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Socio-economic Analysis of the place and use of Agricultural Chemical inputs in Rural Vegetable Production: North Bafou Area Case

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Abstract— *This study aims at analysing the place of chemical inputs in agricultural activities in rural areas, especially in Northen Bafou, in Nkong – Ni subdivision. It assesses the impact of agricultural chemical inputs such as fertilisers, herbicides, insecticides, fungicides and nematicides on Northen Bafou vegetable producers' works. To this end, we identified the supply mechanisms for chemical inputs used in agriculture. We assessed the compliance with operating instructions for their use and, we examined the follow-up framework for producers in the use of those products. Our study population consists of 42 vegetable producers, divided into seven groups, i.e. six (6) producers per village, as the survey was conducted in the seven (7) villages of the study zone, regarding questionnaires. As for group interviews, we conducted seven (7) group interviews in the seven villages. We found that 67.5% of producers don't keep the prescribed doses of chemical inputs. They affirm that chemical inputs improve yields, even if they feel various discomforts such as breathing difficulties, hands itching, eyelids palpitations, dizziness, nausea and vomiting after using the said products. With regard to monitoring producers in the use of chemical inputs, only 5% benefited from training and seminars.*

Keywords— agriculture, exploitation, chemical input, rural environment, harvest.

I. INTRODUCTION

Global agriculture, gradually changing, is increasingly impacted by external forces beyond the sole agricultural sector. It would be impossible to relate here the history of global agriculture evolutions and changes. Nevertheless, it is recognised that, part of challenges faced by agriculture mainly depend on the great roles of advisory and extension agricultural services which put together agricultural research, farmers and rural communities in order to ensure a large dissemination of knowledge, information and technologies. Efforts made by some countries improved their agricultural production and food security. The objective was to leave traditional agriculture, characterized by a low trade volume, for an agriculture highly integrated in the economy as a whole. Then, farm advisory and extension services were considered as factors likely to foment the increase of agricultural productivity (Yann DESJEUX, 2009).

Cameroon has a great agro-ecological diversity, very useful for a wide and various agricultural production (OECD, 2008). Vegetable and crops are an important part of this production. Produced in rural areas by farmers, they play a significant social and economic role. (Ernest NGUITA, 2012).

In order to meet consumer market requirements, farmers have to provide very high quality vegetables. To meet required standards and raise economically viable levels of crops, they need to use many pest control products to fight against weeds, pests or fungal diseases. Obviously, those products are very often necessary to meet production targets, but, it is important to recall that pesticides are toxics, needing rational and safely use (Samuel ONIL and Saint – Laurent LOUIS, 2001).

Agriculture is the very first global economy primary sector. Very diversified, it includes different types, as vegetables, food crops, cash crops. This study, carried out in Northen Bafou, Nkong – Ni subdivision, Menoua division,

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the West Region of Cameroon, focusses on vegetable culture. In the market gardening is the population main activity. However, during production, crops are subjected to several treatments, as chemical inputs such as fertilisers (enrichment, soil improvers) and crop protection products. It is clear that using these chemical inputs on crops is being considered indispensable for cost effective good quality production (as regards the crop size).

Population growth increases food demand, which can only be met by intensifying agricultural activity (Milleville and Serpantié, 1994). Population growth does not always mean arable land increase. Therefore, agricultural intensification pressurises ecosystem, which then, leads to a decrease in soil fertility (Laurence, 1998). Given that, the soil is not inexhaustible, it seems necessary to consider new management methods that make possible rational and sustainable exploitation of land (Manlay, 2000). This sustainable management of soil means that extraction must be compensated by inputs, so that the dynamic balance can be maintained. Various methods contribute to this sustainability: fallow, use of agricultural inputs, rotation or crops alternations, etc. These methods involve different considerations and conditions depending on economics, technology and areas.

II. METHODOLOGY

To carry out this research, we used two (02) data collection methods, namely the qualitative method and the quantitative method. Indeed, qualitative research is a research method that puts author both at the origin and at the centre of research. For Muchielli (1996, p. 11), in qualitative research, actor occupies the most important place. The qualitative approach helped in the multilevel analysis of agricultural risk management and the foundations it is based on.

Quantitative approaches, like surveys, insist on the number of respondents, and the possibility of generalising and extending the findings to wider populations. The main tool of the quantitative method is the questionnaire.

Sampling Method

The sampling method used in this research is the purposive samples for vegetable growers. This is because, we already know that people to meet here are involved in vegetable production. This was possible thanks to guides met in our survey area.

The Study Population

Our study population consists of 42 vegetable producers, divided into seven groups, i.e. six (6) producers per village, as the survey was conducted in the seven (7) villages, as far as questionnaires. As for group interviews, we conducted seven (7) group interviews in the seven villages.

Collection tools

- **The interview guide**
- **The questionnaire**

Data analysis tools

Prior to analysing data, we transcribed data collected in the field during interviews, given that data recording could not be carried out only manually, we used a phone device to vocally record data.

Data Transcription

Transcription is the written format of data vocally recorded. It is preceded by a header bearing the respondent's name, date and place of the interview. The transcription is entire, given that, if summarized, some details can be forgotten. At the end of each interview transcription, were added any comments written in the notebook, during the interview. Those data were manually processed, assigning codes to each category of answers, useful for this research.

Data Analysis

For the analysis of quantitative collected data, we used SPSS (Statistical Package for Social Science, version 20.0) software. This analysis tool helps us to obtain diagrams and tables showing variations observed.

Data collection on the field was followed by a transcription of interviews, observation and other notes, in order to create a database. The interpretation of this data was done through an analysis method, namely the content analysis which can be described as a set of texts analysis developed to deal with non-quantifiable answers. It is also an analysis of the meaning, a way or a system of perceptions, representations of things and facts.

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III. FINDINGS AND DISCUSSIONS

Table 1: inputs used by vegetable producers

Inputs used	Frequency of input use	Percentage of input use	Cumulative percentage of input use
Fertilisers	6	15.0	15.0
Fertilisers + Insecticides	4	10.0	25.0
Fertilisers + Fungicides	1	2,5	27,5
Fertilisers + Insecticides + Nematicides	4	10,0	37,5
Fertilizers + Fungicides + Insecticides	2	5,0	42,5
Urea	1	2.5	45.0
Fertilisers + Insecticides + Nematicides + Urea	9	22,5	67,5
It changes every 6 months	3	7.5	75.0
Fungicides + Nematicides + Herbicides + Fertilisers	10	25.0	100.0
Total	40	100.0	

The findings show that there is a wide variety of these products on the market. They also show that NPK capacity in fertilisers are constantly seriously questioned as declared a respondent: '*all information written on the fertiliser bags, relative to NPK, is false'*. This leads to a new phenomenon: mixing of several chemical inputs by the producers, in order to face poor results and improve efficiency. The table shows that 25% of producers use almost all the inputs vegetable crops needed for a good growth. It is almost impossible for producers in our survey area to reach their objective without different inputs, given that each input has its particularity in vegetable production.

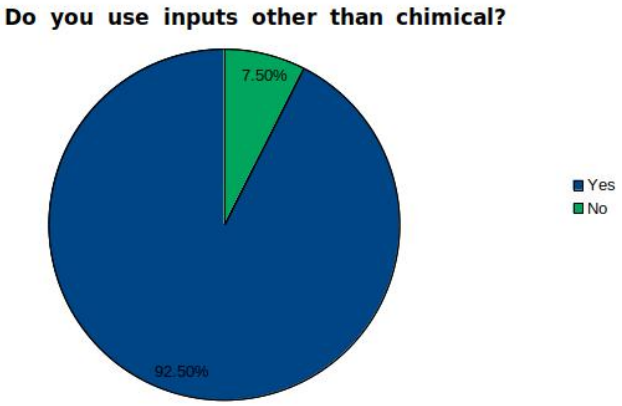

Fig.1: Non-chemical inputs used by vegetable producers

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The problem with these non-chemical inputs is that they are scarce. The above figure shows that 92.5% of producers do not use other non-chemical inputs apart from ashes, compost, droppings and kitchen waste in vegetable production. This is because of the high cost of these inputs.

According to our results, before the popularisation of agricultural chemical inputs, the farmers used more organic one to fertilise soil and fight pests. In addition, they practised fallow. But, they more focused on subsistence farming, selling just a tiny part of their production to satisfy other needs. Nowadays, in order to create a job, farmers embark on conventional agriculture, which involves an important use of chemical inputs. This difference is due to the volume of input which can only be applied in small area farm located near dwellings, around the house. Manlay (2000) reported similar results in Senegal. Only farms very close to home, showed better organic soil compared to that of the bush fields, because these one are far from dwellings.

It's worth note that some producers use rabbit urine, a very powerful nematicide and fertiliser. But with wide plots, it is difficult to provide enough quantity of rabbit urine.

Development consists on leaving low to higher standard of living. Therefore, for social emergence, farmers seek new ways to improve their standard of living. Farmers on the southern side gave up defeatism facing poverty and are dedicated to agriculture in order to meet their needs and improve their economic situation. Good harvests grant a deserve consideration to farmers. As a popular saying goes, if money does not necessarily mean happiness, there is no happiness without money. It is therefore undeniable that earned money gives a social consideration. Economic status going hand in hand with social status, farmers are increasing their efforts to achieve a great one. Money from vegetable sales allows them to acquire material for both large farms and farms near home. As Maslow (1970) says, this allows them to meet their needs for affiliation. Field surveys demonstrate appropriation and social change of farmers thanks to incomes from their activity.

Some farmers use chemical inputs in all stages of production, depending on vegetable needs. But not all producers use inputs at all stages of the production. Some only use them, if there are attacks. In fact 72.5% of producers use inputs at all stages of production. 15% do not use them at all stages and 12.5% use them only if there are attacks. The use of inputs at all stages of production differs depending on farmer needs and expectations. Nevertheless, the first aim of inputs remains: boost of production; improve yields and avoid surprises that may slow down production. All stages of production are important. Note that each stage has its needs. That is why Samuel Onil and Louis Saint-Laurent (2001) say about yield improvement, in order to meet demands of the consumer market, vegetable farmers shall produce very large quantity of vegetables. To reach required standards and viable production levels, they use numerous pest control products to fight against crop attacks.

Vegetable crops are offs season crops produced the year round. These are very delicate crops that require several treatments during their production cycle. After harvest, they should be immediately marketed and consumed because they are easily perishable products. They require rapid disposal. Therefore, farmer should not produce and boost production, but also market the products. If the vegetables are quickly sold, the farmer can carry out several agricultural campaigns and optimise his outcomes. Farmers who own several plots produce different speculations depending on each plot. Directly after the harvest of an agricultural speculation, another speculation of the same family cannot be produced on the same plot. It is necessary to produce a different family speculation to avoid contamination that would cause crop destruction. Besides the use of these inputs, as we said, it is necessary, according to the results, to make crop rotations which consists on an interruption of crops in order to increase biomass; useful to fertilise soil and reduce diseases related to same family crops.

In order to limit post-harvest losses, farmers practise mass production. In other words, they sew speculations in series. We can observe between two or three-week intervals on the same production plot. This production strategy allows them to prevent all production from reaching maturity at the same time. The more the products are sold, the more agricultural seasons are.

Concerning information on inputs supply and use, producers get them in several ways: pears, 25%; neighbours, 27.5%; family members, 12.5%; friends 7.5; advertising 7.5; input sellers, 12.5; agricultural extension workers (agricultural postmaster, AVZ); 2.5%, through seminars and training, 5%. Analysis shows that the majority of producers, depending on their age group, buy and use inputs copying their neighbours. We note that producers barely attend seminars or

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training. The highest education level of the majority of them is the primary school. Agricultural inputs (which are toxic) in the hand of those farmers (very often with low education level and without training, just seeing others do so), can cause critical environmental and health (producer and consumer) damages. Although, these crops can be eaten raw. Women, less dedicated to vegetable production, get less information on use of inputs, than men. Obtaining information rate is 67.5% among men and 32.5% among women.

Results show that producers firmly state that 'their lives are based on agriculture; and agriculture they currently practise entirely depends on chemical inputs'. Moreover, result shows that all Northern Bafou farmers use chemical inputs at all stages of vegetable production, in order to fertilise soil, fight against weeds and destroy parasites. The aim is to boost and have good incomes. The qualitative aspects of products coming from the use of chemical inputs are more oriented towards the market. In fact, these crops are bigger, more beautiful and then easy to sell. But most of farmers say that, most often, the tastes of those crops is different from the ones of crops with organic inputs. According to all the respondents (100%), chemical fertilisers increase yields. The majority of farmers state they can also produce organic fertilisers, but it is insufficient to yield good incomes. So this makes it almost impossible. 80% of vegetable farmers claim that they could use organic inputs, but their scarcity, the difficulty of having great quantities make it impossible, especially for large plots, intended for the market. They admit that it can only be possible for subsistence farming; 20% do not share this point of view.

Results also show an excessive use of fungicides during the rainy season; an excessive use of insecticides during the dry season. This is because of excess water during the rainy season, which is not favourable for plants, given that it can cause fruit rot. Thank to regular presence of water during the rainy season, insects' pressure is down. For this reason, insecticides are less used in this season. In contrast, during the dry season fungicides are less used and insecticides are more used because during this season there are many insects due to lack of water. These insects eat and destroy plants. It is an obstacle for a good growth of plants. Therefore, farmers use insecticides. 90% of producers report using agricultural chemical inputs during both seasons; 67.5% report using more chemical inputs during the rainy season.

However, it worth notice that off-season farming requires more intense work due to water scarcity given that, in the dry season, farmers water plants by means of irrigation. Water mobilisation for agricultural purposes during the dry season is intensification and revitalisation factor of agriculture in the slope. During this season, due to great demand and use, water becomes a very coveted resource. As limited resources, its role in agricultural production increases. It is obviously a renewable resource. But its availability fluctuates and leads to uncertainty which creates conflicts. Since advent of off-season cultivation, water plays a real role as a means of agricultural production. Though, irrigated agriculture is a response to the economic crisis and poverty, which leads farmers to seek alternative sources of incomes.

As interviews show, agricultural chemical inputs are so common and numerous on the market. Therefore the quality of all these inputs should be questioned. As for prices, on the market, there are inputs for all prices, more or less effective. Therefore the legality of such chemical inputs trade. Input prices increase over time. Profits in the agricultural sector depend on prices. Farmers practise input overdose under the pretext that they follow recommendations stated on the label. Therefore, they increase doses for sufficient quantities to sell and make a profit. This results from the fact that agricultural lands are leased and must be exploited to the maximum before the end of the contracts.

We note that farmers, even when overdosing inputs, also consume their crops. Some of them recognise their addiction to chemical inputs, but they also affirm that these inputs have a lot to do with the decline in their health. During field work, we observe that farmers base the inputs' quality on its market prices. In fact they think 'the higher the price, more efficient it is'. The choice of inputs on the market depends on several factors: sellers, price, rental period of land, usage by their colleagues. The table also shows that chemical inputs are always available on the market. 92.5% of vegetal farmers report that inputs' stock shortage on the market never occurs, except for prohibited products.

As for the harvest, vegetable producers immediately sell their harvested products, given that they are easily perishable products. Some products even sold before harvesting. Parts of their harvest is intended for family consumption; at time for donations.

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Some farmers report that they might do without chemical inputs; but just for family consumption and on a very small area. But, on large production areas and for market targets, it should be necessary to use chemical inputs for a good yield, for aesthetic; and especially because natural inputs take longer to react with low quantity. And we already know that producers face huge difficulties to provide with these natural products, since not only they are very expensive but also scarce. Yet, producers need huge quantities of input to meet their needs. Therefore they cannot do without chemical inputs, mainly if plots are rented for a short time.

Results show that, generally, the farmers don't apply recommended doses when there is no impact on crops by complying with prescribed doses. Such farmers feel more discomforts (67.5%) than those who observe doses despite the lack of impact on the crops. 70% of farmers do not observe prescribed doses when there is a non-change on crops while 30% of them observe recommended doses if yields are promising. We note that even those who comply with doses; it is because yields are good and if it wouldn't be the case, they will not comply with prescribed doses as other producers.

All the farmers feel unwell, both producers who comply with doses and those who do not. According to the collective expertise of Inra – Cemagref, agriculture contributes the most to this contamination during spreading. Phytosanitary products losses may vary from 10% to 70%, and spread throughout environmental compartments (air, water and soil).

Findings show that non-compliance with doses by populations is due to the fact that:

— they strongly suspect and even question the accuracy of information about doses mentioned on labels

—the reduction of products effectiveness over time

— the need to get good before the end of the land rental period

—The greater need to adapt to climate change.

Almost all farmers know the danger posed by chemical inputs for health. But the majority (67.5%) of producers, do not comply with prescribed doses.

According to the literature, discomfort includes three levels: mild, severe, and more serious. Contamination without direct manifestation should be highlighted. All producers in this area, those who comply with prescribed doses and those who do not, experience discomfort when applying chemical inputs in their farms. For example, concerning the farmers with breathing difficulties, 10.26% of them, do not protect their hands with gloves when applying inputs; 7.69% do with no protection using the excuse that they are used to, also have respiratory problems. 5.13% of those who cover their nose and mouth with a garment, and 2.56% who wear a mask also have breathing difficulties. During our interviews, most producers said: '*Nothing! We are used to* when asked if they wear protections when applying chemical inputs. So we note that producers who use at least one protection when applying products, as well as those who do not protect at all, feel discomfort in one way or another. Based on field observations, we note that all male producers wear boots when farming; while women do no not with the excuse that they feel uncomfortable with them. Our observations also enabled us to realise that there is a wide gap between what is said by producers and what is done concerning protective measures when applying chemical inputs in farms in order to avoid discomfort. Some producers report that they take protective measures when applying inputs. Yet, they do not.

According to the findings, these sources of information are informal and there is no training on management of agricultural inputs, even if there are few seminars. This is due to the poor organization within collective initiative groups (CIG), source of several inconveniences. Our investigations show that the GICs delegates as well as various members complain. The members complain that delegates are only looking for their own interest. While, delegates complain that members only sign up in CIGs because they need funds and when it does not occur, they accuse delegates of diverting it. This explains why several producers withdrew from CIGs to evolve alone. Most often, those who attend seminars and training are CIGs members. What for those who do not belong to any CIG? This implies the improvement in the monitoring of producers by the area's administrators. They should involve themselves in the management of chemical inputs, in order to ensure a proper use and then preventing excessive use of these products which are dangerous for human health and environment.

The administrative authorities should popularise and insist on sustainable development policy. Each farmer, whether in the local language or in French, should understand

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what sustainable development means. It states that resources should be managed sustainably, such a way as to preserve future generations. If farmers master this notion, there will be a rational use of chemical inputs and environment safeguarding.

50% of producers get information about chemical inputs they use from input sellers; an unreliable source, given that most of these sellers have not received any training in agriculture. We also note that 60% of producers are only interested in the quantity to be used. However, information related to transportation, management of packaging after use of these toxic products is very important for environmental protection.

Interviews show that people information on the use of agricultural chemical inputs even at drinking places, during cultural meetings or any other gathering in the villages. Farmers' advisers are agricultural chemicals sellers who are just concerned with selling their products. Information on products is insufficient because they do not say how to transport, arrange, and mix inputs, how to manage the packaging after usage. In the field, we observe that people even use pesticide bottles to store drinking water and pesticide sachets to package food. We note that these farmers don't any idea of the magnitude of threat for health of these products when aspired.

IV. CONCLUSION

At the end of this research, conclusions mainly concern level of productivity linked to different production factors in this work environment. Our study, focused on the place of chemical inputs in rural agricultural activities (specifically in Northern Bafou), questions farmer's behaviour when using these inputs which can disturb humans, environment, development and sustainability of this activity. It also analyses misuse of chemical inputs by farmers in order to understand the reasons and consequences of this misuse. In addition, the growing number of vegetable producers shows the increasingly important place of this activity as a source of income activity for Northern Bafou populations.

V. RECOMMENDATIONS

Given the relevance of the outcomes of this research, some recommendations are formulated in order to improve the use of agricultural chemical inputs in Northern Bafou. These recommendations go to crops farmers and to the State, in order to preserve our environment.

Recommendations to vegetable producers

Vegetable producers should comply with chemical input doses used in their farms, as labelled on input packet. They shall take precautions, protecting themselves as prescribed, when using chemical inputs, in order to avoid discomfort or even possible future illness.

Vegetable producers should joint together in organisations to benefit from training and seminars. That will help them better manage their agricultural activities, boost production and improve yields. And those who always complain of lack of money for inputs should integrate a CIG in order to be eligible for credits from the State or NGOs.

Recommendations to State

Cameroon State, through (MINADER (Ministry of Agriculture and Rural Development), should organise training seminars, not only on agricultural technics, but also on supply and use of agricultural chemical inputs. It should motivate farmers, members of organisations or no, to attend seminars and trainings. It should also ensure that representatives of each group of farmers, as well as any farmer evolving alone, take part of training seminars, actually transmit lessons received to others, when they get back.

Regarding agriculture financing, the State should subsidise inputs and distribute them, it in order to develop this sector of activity which feeds national populations and neighbouring countries. It should also ensure that inputs get to producers in time. To this end, necessary measures must be taken to meet the demands of each farmer, by following process of inputs distribution from unloading stores to the redistribution to producers' organisations.

The State should strengthen the producer's awareness on protecting environment, in order to promote ecological awareness in the research area.

The State should promote the use of biological inputs which prevents the environment from pollution; maintains soil fertility and produce healthy agricultural products with sustainable and long-term yield.

Cameroonian state should promote sustainable agriculture. This must be a priority, in order to promote sustainable development.

REFERENCES

[1] **Adamou, I., A.F. Chimène, R. Ndjouenkeu, N. Mama, (2009).** *Impact de la gestion de la matière organique sur le statut minéral des sols et des récoltes dans les savanes Soudano Guinéennes de N'Gaoundéré, Cameroun.* **L. SEINY-BOUKAR, P. BOUMARD.** *Savanes africaines en développement : innover pour durer*, Garoua, Cameroun. Cirad, 10 p.

[2] **Akollor, S. I., (2008).** *L'agriculture de subsistance pour mieux nourrir l'Afrique*. Consulté le Mars 2010, 20, sur media21

[3] **Andral, B., (1996).** *Données sur le comportement et les effets des produits phytosanitaires dans l'environnement,* Paris, Ifremer, 106 p.

[4] **Aubertot, J. N., J.M. Barbier, A. Carpentier, J.J. Gril, L. Guichard, P. Lucas, S. Savary, I. Savini, M. Voltz, (2005).** *Pesticides, agriculture et environnement. Réduire l'utilisation des pesticides et limiter leurs impacts environnementaux.* Expertise scientifique collective, synthèse du rapport, Paris, INRA et Cemagref, 64 p.

[5] **Aubertot, J. N., L. Guichard, L .j. Arvalis, P. Mischler, B. Omon, M. S. Petit, E. Pleyber, R. Reau, A. Seiler, (2011).** *Guide pratique pour la conception des cultures plus économes en produits phytosanitaire. Application aux systèmes de polyculture,* Paris 115 p.

[6] **Baldi, I., S. Cordier, X. Coumoul, A. Elbaz, L. Gamet, P. L. Bailly, (2013).** *Pesticides et effets sur la santé.* Expertise collective, synthèses et recommandations, Paris, Inserm, 146 p.

[7] **Bindraban, P., (2010).** *L'avenir de l'agriculture,* Dans le document de discussion d'Oxfam. Synthèse d'un débat en ligne, Oxfam, 97 p.

[8] **Boudon, R. & F. Bourricaud, (2003).** *Dictionnaire critique de la sociologie*, Paris, Puf, 714 p.

[9] **Chaléard, J.-L., (2003).** Cultures vivrières et cultures commerciales en Afrique Occidentale : fin d'un dualisme ? Dans un Ouvrage collectif coordonné par M. Lesourd. *L'Afrique, Vulnérabilité et défis*. Nantes (France): Éditions du Temps, p 267-292.

[10] **Desjeux, Y., (2009).** *Le conseil en agriculture: revue de littérature et analyse des dispositifs de conseil*, Montpellier, Sup Agro, Inra, CIRAD, 116 p.

[11] **Durand, J.P. & R. Weil, (2006).** *Sociologie contemporaine*, Paris, Vigot, 774 p.

[12] **Ekou, N., (2006).** *Mesure de l'efficacité technique des agricultrices de cultures vivrières en Côte-d'Ivoire*. Économie rurale [En ligne], 296 | Novembre-décembre 2006, mis en ligne le 28 octobre 2009, consulté le 10 octobre 2012. URL: http://economierurale.revues.org/1892. p 39-53.

[13] **FAO., (2011).** *La situation alimentaire dans le monde 2010-2011 - Le rôle des femmes dans l'agriculture: Combler le fossé entre les hommes et les femmes, pour soutenir le développement*. Rome.

[14] **Ferragu, C., I. Tron, S. Bompays, (2010).** *Pesticides et santé : état de connaissance sur les effets chroniques en 2009*,ORS Bretagne, 120 p.

[15] **Gomgnimbou, A.P.K., P. Savadogo, A.J. Nianogo, J.M. Millogo_Rasolodimby, (2009).** *Usage des intrants chimiques dans un agrosystème tropical : diagnostic du risque de pollution environnementale dans la région cotonnière de l'est duBurkina Faso,* Biotechnol. Agron. Soc. Environ, p 499-507.

[16] **Grawitz, M., (1993).** *Méthodes des sciences sociales,* Paris, Dalloz 421 p.

[17] **Greenpeace, Pronatura, Birdlife, W.W.F., (2014).** *Orientation pour réduire le recours aux pesticides,* 11 p.

[18] **GRIFFON, M., K. Cleaver, E.H. Freud, C.M. Freud, (1993)**. *Quelles stratégies pour les agricultures en Afrique subsaharienne?* Collection notes et documents, CIRAD, p 16-62.

[19] **Guyer, J.I., (1984).** Family and farm in Southern Cameroon. *African Reseach Studies.*

[20] **Hauert, P. (2012).,** *L'importance des engrais,* Paris, Hauert, 99 p.

[21] **INTER AGRI AFRIC, Comité de suivi, FAO. (2009).** *Etude diagnostic sur l'agriculture biologique au Cameroun.* Rapport final, 86 p.

[22] **Lappé, A. (2010).** *Pourquoi manger du pétrole alors que nous pourrions manger de la lumière du soleil ?* Dans le document de discussion d'Oxfam. Synthèse d'un débat en ligne. *L'avenir de l'agriculture,* Oxfam, 97 p.

[23] **LAURENCE, W. 1998.** *Dynamique et biomasse des fragments de la forêt amazonienne.* Actualités des Forêts tropicales, Bulletin de l'OIBT.

[24] **Malassis, L., & M. Padilla, (1986).** *Économie agro-alimentaire*: *l'économie mondiale,* Paris, Cujas.

[25] **MANLAY, R. (2000).** *Dynamique de la matière organique à l'échelle d'un terroir agro-pastoral de la savane ouest-africaine (Sud-Sénégal).* Thèse Doctorat ès sciences de l'environnement. Ecole Nationale du Génie Rural, des Eaux et Forêts. Université de Montpellier, 246 p.

[26] **Maslow, A. (1970).** *Motivation and Personality,* New-York, HERDER.

[27] **MILLEVILLE, P. & SERPANTIE, G. (1994).** *Intensification et durabilité des systèmes agricoles en Afrique Soudano-Sahélienne. Actes du Séminaire International, Dakar, Senegal,* Benoit-Cattin M. Juan-Carlos D., Paris, p 33-45.

[28] **Ministère de l'environnement et forêts, (1996).** *Plan national de gestion de l'environnement,* volume II, 577 p.

[29] **Minko, B.M.A., (2011).** *Analyse socio-économique du système de commercialisation du riz dans la vallée du Logone (Région de l'Extrême Nord)*.Mémoire de fin d'étude. Université de Dschang, Cameroun.

[30] **Murua, J.R. & A. Laajimi, (1995).** Transition de l'agriculture conventionnelle vers l'agriculture durable : quelques réflexions. Dans Zekri S., Laajimi A., *Agriculture, durabilité et environnement*. Zaragoza : CIHEAM, p 75-86.

[31] **Nguita, E., (2011).** *Pauvreté des chefs de ménage exploitants agricoles en milieu rural au Cameroun : Recherche des facteurs explicatifs.* Mémoire de fin d'étude de master professionnel, IFORD, 138 p.

[32] **OCDE. (2012).** *Qualité de l'eau et agriculture : un défi pour les politiques publiques.* Essentiels et résumés, *www.oecd.org/agriculture/eau* 17 p.

[33] **Onil, S. & S.L. Louis, (2001).** *Guide de prevention pour les utilisateurs de pesticides en agriculture maraîchère*, Québec, Irsst 89 p.

[34] **Penouil, M., (1979).** *Socio-économie du sous-développement.* Paris : Dalloz.

[35] **Poelma, H., (2013).** *L'avenir de l'agriculture,* Dans le document de discussion d'Oxfam. Synthèse d'un débat en ligne. Oxfam, 97 p.

[36] **Rengam, S.V., (2013).** *L'avenir de l'agriculture,* Dans le document de discussion d'Oxfam. Synthèse d'un débat en ligne. Oxfam, 97 p.

[37] **Sigot, A.J. Thrupp, L.A. & J. Green, (1995).** *Discourse on Gender and Natural Resource Management.* In: Towards Common Ground: Gender and Natural Management in Africa, ACTS Press, Nairobi, p 1-13.