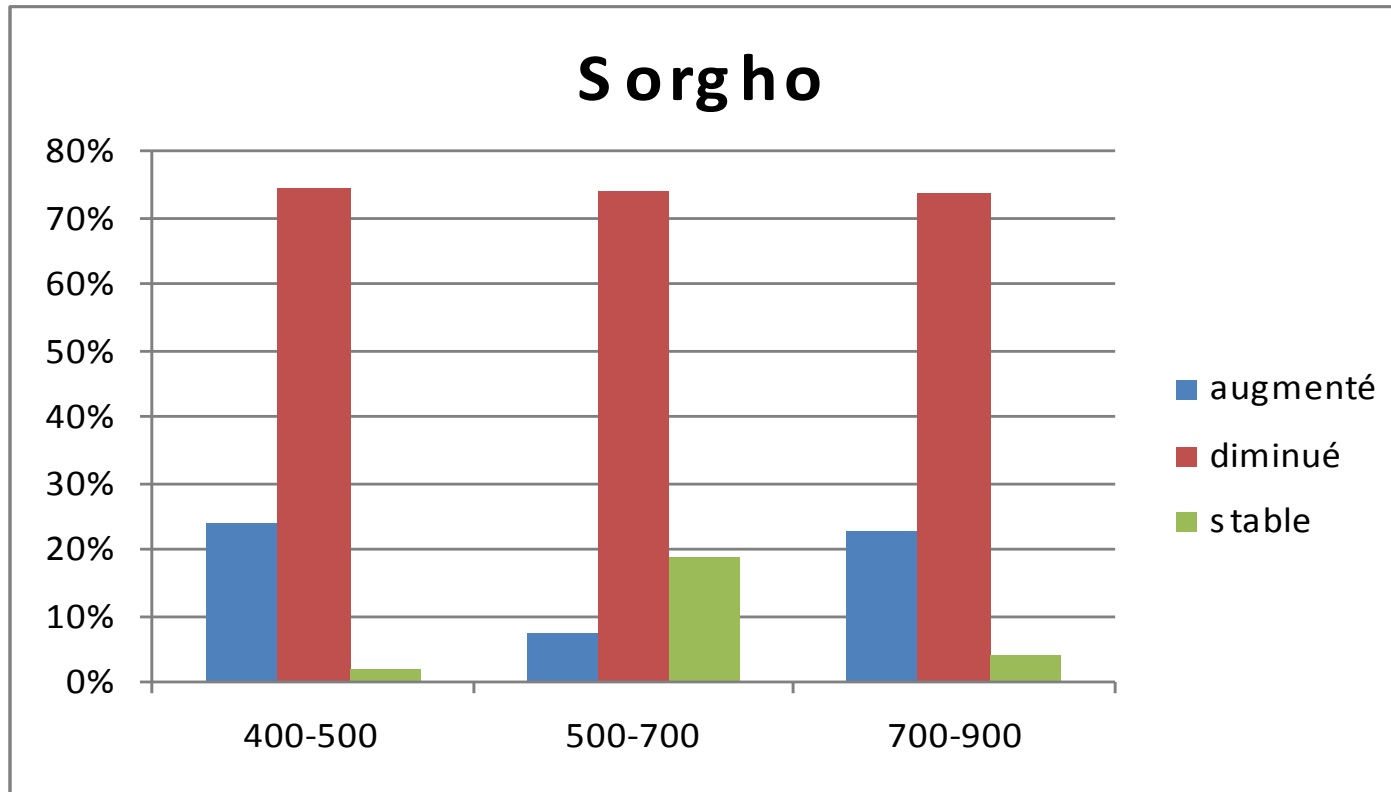
**Seeds access evolution during
the past 20 years.**

Perception of crop yield evolution

The perception of the evolution of the crop yields (millet and sorghum) is generally negative.



Millet yield evolution during the 20 last years



: **Sorghum yield evolution during the 20 last years**

Local strategies of current adaptation

Strategies to improve rural productivity:

- ☐ Choice of new crop varieties.
- ☐ Changing land use,
- ☐ Changing farming techniques and management of soil and water
- ☐ Irrigation practice in dry season

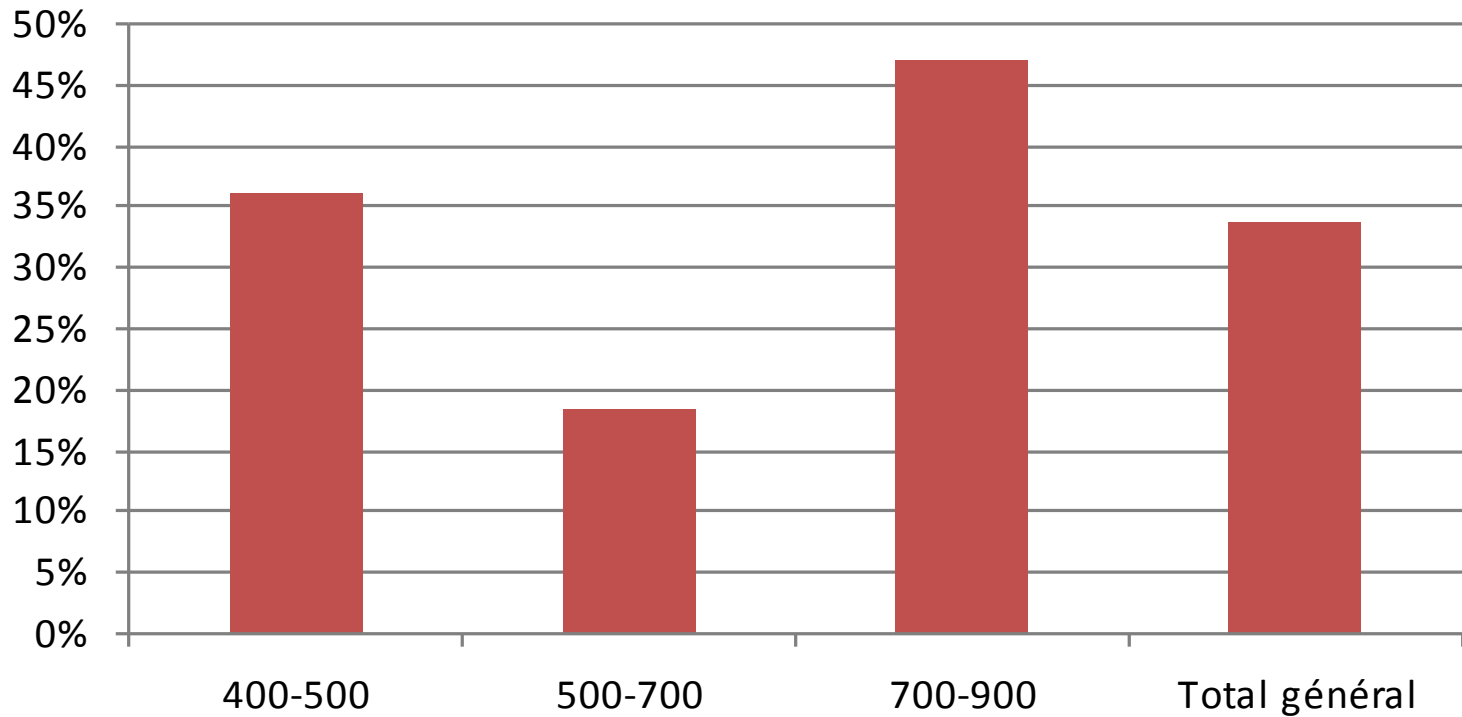
Non-agricultural strategies

- ☐ Trade,
- ☐ Migration,

Generally , choosing an agricultural improvement strategy depends on the rainfall zone.

So, for exemple « choice new seeds » is noted in all zones, but with some differences in magnitude : in the wet zone (700 to 900mm), 47% of respondents chose new varieties. In contrast with few people (only 18%) of the intermediate zone (500-700 mm)

nouvelle variété



New varieties adoption by
farmers

Conclusion

Farmers in the Sudano-Sahelian hold an unfavorable climate and rainfed agriculture in the past 20 years. Adaptation strategies in the actual situation appear to be complex and difficult to document.

In contrast with the past situations (before sixties), actual adaptation is difficult, according the complication induce by general environmental degradation and population augmentation growing In this region, development of better water management techniques (runoff collecting for exemple) is a research need for rainfed agricultural securisation.

THANK YOU