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Research Article



PERCEPTIONS OF PESTICIDES IMPACTS ON AGRICULTURAL SOILS IN THREE LOCALITIES OF NORTHERN CAMEROON (SANGUÉRÉ-PAUL, DJALINGO AND BABLA)

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ABSTRACT

Despite their dangers, plant protection products continue to be used throughout the world and in developing countries, in which Cameroon is one of them. This study was carried out in order to gather the perceptions of farmers on the impacts of pesticides on agricultural soils and finally to propose alternatives for solving agricultural/environmental problems.225 people were concerned with the known as study. The method used to collect farmers perceptions is based on interviews conducted with farmers in the survey areas (semi-structured interviews and focus group). The results show that 46% of the farmers surveyed use only herbicides in the field, 39% combine herbicides with insecticides, and 15% combine herbicides with insecticides and fungicides. The most widely used pesticide is Round up, despite its ban. It is followed by Gramosol, Atrazine, Kalach, and Duiron. 135 people (60%) of the farmers surveyed qualify the agricultural environment as moderately good (farmers having staying between 6 and 20 years and over 20 years in the study localities). 8% say it is poor quality. The perception of the quality of the agricultural environment depends very much on the residence length. 173 people (77%) of the farmers surveyed have noticed a degradation of the soil since they began to use pesticides in the field. 85% noted a proliferation of weeds/insects in fields treated with pesticides. 91% also observed a proliferation of new species of grass/insects in fields treated with pesticides. Majority of the farmers surveyed (60%), believes that instead of pesticides, the use of agricultural machinery is better and will allow them to boost their agricultural production while protecting the soil and the environment.

Keywords: Peasant perceptions, Pesticides, Agricultural machinery, Agricultural productions, North Cameroon.

INTRODUCTION

The use of pesticides in agriculture has been considered as necessary evil to guarantee the effective protection of farmer's crops, which guarantees productivity that meets his objectives (Olina etal., 2015). These pesticides (insecticides, fungicides, herbicides, etc.) increased agricultural production, land productivity and labor during the fifty past years. At the same time, the negative externalities resulting from the use of these inputs and their toxicity have increasingly posed environmental problems affecting ecosystems and human (Olina et al., 2015). These externalities include damage of agricultural land, livestock, flora and fauna (Wilson et al., 2001) In some African countries, several studies and works have highlighted the non-respect of good agricultural practices by producers (Lendres, 1999; Domo, 1999; Toé et al., 2000; Toé et al., 2002; Okoumassoum et al., 2002; Traoré et al., 2006). Indeed, there is a non-compliance with doses and the treatment schedule, the use of products at times when it is not recommended, a non-recommended mixture of products, a non-respect of the hygienic attitudes recommended during the treatments, improper disposal of leftover products and empty packaging (Toe et al., 2010). In the North Cameroon region, the use of pesticides has become essential for crops. There has been an incessant increase of pesticide use over the past 20 years, particularly herbicides (of commercial name: Paraquat, Glyphosate, Diuron, and Atrazine) in cotton-cereal rotation systems, especially since the extension of the no-till technique (Duque et al., 1999). These pesticides used in fields have negative impacts in various compartments of the ecosystem (Tissier et al., 2005).

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In this part of the country, the peasant perception of the impacts of pesticides on agricultural soils remains for the majority of farmers very outdated. They believe that the perpetual use of these chemicals will be responsible for the decline in the fertility of their croplands and loss of biodiversity. Peasant perceptions therefore represent an important socio-cultural factor, which guides the choice of innovations and determines their adoption (Pannell, 2007). The objective of this study is therefore to gather the perceptions of farmers on the impacts of pesticides on agricultural soils and finally to propose alternatives for resolving agricultural/environmental problems, which is increasingly growing in this part of the country.

MATERIAL AND METHODS

Location of the study area

The area covered by our study is located in the Garoua 3 district (area of approximately 432.5 km²) and is limited: to the North by the Benoue River; to the south, east and west by Ngong commune (PCD, 2011). The figure 1 shows the location of these different zones. The climate is a Sudanese type, characterized by an annual rainfall between 1000 and 1100 mm and mean annual air temperature of 28 °C (Olivry, 1986). The vegetation consists of tall grasses, deciduous trees and savannahs (Letouzey, 1985). The superficial formations are constituted of ferruginous soils and vertisols (Raunet, 2003).

Choice of localities

Two (02) criteria were used when choosing the study zones:

 The localities of Sanguere Paul, Babla and Djalingo, represent larges places where there are large periodic market. They are

- significant places for the exchange of agricultural products and therefore major agricultural production areas.
- The choice was made on zones where the practice of cotton / cereal or cereal / cotton rotation has been constant for several years, seeing that these are the dominant cultures in the locality.

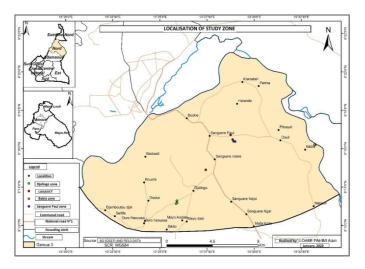


Figure 1. Location of study zones

Data collection

An investigation phase (semi-structured interviews and focus group) was conducted for 3 months (January, February and March). Farmers were ask their perceptions of the probable impacts caused by pesticides. 225 farmers were randomly chosen in the localities surveyed for this study. The only condition was residence in the localities surveyed. The survey form is structured in three main parts: Information about the respondent; relationship they make between agricultural landscape and pesticides used and finally their knowledge and feelings in relation to soil degradation.

Data analysis

The ODK-Collect software on smart phone was used to collect the answer of peasants during the investigation. The data collected was converted and opened in Excel version 2013. SPSS software version 20.0 was used for descriptive analysis of data.

RESULTS AND DISCUSSION

From these surveys carried out with farmers in order to collect their perception of the probable impacts caused by pesticides, the following results emerge: the age group of the respondents is presented in figure 2. 32% are aged between 15 and 30 years. In addition, 68% are aged between 31 and 55 years. The profession of substitution carried out revolves around: civil servant, fisherman and motto-bike riders. 46% of respondents use only herbicides in the field, 39% use both herbicides and insecticides and finally 15% at the same time herbicides, fungicides and insecticides. Figure 3shows different pesticides used and their percentage of uses. The most commonly used is Round up, followed by Gramaxone, then Atrazine, Kalach, Duiron, Supermachette and Nicomais. Among these most widely used pesticides, the doses for field use differ: some farmers followed the doses recommended by the manufacturer, while other overdose. 60% of people surveyed still respect the prohibited doses. On the other hand, 40% persisted in not respecting the doses prohibited by the manufacturers. For example, for a quarter of hectare that requires 4 sachets of Round up (a product additionally prohibited by the Cameroonian government), some farmers use 05 sachets.

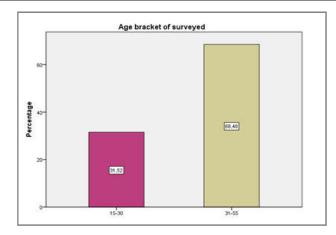


Figure 2. Age group of the farmers surveyed

This propably demonstrates the impact that such practices caused not only at ground level, but also at environmental level. This high percentage (46%) in favor of the single use of herbicides is explained firstly by the type of crops most practiced by farmers in these localities (mostly cereals) and not necessarily requiring the use of fungicides and insecticides. Then the gradual loss of animal biodiversity of soil has reduced the use of fungicides and insecticides and contributing to an increase of weeds that have become resistant to herbicides. Finding also made by Olina Bassala (2015) and Boschetto (2013).

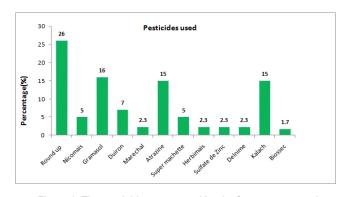


Figure 3. The pesticides most used by the farmers surveyed.

Figure 4 shows the perception of the quality of the agricultural environment by the population surveyed according to the length of time spent in the study localities. 60% of the farmers surveyed who have already done between 6-20 years and over 20 years qualify the current state of the agricultural environment as moderately good. 15% who have already done more than 20 years qualify it as good quality. And 8% of farmers who have already done more than 20 years qualify it as poor quality. Just 2% for those who have always resided in these localities qualifies the agricultural landscape of good quality. This rate of 60% effectively shows that the perception of the quality of the agricultural environment depends very much on the length of residence in the locality. We can say that longer is the resident period in the locality, more positive is the perception of the agricultural environment. It also depends on age because the oldest people surveyed (31-55 years) find this rate 60%. On the question of whether they have noticed any degradation of the soil since they have used pesticides in the field, 77% of respondents say "Yes". Only 23% say "No" (Figure 5). Those who claim it by saying "Yes" present it on an average degradation scale. Herbicides induced the "degradation" of land and reduce fertility when applied regularly to the plots. This can be verified by certain indicators, such as the presence of sandy beaches in cultivated plots, the appearance of certain weeds which were rare before the introduction of herbicides. Finding also made by Olina Bassala (2015).

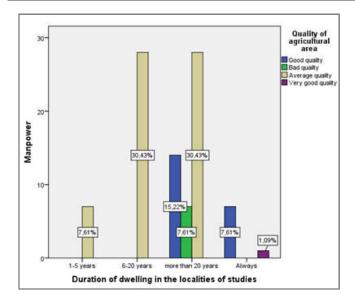


Figure 4. Perception of the quality of the agricultural environment according to the length of residence

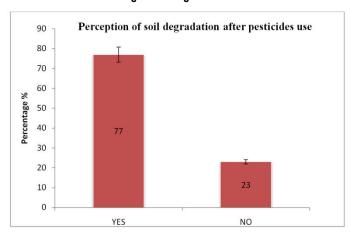


Figure 5. Perception of farmers on soil degradation due to pesticides

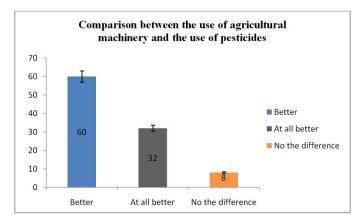


Figure 6. Comparison between the use of agricultural machinery and the use of pesticides

On another question, which is whether the yields produced are good quality compared to previous years, 69% say "Yes" and 31% say "No". Those who say "No" attribute it to declining soil fertility, overuse of pesticides and soil degradation. 85% of the farmers surveyed said they observed an increase in the proliferation of weeds / insects in their fields treated with pesticides. Only 15% have not observed any change in their field treated with pesticides. 91% also say they have observed an overgrowth of new herb / insect species, and only 9% say they do not observe anything at all. This proliferation of new species and weeds is explained by an over dosage of pesticides, a lack of crop rotation, poor use of agricultural equipment and

continuous use of the same type of pesticides on a plot. Finding also made by Picard (2018). Figure 6 opposite presents the comparison made between the use of agricultural machinery and the use of pesticides. 60% of the farmers surveyed find the use of agricultural machinery better compared to pesticides. 32% do not find it better and only 8% do not find any difference between the both. The 60% of farmers surveyed justify their choice by mechanical rotation of the land because there is no soil degradation and pollution when using agricultural machinery.

CONCLUSION

The present study, conducted on peasant perceptions of the impacts of pesticides on agricultural soils to propose alternatives for solving agricultural / environmental problems in three localities in the North Cameroon region (Sanguere-Paul, Djalingo and Babla). The study permit us to affirm that the peasant perception of the impacts of pesticides generally depends on the number of years of residence in the locality. The longer peasants spend the time in the locality, more their perception differs, compare to those who have not passed enough the time. For the peasants, pesticides, particularly herbicides would cause a "weakening" of the land and a decrease in fertility when they are applied regularly in the plots. This can be verified for example by the presence of sandy beaches in cultivated plots, the appearance of certain weeds / insects and new species of grass / insects which were rare before the introduction of herbicides. According to them, it would be wise to use instead of pesticides, agricultural machinery which seems to be better and will at the same time allow them to increase their agricultural production while protecting the soil and the environment around them. This is why crop rotations are strongly recommended. A study should be carried out to identify new herbaceous / insect species that have appeared in the field and to observe their behavior in nature. Likewise, the use of agricultural machinery and the use of plant extracts such as Neen, Khayasenegalensis etc., for their pesticidal effects in the field instead of the use of chemical pesticides should be increasingly suggested to peasants, for a stabilization of agricultural soils pollution which is severely increasing nowadays in this part of the country.

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