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THE DETERMINANTS OF ADOPTION OF IMPROVED VARIETIES OF SESAME IN NORTHERN BURKINA FASO

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Abstract

In the Northern region of Burkina Faso, the soils degradation and the irregularity of the rainfall patterns have been the major constraints that affect the food security. The stakeholders developed the initiatives aiming to reduce the effects of the climatic changes. In order to integrate the structures of agricultural researches, the objectives were to assess for farmers preferences on improved sesame seeds, to breed for improved varieties adapted to the soil and the climate; to evaluate and select the most ideal sesame variety of Yatenga. A survey has been done on 126 farmers of two rural communes (Barga and Namissiguima) in the province of the Yatenga. The rate of adoption of the improved varieties of sesame is 83.33%. The econometric results have shown that the decisions of adoption of the varieties improved were based on: age, the level of training, the number of workforce and the number of cattle possessed by the household. In a changing climate marked by cycles of season's disturbances, it is more than necessary to promote improved varieties adopted socio-economic conditions of producers focusing on training farmers to use rationally improved varieties taking into account the recommendations of research.

1. INTRODUCTION

In Burkina Faso, the economy is essentially based on agriculture activities that contribute to 35% of the Gross domestic product (GDP). Hence agricultural activities occupied up to 82% of the active population. The main agricultural activity in the northern region is cereals production that are staple food crops for farmers livelihoods. Farmers in the region are still using the basics tools to farm their fields. Since several decades; the country like many countries in the world is submitted to soils erosion. In addition, for several years the economy is being threaten by many constraints (economy and climate change). Therefore, these facts are compromising the future of a whole generation in the Sahel zones. Otherwise, the different drought events and the climatic changes that the country had encompassed had non negligible consequences on the agricultural ecosystems and the average crops yields. This situation resulted in accentuate poverty in the rural area despite of numerous investments achieved by the government, projects and Non-Governmental Organizations. Food security stays a constant preoccupation for the populations of

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the Sahel zones. In this part of the country, farming activities are undertaken during the rainy season and depend on erratic rainfall and soil fertility. The direct consequence is a great decrease in the crops productions. The research of new strategies of crop production that improve and sustain the crops productivities and protect the environment (Rajot *et al.*, 2002) needs to be address. The way chosen by the farmers in the North of the country and notably in the Yatenga, supported by governmental services and NGO is the use of the improved varieties. Even though, after several decades of broadcasting the improved varieties the level of adoption by the farmers is staying very low. The rate of adoption of the seeds varieties at the national level to all seeds is indeed very low 8.4% (Sanou, 2014). The choice of the sesame is not fortuitous in this sense that it is one of the cash crops of the northern region. The rate of auto consumption of the sesame is 48% while the interior demand represents 50 at 52% of the national production (SP/CPSA, 2013)**.** In addition, the contribution of the sesame to the Gross Domestic Product (GDP) is lower to 0,2%. The returns of export of the sesame passed from 6,817 billion in 2008 to 98,898 billion in 2015 in Fcfa (APEX, 2016). In order to sustain the yield and the production of the sesame crops in the Sahel zones, it becomes important to identify the factors of adoption of improved varieties for seek to increase the adoption rate.

The present study aims to identify the factors that influence the adoption of the improved varieties of sesame in two rural municipalities (Barga and Namissiguima), Yatenga province of Burkina Faso. It is in prior, to know the rate of improved seeds adoption, second to reveal the factors that have some impacts on the adoption of the improved varieties of sesame in the province of the Yatenga. The hypotheses of the survey were:

- The rate of adoption of the improved varieties of sesame is lower to 50%
- The level of education has a positive influence on the adoption of the improved varieties of sesame
- The number of possessed cattle positively influences the adoption of improved varieties of sesame.

2. METHODOLOGY

2.1. Description of the study area

Four (4) villages of rural communes of Barga (Lemnogo-Mossi, Ramdolla-Mossi) and of Namissiguima (Bagayalgo and Kononga) in the province of the Yatenga, county seat of the region of the North have been surveyed (figure1). The rural communes of Barga and Namissiguima are submitted to a climate of Sahel type, hot and dry characterized by two (2) seasons: a dry season of October to May and a rainy season of June to September. The length of the rainy season is from one year to the next variable, with the maxima of precipitations recorded between July and August. The soils of these two communes belong to the big family of evolved soils of erosion on gritstones material. The populations of the two rural municipalities according to the data of the General Census of the Population and the dwelling (INSD, 2009), were estimated to 65 223 inhabitants and 52.48% of the population are constituted of women.

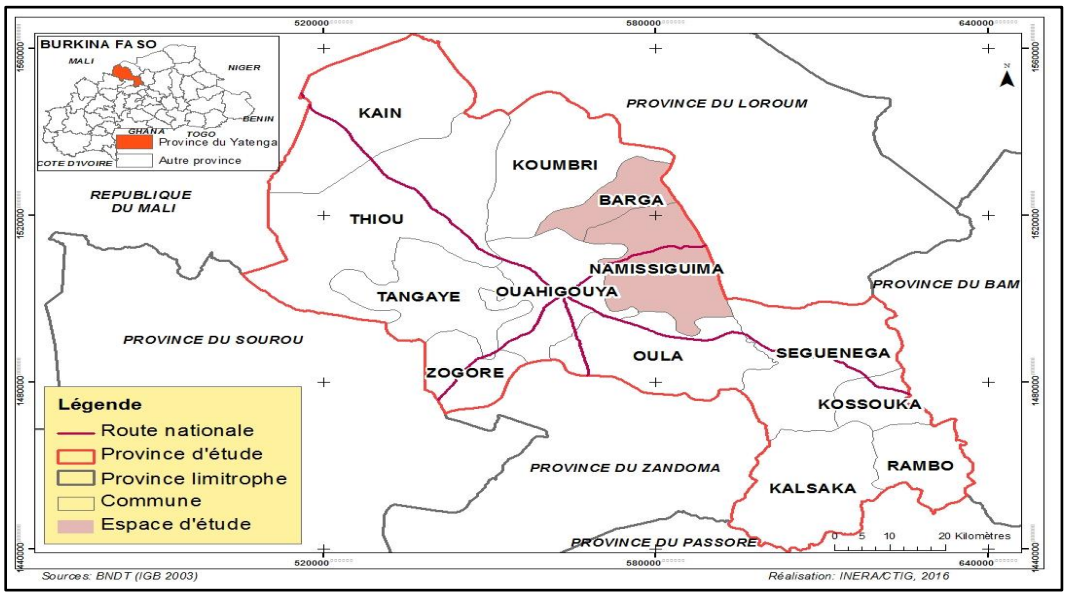

Figure 1: Localization of the survey sites

2.2. Sources of data and methods of data collection

The villages were selected taking into account the level of sesame production and their accessibility. Producers were chosen in a reasoned manner, according to their area of sesame production. Socio-cultural diversity was also taken into account. The approach used in study is a semi-structured individual interview. A questionnaire has been used to assess the views of 126 heads of household in the two rural communes. In two villages Barga commune (Lemnogo and Ramdolla), 62 producers were selected i.e. 31 producers per village. For Namissiguima commune, 64 producers were selected in the two villages (Bagyalogo and Kononga), ie 32 producers per village. In the total sample there was 29 women and 97 men. We used the software SPSS and Stata for the analysis of the data.

2.3. Theoretical framework

The technological innovation makes reference to the action to innovate, that means the introduction of something again as regards to the use, the custom, the belief and the scientific system (Rogers, 2003). It is admitted extensively that the technology can be material or immaterial. The technology also refers to elaborate methods in order to make efficient its use. The diffusion is the manner of which circulates information concerning an innovation. In the setting of a technological innovation product, the objective consists then in carrying the potential consumers to adopt the product. The diffusion will permit to provide information on the new technological product; thereafter, the consumers will determine if they will adopt or no the innovation or the technological product. The adoption of the technologies agricultural relief of a behavior rational of the farmer that grants preference more from the moment it procures him the more of utility (Mounirou, 2015). There are three groups of adoption models: (i) the diffusion of innovation model, (ii) the model of the economic constraints and (iii) the model of innovation adoption. The last model is the one that is the more used. Indeed, according to this model, the features of the technique, in the institutional and socioeconomic context of the production, play a big role in the process of adoption. The model of adoption of the innovations (Adesina & Zinnah, 1992) integrates in more the individual's perception that was very little studied. This definition puts in inscription the features fundamental of the adoption as the intensity, the time passed in the application and the choice rational of the agriculturist. According to the neoclassic theory, the farmers adopt new technologies if they bring them some clean economic advantages (Kabunga *et al.*, 2012). However, it is established that the reason for which the farmers adopt a new technology

goes beyond the neoclassic theory. Numerous studies analyzed the variables that influence the adoption of new technologies in the agricultural sector (Etoundi & Kamgna, 2008; Kini, 2007; Miah *et al.*, 2015). In general, the variables affecting the adoption of a new technology have been classified in three groups that are the human capital, the structural factors and finally the social capital. With regard to the human capital, it is of use to value the effect of age, the sex, the education, the literacy, and of the experience and the agricultural training. Among the structural factors, the size and the income of the households have been analyzed extensively. Finally, some recent studies put the accent on the effects of the access to the social networks on the perception of a new technology by the farmers and their consequences on the process of adoption. In the econometric literature, three models have frequently been used to analyze the adoption of the new technologies: the models with linear probability, the logistical function (Logit) and finally the functions with normal density (probit). These models use some variables to binary choice as dependent variable. Of these three models, the model logit is the more used. Indeed, the objective of our study was to specify the behavior of the farmers facing the improved varieties while identifying the factors that influence its adoption, under the shape of a probability. To reach this objective, we opted for a modeling the Logit, facilitating the handling of the results (Hurlin, 2003; Bourbonnais, 2011; Duguet, 2008; Jacquot, 2000). Indeed, two properties make the interest of the logistical distribution function in the modeling of the discreet choices. It is notably about its interval that cuts down to [0, 1] and of the possibility to be linearize by a logarithmic transformation. In this model, one defines a variable y* as follows:

$$y_i^* = \alpha + X_i\beta + \varepsilon_i$$

where y_i^* represents the profit or the interest withdrawn by the farmer of his engagement in the use of the improved varieties of sesame; xi is a variable that can influence the practice; β the coefficients associate to the different variable of the model and ε_i the mistake associated to the variable. The variable yi* not being observable, it is necessary to generate an observable variable expressing the use of the varieties improved of sesame by the farmers:

y = 1 si y* > 0 et y = 0 si y* ≤ 0. The regression of the model logit characterizing the adoption by a sample of farmers is specified as following (Hurlin, 2003; Bourbonnais, 2011; Duguet, 2008; Jacquot, 2000).

$$p_i = E(y_i) = F(\alpha + X_i\beta) = \frac{1}{1 + e^{-(\alpha + X_i\beta)}}$$

where does the "*i*" index indicate the i^{th} observation in the sample, p_i is the probability that an individual face a choice given *yi*, *e* is the basis of the natural logarithm , x_i is a vector of the exogenous variables, α is a constant and β_i is coefficients associated to every variable explanatory X_i to estimate. A positive coefficient means that the probability increases with the growth of corresponding independent variable. The coefficients α and β in the logistical regression are estimated while using the Method of maximum likelihood. The table 1 explain the variables used in the model. The decision to adopt the improved varieties depends on several factors:

2.3.1. Age of the household head

It is the number of years of the household head. It is expected that age has a positive effect on the adoption of the improved varieties of sesame.

2.3.2. Level of education

It is a binary variable, takes the value 1 if the farmer is at least alphabetized and 0 otherwise. The level of instruction in theory plays positively on the adoption of the technologies insofar as one says itself that the one that is instructed is opened more to the change. It is a very determinant factor in the adoption of the technologies. It increases the level of understanding and the faculty to apply and to distribute the instructions of the extension services.

2.3.3. Training

It is a binary variable that takes the value 1 if the farmer has been trained in the use of improved varieties of sesame and otherwise its value is 0. The training on the use of the improved varieties allows the farmer to be illuminated and to choose the best varieties as well to apply the recommendations on the technical itineraries. Therefore the trained farmers are more capable to adopt the improved varieties than those untrained one. It is waited of the training a positive effect on the adoption of the improved varieties of sesame. It is often admitted that the individuals having been trained on an innovation have tendency generally to adopt it. improved varieties

2.3.4. Number of workforce on farm

This variable refers to the total number of workforce in the household. The number of workforce is often mentioned like an essential variable in the adoption of new technologies (Adéoti *et al.*, 2002). The number of workforce of the household constitutes the main strength of work. The variable numbers of workforce is bound positively to the adoption of the new technologies. It is expected a positive sign of this variable on the adoption of the sesame varieties.

2.3.5. The membership to an organization of farmers

It is a binary variable that takes the value 1 if the individual belongs to an organization of farmers and otherwise the value 0. The members of the farmers' organizations often receive multiform supports and it can contribute to the adoption of the improved varieties of sesame. A positive effect of this variable is expected on the adoption of the varieties improved of sesame (Etoundi and Kamgna, 2008).

2.3.6. Plot size

This variable is expressed in hectare. It is demonstrated that the grown area of a crop is negatively correlated to the probability of improved varieties adoption. The reason is that more the crop plot is big, more a few more of money is necessary to acquire seeds. Therefore, it is expected a negative sign of this variable on the adoption of the improved varieties of sesame.

2.3.7. Gardening in dry season

It is a binary variable taking the value 1 if the farmer leads an activity of gardening in the dry season and otherwise the value 0. One expects what those that practice the gardening are more minded to adopt the improved varieties because of this other source of income during the dry season.

2.3.8. The number of small ruminants

The number of small ruminants possessed: The possession of small ruminants allows the household to produce manure for fields fertilization and as source of income. In addition, selling the small ruminants is a great source of income for the farmer. The households possessing more small ruminants will be arranged more to invest in the purchase of improved seeds than the others. It is waited of this variable a positive effect on the adoption of the improved varieties of sesame.

2.3.9. The number of cattle

According to Randrianarison (2001), a large size of the livestock also associates to a bigger probability to adopt the soils water conservation techniques. Indeed, the livestock not only constitutes a wealth for the household, but also constitutes an animal traction availability. A richer household is more motivated to adopt improved varieties of sesame and it is expected a positive effect of this variable on the adoption of the improved varieties of sesame.

2.3.10. Having a radio set

It is a binary variable that takes the value 1 if the farmer possesses a radio set and 0, otherwise. It is waited that this variable acts positively on the adoption of improved varieties of sesame. The fact of having a radio set is an opening door to information's and notably on the innovations.

2.3.11. Number of meal per day

It is a quantitative variable that indicates the level of food vulnerability of the household. More the number of meal per day in the household increases, more the household is less nutritionally vulnerable.

2.3.12. Mastering of technical itinerary of the improved varieties

It is a binary variable that takes the value 1 if the farmer is on ease with the improved varieties technical itinerary and 0, otherwise. One expects that the ease with technical itinerary of the improved variety of sesame has a positive effect on its adoption.

Table1: List of the variables of the model and the awaited signs of the parameters

Variables	Type of variables	Description	
Adoption	Qualitative	Varying 1 in case of adoption of improved varieties of sesame and 0 if not.	
Explanatory variables of the model			Sign expected
Age	Quantitative	Age of the household head	Positive
Level of education:	Qualitative	Level of education of the farmer : 1 educated, 0 non-educated	Positive
Training	Qualitative	Training on the use of improved varieties of cowpea. 1if yes, and 0 if no	Positive
Number of workforce on farm	Quantitative	Number of persons working in the farm	Positive
The membership to an organization of farmers	Qualitative	Member of farmer group	Positive
Plot size	Quantitative	Number of hectare	Negative
gardening activity	Qualitative	Run gardening during the dry season. 1 if yes, and 0 if no	Positive
The number of small ruminants	Quantitative	Number of farmer's small ruminants	Positive
The number of cattle :	Quantitative	Number of farmer's cattle	Positive
Having a radio set	Qualitative	Having a radio set. 1 if yes and 0 if no	Positive
Number of meal per day	Quantitative	Number of meal per day	Positive
Mastering of technical itinerary of the improved varieties	Qualitative	Ease of seed improved mastery 1 if ease and 0 if not	Positive

3. RESULTS AND DISCUSSION

3.1. Descriptive results of continuous variables

The average age of the farmers who adopted and who have not adopted the sesame improved varieties is 46.78 years and 42.86 years, respectively. Then, the most aged farmers are those who merely adopt the improved varieties of sesame? The average number of workforce household where improved varieties are not adopted is of 5.33 which is superior to workforce number (5.01) in household that adopted the new varieties. So, farmers don't adopt the improved varieties when they have enough de workforce. The average of plot size of the farmers who have adopted the improved seed is of 0.365 hectares that are slightly superior to the one of the farmers who don't adopt the seed improved sesame that is of 0.27 hectare. This means that farmers who grow sesame on big plots tend to adopt the improved varieties in contrast of those that grow sesame on small plots. The average number of small ruminants in household that adopted the improved varieties (6.63) is extensively higher compared to the one of household that do not adopt (3.52). The average number of cattle of the farmers who adopted the improved seed (1.09) is similar to the one of the farmers who did not adopt the improved seeds (1.14). The average number of meal per day

of the farmers who adopted the improved seed (2.55) is equal to the one of the farmers who did not adopt (2.57) as indicated in the table 2. Improved varieties

Table 2: Some quantitative socio-economic characteristics according to the statute of adoption

Characteristics	Farmers having adopted the improved varieties sesame			Farmers who did not adopt the improved varieties sesame		
	Moyenne	Minimum	Maximum	Moyenne	Minimum	Maximum
Age	46.78	23	73	42.86	20	65
Number of workforce	5.01	1	10	5.33	1	15
Plot size	0.365	0.1	2	0.27	0.10	1
Number of small ruminants	6.63	0	200	3.52	0	17
Number of cattle	1.09	0	10	1.14	0	9
Number of meal per day	2.55	1	3	2.57	2	3

3.2. Descriptive results of dummy variables

The table 3 shows that on the set of the men of the sample, 85.6% among them adopted the improved varieties of sesame against 14.4% among them that didn't adopt them. That shows the adoption of the varieties improved is incumbent more upon the men that to the women. This situation consists of itself by the fact of the sociological weights that banishes the women to the second plan concerning decision making and access to information. Indeed 75.9% of the women of the sample adopted against 24.1% that didn't adopt them.

The level of education is in general a key factor concerning adoption of the technologies and of the improved varieties in particular. Indeed 87.3% of the educated adopted the improved varieties against only 12.7% of the educated that didn't adopt them. 80.3% of the non-educated adopted the improved varieties against 19.7% that didn't adopt them.

The farmers having received some trainings in the use of the improved varieties, merely adopt improved varieties (94.3%) compared to non-trained one (5.7%). The training is a key element in the adoption of the innovations. 85.7% of the members of the farmers organizations adopted the improved varieties and 88% of those who practice gardening activities during in the dry season adopted the improved varieties of sesame. 85.7% of farmers who own a radio set adopted the improved varieties of sesame.

Table 3: Some qualitative socio-economic features of the sesame farmers according to the statute of adoption

Qualitative socio-economic characteristics		Famers having adopted improved seed sesame	Farmers who did not adopt improved sesame seed
Sex	Male (%)	85.6	14.4
	Female (%)	75.9	24.1
Level of education	Educated (%)	87.3	12.7
	No educated (%)	80.3	19.7
Training	Trained (%)	94.3	5.7
	No trained (%)	79.1	20.9
Member of farmer group	Yes (%)	85.7	14.3
	No (%)	80.4	19.6
Gardening activity	Yes (%)	88	12
	No (%)	80.3	19.7
Having a radio set	Yes (%)	85.7	14.3

	No (%)	75	25
Mastering of technical itinerary	Yes (%)	84.7	15.3
of the improved varieties	No (%)	62.5	37.5

Source: Own calculations.

3.3. Rate of adoption of the improved varieties improved varieties of sesame

The adoption rate is the ratio between the producers who have adopted improved varieties of sesame and the entire user population surveyed. The rate of adoption depends on several factors. On a sample of 126 farmers investigated 105 adopted the improved varieties of sesame giving a rate of 83.33%. While extrapolating, it can said that 83.33% of the farmers of the two rural municipalities use the improved varieties of sesame. The data don't allow us to estimate the extent of the adoption.

3.4. Factors of adoption of the improved varieties of sesame

The econometric model with the binary logit permitted to estimate the influence of the variables on the probability to adopt the improved varieties of sesame. The assessment of the model through the maximum likelihood method and the level of adequacy shows that the evaluations are globally meaningful for the model as the shows the table 4. Indeed the Log likelihood is -47.31 and the model is meaningful to 10% (Prob.> chi2=0.0632). The numeric value of the coefficients of the logit model having not a direct interpretation, it is rather the signs of the coefficients that indicate the effect of every explanatory variable on the explained variable. The effect of the explanatory variables on the probability to adopt the improved varieties of sesame is appreciated through the calculation of the marginal effects.

Four variables influence the probability of adoption of the improved varieties of sesame. Age, the training to the use of the improved varieties, the number of workforce and the number of cattle possessed by the household. Age of the household head and the training act positively on the adoption of the improved varieties of sesame while the number of workforce and the number of cattle act negatively on the adoption of the improved varieties of sesame. Variable age acts positively on the adoption of the varieties improved of sesame. Indeed, more one is aged, more one adopts the improved varieties of sesame, it understands itself in the measure with age one ends up trying several improved varieties and by finishing to keep those that are effective. The young men not having an experience again prefer to use the local seeds. Age could be an indication that the more farmers aged have more resources in relation to the young farmers, because they worked a long time and accumulated resources sufficiently. The analysis of the effects marginal watch that the fact to be aged driven a growth of the probability of adoption of the improved varieties of sesame of 0.006 point. This result is similar to the one found in Tanzania (Beyene & Kassie, 2015) to the doorstep of 1% for the maize, to Nigeria for the cowpea to the doorstep of 5% (Adéoti *et al.,* 2002), in Ethiopia to the doorstep of 10% for the stones lines (Aklilu & Jan, 2007) in Centrafrique for rice to the doorstep of 1% (Bessane-Mbetid, 2014), to Cameroon for the maize to the doorstep of 5% (Etoundi and Kamgna, 2008), to Nepal to the doorstep of 10% for the adoption of the potato (Kafle & Shah, 2012). This result is also in conformity with the one found in Zambia (Kaliba *et al.,* 2000) for the adoption of improved varieties of maize in the doorstep of 1%.

This result is invalidated however in Ghana for the maize in the doorstep of 5% (Hussein *et al.,* 2015), to Malawi for the maize to the doorstep of 5% (Sanou, 2014), to Cameroon to the doorstep of 5% for the soil water conservations techniques (Ngondjeb *et al.,* 2011) and to the Northern of Benin for the folio to the doorstep of 1%.

The training in the use of the improved varieties acts positively on the adoption of the improved varieties of the sesame. It means that the one that is trained is reinforced in capacity. The analysis of the marginal effects watch that the fact to be trained to the use of the improved varieties of sesame deludes the probability to adopt the improved varieties of 0.104 point. These results are in conformity with those found in Burkina for the adoption of the stones lines in the doorstep of 5% (Kinané *et al.*, 2007) and to Benin where the training acts positively on the adoption of the struggle stacked targeted to the doorstep of 1% (Kpadé & Mensah, 2013). However to Burkina, it has been found that the training influenced negatively the adoption of the technical water and soil conservation (Kinané *et al.*, 2007).

Two variables are correlated negatively to the adoption of the improved varieties of sesame; it is about the number of workforce and the number of cattle.

The number of workforce has a negative impact on the adoption of the improved varieties of sesame in so far as the culture of the sesame is not demanding in workforce. The number of workforce acts negatively on the adoption of the improved varieties of sesame; it means the household that has fewer workforces adopts the improved varieties of sesame. In other words the household that has more of workforces made not resorts to the improved varieties because having a lot of strength of work. The analysis of the effects marginal watch that the number of workforce in the household decreases the probability to adopt the improved varieties of 0.023 point. This result is contrary to what has been found in Ivory Coast for the adoption of the improved varieties of rice (NDE-ATSE, 2007), to Cameroon on the adoption of technical water and soil conservation (Ngondjeb *et al.*, 2011). Indeed, it has been found respectively that the number of workforce encouraged the adoption positively in the doorstep of 10%. It means that the households having more workforce adopt the techniques of conservation of waters and soils more because their realization requires a strong mobilization of the workforces (Ngondjeb *et al.*, 2011). To the north of Benin, of the authors (Paraïso *et al.*, 2016) found that the number of workforce influence positively the cultivation of the fonio to the doorstep of 10%.

The variable number of cattle is also correlated negatively to the adoption of the improved varieties of sesame. It can explain itself by the fact that more one has cattle more one is rich and one has enough manure to apply on the plots and less one is interested in the improved varieties of sesame. This result is in conformity with those found in Ethiopia to the doorstep of 1%, indeed the number of livestock acts negatively on the adoption of the stone lines (Aklilu & Jan, 2007) for the adoption of fertilizer to the doorstep of 1% (Asfaw & Admassie, 2004).

This result is invalidated however by the one found in Ethiopia for the adoption of the improved varieties of maize in the doorstep of 5% (Yishak and Punjabi, 2011), in the center of Nepal for the adoption of improved varieties of rice in the doorstep of 5% (Ghimine *et al.*, 2015), in Zambia to the doorstep of 5% for the adoption of improved varieties of maize. It is some in the same way to Nepal for the adoption of the potato in the doorstep of 10% (Kafle & Shah, 2012).

The number of cattle acts negatively on the adoption of the improved varieties of sesame it wants to say the household who has not enough the cattle adopts the improved varieties of sesame because conscious that the workforce, the generated incomes as well as manure is limited. The analysis of the marginal effects watches that the number of cattle in the household decreases the probability to adopt the improved varieties of sesame of 0.023 point.

Some previous studies showed results contradictory of the age effect however on the adoption of improved varieties. Some studies (Hussein *et al.*, 2015; Alene & Mwalughali, 2012) showed that age had a negative effect on the adoption of the improved varieties whereas (Kaliba *et al.*, 2000; Adesina & Zinnah, 1993) showed a strong positive correlation between age and the adoption of the agricultural technologies.

The number of cattle possessed acts negatively on the adoption of the improved varieties; this result invalidates several previous studies in this sense that the number of cattle is an approximation of the farmer's wealth and should permit them to reach and to buy the improved varieties. The farmers who possess lot of cattle should also have the ability to face the risks bound to the use of a technology. Some crop residues are used like feed for the animals and the farmers use the manure descended of the cattle also to fertilize soils. Some authors (Njane, 2007; Aklilu & Jan, 2007) found that the ownership of cattle can influence the adoption of the technologies. The hypothesis that stipulates that the ownership of cattle is determining in the adoption of the improved varieties is invalidated. Indeed the number of cattle influence negatively on the adoption of the improved varieties of sesame. The probabilities of adoption of the seed improved are weak if the farmers don't pull a short-term profit of it. The main objective of the farmers of the Northern Burkina is to achieve food security.

Table 4: Econometric results of the factors of adoption of the improved varieties of sesame of the model logit

Variables	Seed improved sesame		
	Coefficients	Marginal effect	Probabilities
Age	0.069	0.006	0.077*
Level of education	0.356	0.033	0.494
Training to use the improved seed	1.379	0.104	0.063*
Number of workforce	-0.25	-0.023	0.037**
Plot size	1.227	0.114	0.188
Adherence to group farmer	-0.227	-0.021	0.715
Gardening activity	0.602	0.054	0.333
Number of small ruminants possessed	-0.246	-0.023	0.098*
Number of cattle possessed	0.068	0.006	0.207
Having a radio set	0.92	0,088	0.21
Number of meal per day	-0.783	-0.073	0.175
Mastering of technical itinerary of the improved varieties	1.177	0.162	0.138
Constant	-0.727		0.708
	Number of obs.:		126
	Wald chi2(12):		20.21
Logistic regression	Prob > chi2:		0.0632
	Pseudo R2:		0.1667
	Log pseudo likelihood:		-47.31
	Correctly classified:		80.95%

*** Significant at 1%; ** Significant at 5%; * Significant at 10%

Source: Own calculations.

4. CONCLUSION AND RECOMMENDATIONS

The rate of adoption of the improved varieties of sesame is 83.33% in the two surveyed rural zones. This rate is superior to 50%. The analysis of the econometric results find the right term shows that four factors influence the probability of adoption of the improved varieties of sesame. These variables are: age, the training to the use of the improved varieties the number of workforces and the number of cattle possessed by the household. The results also confirmed that more the farmer has cattle, less he is arranged to adopt the improved varieties of sesame. The results of this study are useful in strategies or interventions that will contribute to increasing the design of improved varieties of sesame extension policies among small farmers. In a changing climate marked by cycles of season’s disturbances, it is more than necessary to promote improved

varieties adopted socio-economic conditions of producers through training, educating and supporting them in raising cattle.

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