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Marketing modes, social uses of pesticides and consequences: An obstacle to sustainable agriculture in the department of Dabou

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Abstract
This research is part of the pesticide management policy for sustainable agriculture and health. Since the green revolution, agricultural practice includes the use of pesticides in order to intensify agricultural yields (M. Kanda, 2009; C. Ahouangninou, 2011; TD Doudou and SA Adou, 2018) [13, 3, 10]. However, during the life cycles of pesticides, several actions deviate from commercial standards (licit sale of pesticides by qualified persons) and required phytosanitary practices (compliance with pesticide doses and deadlines before harvesting agricultural products). The qualitative side of this research took place in the department of Dabou. For data collection, we used immersion, semi-structured interview, both direct and participant observation, documentary research and field notebook keeping. A total of fifty (50) social actors (administrators, distributors, sellers, farmers and greengrocers and consumers) were questioned on the basis of the reasoned choice technique. The data collected was transcribed, sorted according to research themes and processed using content analysis. The Social Life Theory of drugs (Appadurai, 1986) [4] and the Rational Choice Theory (Boudon, 2004) [6] were used for the analysis. This study reflects the ground results. First, it analyzes commercial strategies and logic of pesticides purchasing. Then, it explains the different ways of using them. Finally, it shows that the different modes of marketing and social uses raise the problem of vegetable quality, constraints to sustainable agriculture and health problems.

Keywords: agricultural practice, pesticide marketing strategy, purchase and use of pesticides, quality of vegetables, Dabou

Introduction

Since the green revolution, agricultural practice has associated the use of pesticides with a view to intensifying agricultural yields. (M. Kanda, 2009; C. Ahouangninou, 2011; TD Doudou and Adou, 2018) [13, 3, 10]. In Côte d'Ivoire in particular, the use of pesticides has improved the living and working conditions of farmers by providing them with considerable agricultural yields (UNEP-FAO, 2010). This was possible thanks to agricultural policies and inputs management strategies (particularly pesticides) put in place by the Ivorian government. Indeed, the Ivorian government has relaunched the agricultural policy by improving productivity, competitiveness, search for food security and diversification of crops. (V. Adoli, 1998; Minagri, 2012) [2]. To achieve this, several agronomic structures (CNRA [1] and ANADER) [2] have been created to assist farmers in their various agricultural practices. A pesticide committee was also created. It is responsible for approving phytosanitary products before they are sold, granting approvals to resellers and pesticide applicators. But sale and use of pesticides remain a concern to the ivorian government. Several agricultural projects have been piloted by supervisory structures in order to assist farmers in the rational use of pesticides (V. Adoli, 1988).

The Ivorian government has signed and ratified several international conventions and introduced laws covering the field of pesticides in favor of populations' health. Despite these measures, the use of pesticides remains a source of public health problems among populations. The agricultural regions of Côte d'Ivoire are mostly confronted with the problems of exposure and mortality related to pesticides (MINDD, 2010). The department of Dabou, an essentially agricultural area (A. Kangah, 2009), is not excluded in terms of harmful effects of pesticides, particularly on health and the environment. Among the *Odzukru* [3], diversification of crops and intensification of agricultural products replace the vegetation of the said locality. Farmers are using pesticide in farming practices for productivity purpose. However, during the life cycles of pesticides, several actions deviate from commercial standards, required phytosanitary practices and problems related to sustainable agriculture practice. Users and populations of the different villages surveyed (*Aklôdz*, *Kôsr*, *Kibrm*, *Tukpa*, *Lôkp*, *Orgbaf*), as well as people of Dabou are victims of several pesticides-related diseases. Pesticides are a social concern and a sensitive subject because of their uncontrolled effects. So, how does the marketing of pesticides operate in the locality of Dabou? What are the social uses of pesticides as well as logics that underlie them? What are the perceived adverse effects of pesticides on crops, agricultural product quality and humans? To answer these questions, a research methodology is adopted.

1. Materials and methods

This study took place in the department of Dabou, particularly in the villages of Aklôdz, Kibrm, Kôsr, Lôkp, Orgbaf, Tukpa and the town of Dabou. The surveyed population are individuals who use, or intervene directly or

indirectly in the field of pesticides. It also concerns people who are victims of pesticides. We opted for the qualitative survey. This approach permits to understand the way actors think, speak and act intentionally (H. Dumez, 2011) [11], during the purchase and use of pesticides. This type of survey allowed us to understand the logic underlying the sale, purchase and use of pesticides. Data collection required immersion, semi-structured interview, direct observation, participant observation, documentary research, ground notebook keeping and photographs. A total of fifty (50) social actors (administrators: (5); distributors: (02); sellers: (10); farmers: (25); greengrocers: (04); consumers: (04)), were interviewed using the Reasoned Choice Technique. The recorded interviews were transcribed verbatim. The notes were registered using Word 2013. These various data collected on the ground were subject to tri-themes, and were also processed using content analysis. Theories of Social Life of Things (A. Appadurai, 1986) [4] and Rational Choice (R. Boudon, 2004) [6] were used for data analysis.

2. Results

The results raised by research turn around marketing, social uses of pesticides, logics that underlie them, as well as perceived undesirable effects of pesticides on the quality of vegetables.

2.1. Marketing methods

2.1.1. Ethnography of places where pesticides are sold

Speeches of respondents and observations made on the ground highlight several places where pesticides are sold. The decision-making process for choosing places where pesticides are sold highlights plural logics, which underlie the economic and competitive strategies of sellers surveyed. The sale of pesticides coexists with that of agricultural equipment, commercial objects and food. These sales areas are made up of pesticide stores, shop-houses and movable pesticide stores. These stores do not have the same architectures, but we are witnessing illicit practices in the overall pesticides marketing. Indeed, in these sales areas, they sell both obsolete, illegal and legal pesticides. These different pesticides were observed by means of a direct and prolonged approach in stores and a synthetic and specific analysis of speeches as well as gesticulations of sellers surveyed and customers (users) while exchanging. Illegal and expired products are sold clandestinely or openly to users depending on the location. When a product is needed in the shop (houses serving as selling shop for consumable and cosmetic products), sellers touch pesticides and other products one after the other in a reversible way to serve customers. In Dabou (at villages' station and in the main market's streets) and in villages (at the station and shops), illicit pesticides are sold in the open air. Agro-pharmaceutical products are displayed ostentatiously depending on the availability of market places and are sold near consumable water and food (attiéké, fish, fresh water, donuts, porridge, fried banana) by vendors who do not have any sales certificates.

2.1.2. Commercial strategies and purchasing logic for pesticides

Vendors use several marketing strategies.

2.1.2.1. Market supply of new pesticides

Users and vendors of pesticides are reluctant to purchase new pesticides. Farmers find it difficult to buy these products to which they are not accustomed. Thus, sellers obtain small quantities of new pesticides from distributors, then resell them to users in order to ensure the effectiveness of the product. The latter use them to test their effectiveness. Once the effectiveness has been certified by users based on their experience, sellers obtain large quantities of new phytosanitary products for sale.

"We use the experiences of users to sell. To get customers, they are told to do exactly what the users did to have a good return. They are the main actors and products users. So, what they say and what they do is true. When they say this new product is effective it means that the phytosanitary product manages to solve their problem properly. It's because the product is good. We are careful buying a product like that, because no one may buy it since users don't know it. You need a customer to reassure you of its effectiveness", [excerpt from interview conducted on 2/09/2018 in Dabou with Ali, pesticide seller].

Following testimonials from users who tried the product for the first time, sellers find it difficult to refer to indications given on the packaging to market pesticides. Rather, they rely on the explanations and the number of pods used by users to promote new phytosanitary products in their stores. In return, the purchase and use of a new chemical product is subject to a process. Indeed, users take the risk of buying the new pesticide, then use it by following the oral prescription given by the seller. After use, when they obtain a satisfactory result, it becomes very difficult for users to change the phytosanitary product and the dosage prescribed (not the one requested by the manufacturer) by the seller. The satisfaction that new products provide from the application of sellers' prescriptions seals the relationship of trust between users and sellers. The supply of a sufficient quantity of a new product is then part of a decision-making process by sellers, which takes into account the satisfaction observed by users, which leads to its easy purchase.

Pesticides are also sold through pictures on the packaging.

2.1.2.2. Packaging decorated with beautiful pictures

Pesticides with packaging decorated with pretty pictures are widely purchased by users**.** At market level, the decision to buy pesticides is also part of a symbolic representation of efficiency. In fact, users socially and culturally construct efficacy from the packaging of phytosanitary products presenting attractive pictures. Farmers feel concerned by the use of pesticides whose packaging includes images of agricultural products they practice; dead weeds or pests they are confronted to on their farms. By purchasing these products, users expect a production without defects or identical to that observed on the packaging. But, if this is not the case, they embark on non-prescription use by doubling the doses and the number of treatments per production. In addition, they prefer to buy phytosanitary products for cotton and cocoa whose packaging bears the same photos as the insect pests of their plants. However, users refuse to buy pesticides when their packaging undergoes a change in terms of design, writing and format even though they contain the same information. Also, the sale and purchase of pesticides are part of a psychological universe.

2.1.2.3. Psychological universe of pesticides purchase

Pesticide sellers (licensed and unlicensed) rely on the psychological aspects of farmers to sell their various

products. From the name of the store to the disposal of phytosanitary products, pesticides are sold according to the psychological state of users. Sellers use cognitive expressions such as "The good planter", "Agricultural route", "Agricultural spaces: quality makes the difference", "Agricultural universe" to name the stores, to testify not only to the existence of products but also to translate the end of peasants' difficulties. In front of pesticide shops are signs on which the expression "sale of phytosanitary products and agricultural equipment" is repeatedly mentioned, in order to officialize the marketing of equipment and pesticides. They use signs to praise stores and quality products through several expressions, the most frequently of which are mentioned above. Inside the stores, sellers display on their shelves a variety of pesticides (herbicides, insecticides, fungicides, nemanticides, acaricides), so that users can easily choose agro-pharmaceutical products. Through the ostentatious display of pesticides, we observe that the purchase of pesticides becomes for the customer a psychological and cognitive process. Users buy products according to the representation they have of them. They buy products based on the visibility of images, the readability of words and the meanings given to the expressions relating to chemicals and the ability to resolve nuisances. This is similar to the study by (TD Doudou and SA Adou (2018) [10]. In this condition, the attendance of sale shops and the purchase of pesticides no longer focus on expert knowledge, but rather on the impressions that made from the sensations resulting from placards information, signs and exposure of pesticides. Users also use pesticides on the basis of empirical knowledge.

2.2. Social uses of pesticides

2.2.1. Preparation or mixture of herbicides

Preparing pesticides is an essential step before spraying. The preparation of pesticides varies according to groups of users and different families of pesticides. Several liquids are used by users for the preparation of mixture. In the villages of *Kibrm*, A *klôdz* and *Lôkp*, pesticide users use liquid soap (known as "javel clean", "javel helios" and "javel cross") and powder soap (known as grain of bleach "Omo", "Nile", "Klesoft" and "Ariel") for their various herbicide mixture. During the rainy seasons, farmers add refined table oil and cooking salt to their various herbicide mixtures. They use oil by taking the closure of the container of herbicides as a measure. According to farmers, the addition of oil allows the herbicide to stick, attach quickly to the leaves of weeds and resist in case of rain. As for cooking salt, it is perceived by farmers as a product capable of acidifying the weed killer in order to effectively destroy the leaves and roots. Also, some use hot water to mix granular pesticides. Hot water allows for this purpose to quickly dissolve the grains of herbicides. It should be noted that farmers buy more grain herbicides, because they believe they are less expensive.

Others also use the residual water from the dewatering of cassava semolina to prepare herbicides.

2.2.2. Mixtures of other pesticides and chemical fertilizers

At the level of agricultural sites, some users make the preparation by mixing only insecticides or fungicides between them for the maintenance of plants. Others mix the two groups of phytosanitary products by adding chemical fertilizers such as NPK and Urea.

"You spill the decis, califert, almanerb and polythrin insecticide in a four-liter container. Then you add a liter of water. You will get a colorless pesticide. Regarding the treatment, you follow the dosage of polythrin (cotton insecticide) by taking three to four times its closure to reverse in the sprayer. These different mixtures allow the crops to produce in abundance, it is actually effective", [excerpt from interview carried out on 26/10/2018 in *Kôsr* with Landry, market gardener].

Another says: "I mix califert, polytrine and cotzeb 80% Wp by putting them in a can, then I add water to a volume of one and a half liters. For spraying, I have a decision closure that I use as a measure for all insecticides. Califert allows plants to grow because it is a liquid fertilizer. Polytrine fights insects. This product is a cotton insecticide. Cotzeb 80% Wp fungicide allows plant leaves to resist. All of this mixture helps plants to grow, to fight and to be resistant" [excerpt from interview carried out on 25/10/2018 in *Kôsr* with Henry maraicher] .

The use of a single type of pesticide reveals the confidence that one has for the phytosanitary product in terms of fight against plant diseases. These various mixtures are used in non-standard doses.

2.2.3. Doses used outside of prescription

On the packaging of pesticides are written the phytosanitary products dosage prescriptions. These doses are prescribed according to the types of agricultural production, in order to avoid perverse effects of said products on human beings and the physical environment. However, the doses used by users surveyed are different from the written prescriptions. From one user to another, the measures and the volume of pesticides used vary. Indeed, the measure used to serve the pesticides do not have the same volumes, and the number of treatments goes against the requirements. Farmers visited use various measures that are not recommended, such as matchboxes, tomato pods, spoons and the naked eye. The dose used is often a function of the perceived resistance of nuisance. A respondent will say:

"In my opinion, the prescribed doses do not correspond to the sizes of herbs. The packaging entries do not correspond to the reality of fields. When they say one liter per one hectare (1ha) it doesn't always correlate with the size of herbs. So, to do a treatment with tall weeds, you have to buy several boxes of herbicides, mix them and then increase the dose to kill the weeds effectively. The dose to use depends on the size of herbs. In this case, when they say one liter per one (1) hectare, the dose should be increased. When it rains, we respect the prescribed dose of insecticides. But in dry periods, doses should not be observed, as insects will destroy cultivated plants. We do not respect the doses because it's very hot and sunny … I learned certain practices from my father, who knows market gardening well, with my friends and often my own experiences" [excerpt from interview conducted on 09/16/2018 in Dabou with Gaston, market gardener].

The methods of pesticide use among farmers are the result of internalization of ordinary knowledge learned, transmitted and shared, through the interaction of users and sellers. Doses are generally based on the search for the maximum effectiveness of pesticides.

2.2.4. Logic of the social uses of pesticides

Several logics underlie the use of pesticides:

2.2.4.1. Logic of the use of pesticides related to crop and plant evolution stage

From the destruction of weeds to the preparation of the soil, including the transplanting and flowering of cultivated plants, users generally use *nematicide (furadan* 5 G), insecticides, fungicides and herbicides to destroy weeds and fight against insect pests of crops. They use pesticides to maintain plants, repel insects, to make vegetable products shine. These mixtures respond both to preventive and curative logics of plant diseases, and to the destruction of weeds.

"From the first two months, I mix decis + califert + polythrin to drive away insects, in order to allow the eggplant and pepper plants to produce more flowers. From the third month, I make the same mixture, then I add this time the liquid fertilizer diclofert. I make this last mixture, so that the plants can quickly produce vegetables in abundance", [excerpt from interview carried out on 22/10/2018 with Emmanuel Zadi at L ɔ kp, a market gardener].

Another states that:

"When plants are small, you first put Urea or NPK fertilizer to allow their growth. After a month, I mix insecticides (cypercal, K-optimal, lambda master or power) + fungicides (Ivory 80 WP and callicuivre 50WP) + grain chemical fertilizers such as Urea and NPK, to obtain a liquid. This allows plants to produce vegetables in record time," [excerpt from interview conducted on 25/10/2018 at K ɔ sr with Henry, market gardener] .

2.2.4.2. Obtaining beautiful vegetables

The production and consumption of food products of great beauty is the reality underlying the use of pesticides. At the market level, consumers demand vegetables and starches that look good. In other words, this dimension is the main argument for attracting customers. The visually pleasing vegetable has become a social object around which social relations are built, particularly between sellers (of pesticides and vegetables) and producers. Indeed, on the market, customers (users) present to sellers vegetables that are pleasant to the sight and provide information allowing them to obtain attractive vegetables. Also on agricultural sites, some greengrocers buy pesticides to offer them to their vegetable suppliers, in order to achieve sufficient quantities of beautiful products at harvest. Additionally, some people buy pesticides for farmers, so that at times, they buy vegetables at a cheaper price. By doing this:

"Depending on the milking, I manage to obtain good peppers, okra, as well as good aubergines and tomatoes, which enable me to sell my goods easily. Otherwise, the vegetables, which are not maintained with insecticides, are not profitable for us", [interview conducted on 14/10/2018 with Véronique, greengrocer at the Aklodz market].

Another greengrocer adds in these terms:

"When vegetables aren't big and beautiful, customers aren't interested. This is why I urge my suppliers (market gardeners) to use Decis (insecticides) and yellow powder (fungicides), so that they can provide me with fine products at harvest; customers prefer agricultural products that are pleasant to the eye. Sometimes I give him money so he can buy it. But he reimburses me at harvest", [interview conducted on 09/12/2018 with Mariam, greengrocer at the Dabou market].

These comments show the influence of greengrocer and end consumers in the choice and use of pesticides. Farmers, faced with market demands, use specific pesticides to meet the demand for high quality vegetables. However, the purchase and use of pesticides are part of the search for maximum efficiency.

2.2.4.3. Search for maximum efficiency

The purchase and use of a pesticide lies in the search for performance. Users give pride place to the effectiveness of pesticides not approved in Côte d'Ivoire, those approved in the country but expired, or products approved but unsuitable for cultivation. Some users perceive obsolete pesticides as powerful in solving field tasks.

"When pesticides are obsolete, they become more powerful. They are effective, they kill insect pests well. But often they tire the cultivated plants, in terms of growth, and productivity, because some vegetables do not support their dose. When the plant supports the doses of these pesticides, there is nothing to say, because they produce well, and the vegetables also shine. When these growth and productivity problems due to expired insecticides arise, NPK fertilizers and Urea are used to solve, to cure the plant. Then, with abundant watering, the problem is solved", [excerpt from interview conducted on 09/11/2019 in Dabou with Richards, market gardener].

Other users also mix licit and illicit pesticides. The licit pesticides used in these mixtures are not appropriate for the cultivation practice. In other words, users make mixtures of cotton or cocoa insecticides and non-approved pesticides to treat vegetables.

"To fight against insects that quickly destroy plants, you take the 25ml insecticide called thian. This insecticide is not bulky. By using it alone, for spraying, you risk losing money, because it costs 6000 FCFA per unit. In order to be able to spray the whole field, I reverse the thian and the lambda power or master in the same box, which allows me to obtain a single liquid. For the application, I respect the dosage of thian, because it is a cotton product, it is very powerful. But when the insects persist, I double the quantity four times, instead of three", [excerpt from interview conducted on 09/11/2018 in Dabou with Gaston, market gardener].

These practices demonstrate not only the use of licit pesticides inappropriate for market gardening but also the illicit pesticides used in agricultural practices. Also, pesticide users use total herbicides instead of selective herbicides for weeding cassava fields. This has adverse effects on agricultural production

2.3. Perceived perverse effects of the social uses of pesticides on agricultural production

2.3.1. Perceived impact of pesticides on crop plants

The spraying of crops with obsolete and illegal pesticides poses serious problems for good growth of plants. According to farmers, the use of obsolete pesticides delays the evolutionary stages of cultivated plants.

"Often it dries up lettuces, tomato leaves and others rot the fruits of cultivated plants such as peppers, eggplants and tomatoes. But some farmers do not know that it is these expired products that are the cause of this damage",[excerpt

from interview conducted on 09/11/2018 in Dabou with Richards, market gardener].

These remarks show that the use of counterfeit pesticides has an impact on the state of evolution of sprayed plants. They also reveal, that peasants destroy, dry up the productions by the inappropriate manipulation of herbicides in cassava.

2.3.2. Sprayed Cassava Fields

Excessive use of herbicides in the cassava field causes economic loss. Indeed, the herbicides sprayed abusively during all the stages of evolution of the cultivated plant (cassava) turn black and also make the cassava semolina a yellowish color. Thus, the "attiéké" obtained during the preparation of semolina loses its beautiful white color, in favor of the black or brown color and is not appetizing. According to women, this type of "attiéké" is not economically profitable. It does not attract customers. What's more, this food quickly breaks down (rots). An "attiéké" seller supports:

"It's because we can't do otherwise. Financial problems force me to sell this type of "attiéké". My husband rarely uses phytosanitary products. As a result, its cassava produces good quality "attiéké". This is not the case for other farmers. The quality of cassava does not allow for long storage, as it used to be. This is due to the overuse of pesticides. We don't known whether this use also makes us sick. », [excerpt from interview conducted on 12/09/2018 in Dabou with Danielle, seller of attiéké] .

Sprays cause rotting of vegetables.

2.3.3. Early rotting of harvested vegetables

The use of pesticides in vegetable fields disturbs the hardness of harvested agricultural products. At sites' level, market gardeners use during field work, the three families of pesticides, namely herbicides, insecticides and fungicides. During ground studies, we found that market gardeners in the district of Dabou, who generally work in the lowlands, and some market gardeners in the villages use herbicides to weed the plots. This category of peasant uses pesticides to prepare the soil (insecticides), to destroy weeds in the space to be cultivated, through total herbicides. After sowing, they use insecticides, fungicides and chemical fertilizers. No fresh vegetable escapes the spraying of chemicals. The spraying of pesticides and fertilizers is part of social, economic and symbolic logics demonstrating an accelerating rate of growth and productivity of cultivated plants. Indeed, uses made by all the farmers of the said department respond to various logics, such as destruction of weeds and insect pests, the growth of plants, the embellishment of agricultural products, the increase in yields.

Gound data (Aklôdz, L ɔ kp, Orgbaf, Kôsr, Dabou) show that users generally spray pesticides three to four times per vegetable production in order to meet the demand for vegetables. However, harvested products are not resistant as they degrade and rot rapidly. The data corpus mentions greengrocers' complaints regarding the resistance of agricultural products harvested from fields sprayed with pesticides.

"Eggplants and tomatoes rot quickly. As soon as you buy them, they spoil. Today's tomatoes and peppers don't last long enough because of chemicals products." [excerpt from interview conducted on 10/10/2018 in Akoldz with Véronique, greengrocer] .

"Vegetables are full of chemicals; the same applies to other agricultural productions. Vegetables contain pesticides, chemical fertilizer. Pesticide-free vegetables last longer. They do not rot quickly when harvested, which allows for a margin of profit. [excerpt from interview conducted on 09/12/2018 in Dabou with Larissa, greengrocer].

According to respondents, the flavor of harvested products is affected by the excessive use of pesticides.

2.3.4. Loss of taste in vegetables

During ground phase, pesticide users are accused and blamed for the poor quality and undesired taste of vegetables we consume. Repeatedly, various actors interviewed blame the taste of agricultural products for repetitive spraying of pesticides. These social actors state that current vegetables are tasteless because they contain pesticides. According to respondents, agricultural products such as tomatoes, eggplants, carrots and cucumbers containing pesticide residues slightly burn the tongue when eaten raw. "*To know if an eggplant and a tomato contain pesticides, you have to taste them raw. If the pesticides are there, you will feel your tongue burn*" [excerpt from interview conducted on 02/10/2018 in Aklodz with Gérald, market gardener] .

According to respondents, the current vegetables do not have a good flavor when they are also prepared. A saleswoman with whom we had an interview at the Dabou market explains:

"I can testify that these phytosanitary products are not good at all. Just because I sell vegetables doesn't mean I have to hide the truth from you. When I prepare vegetable products, for example aubergines, I notice that they are not tasty; yet they are beautiful and big. On consumption, you have the expression that they are not well formed but they present an enviable aspect. I can say that they are picked under the effect of magnification", [excerpt from interview conducted on 09/10/2018 in Dabou with Larissa, greengrocer] .

"Today's peppers are not spicy. It doesn't burn like the ones before, they're big and pretty for nothing. It's not their fault, because peppers absorb too many insecticides, fungicides and chemical fertilizers. Now everything is chemical. When you eat certain vegetables like eggplant and tomato, you don't feel anything like taste." [excerpt from interview conducted on 18/10/2018 at the Dibrm market with Brigitte, greengrocer].

"We notice that agricultural products are no longer tasty as before. They contain a lot of water. It looks like they are harvested prematurely", [excerpt from interview conducted on 09/10/2018 in Dabou with Mr. Assi, state-certified nurse at the Dabou Methodist Hospital].

These comments show that the form of agricultural products is misleading. They are pleasant to the eye. These products are harvested under the effect of pesticides which makes them beautiful and big before their maturity. Also, they are harvested by farmers, without respecting the prescribed doses and pesticide persistence period mentioned on the notices. These products affect the health of producers.

2.3.5. Health implications

On that point, here are some of the answers obtained: "Pesticides have an impact on agricultural products, but also on humans. The use in fields is done without any or

maximum protection". [excerpt from interview conducted on 09/12/2018 in Kôsr with MYG, farmer].

Farmers come to the hospital with health concerns: skin conditions, eye conditions, respiratory problems. Through the questions they are asked, pesticides have something to do with it. Without precautions, they are exposed. [excerpt from interview conducted on 09/10/2018 in Dabou with MK, nurse at Dabou General Hospital].

These remarks show that pesticides have caused diseases among populations. Farmers, users of chemical products and health professionals affirm their existence in the study sites. They affect the skin, the eyes, the lungs, which keeps them away from their activities. The health problems producers go through are linked to the lack of precautions. Several factors, namely the level of education and poverty, explain this reality. The results were discussed.

Discussion

In the department of Dabou, the purchase and use of pesticides are socially constructed by social actors. As in the case of pesticide trade names (TD Doudou and SA Adou, 2018) [10], users are influenced during the purchase of phytosanitary products by expressions, which praise the availability of effective chemicals within stores. This study reveals that farmers also buy pesticides from unqualified sellers. This is justified by the studies of M. Doumbia, (2009) [9] and M. Kanda, (2014) [15]. These authors mention that market gardeners prefer to buy pesticides from sellers who do not have sales approvals. In addition, sellers in the Department of Dabou, as indicated by M. Kanda (2013) [4], provide users with pesticides of dubious quality. The purchase of pesticides in this locality lies in their perceived effectiveness by users. The study conducted in Bouaké by TD Doudou and SA Adou, 2018) [10] shows that users buy and use illegal and inappropriate pesticides for the practice of their culture. 0They prefer to buy counterfeit pesticides, from any person, because they perceive them to be very effective. (C. Ahouangninou, 2011; M. Kanda, 2014) [3, 14]. Our direct and prolonged observations on agricultural sites reveal that the users surveyed use pesticides to destroy weeds, to grow vegetable plants, to kill insect pests. These logics of pesticide use are similar to the use of drugs. (S. Fainzang, 2006; S. Van der Geest; A. Hardon, 1996) [12, 23]. In effect,

"Individuals buy drugs, for extreme and extraordinary sensations, for the increase of pleasure and well-being, for the improvement of performance, for the prevention or cure of disease, for drowsiness, for symptoms' relief". (Lovell and Aubisson, 2008) [17].

On agricultural sites, producers use pesticides in addition to doses prescribed on the packaging. They use the naked eye, matchboxes, spoons and buds containing pesticides as measures when preparing mixture. This result is also demonstrated by studies conducted by M. Kanda (2013) [14] and B. Tarnagda (2017) [22]. According to their studies, market gardeners do not apply doses indicated by manufacturers, because they use measures that are not recommended during spreading. The use of inappropriate measures appears as a legitimized rule at the level of furrowed agricultural sites. The comparison of pesticides doses with those of prescribed drugs (S. Van der Geest S., A. Hardon, 1996; S. Fainzang, 2006) [23, 12], shows that the relationship maintained with prescribed doses depends on social life of pesticides. (A.Appadurai, 1986) [4]. Indeed, the decision to buy a pesticide and to use it according to a rule empowered by users is generally based on the internalization of learned standards habits, transmitted by stores, relatives or social environment.

The overdose of pesticides is constructed from the tinkering mixtures and personalized orientation in terms of spreading. For the farmer, the manageability of pesticides doses on the sidelines of prescriptions is part of the search for the best efficiency of phytosanitary products capable of fighting against the aggressors of crops, and producing more vegetables. However, the search for efficiency generally leads to non-compliance with the required application doses (CY Koffie-Bikpo, 2017) [16], and increases the risk of contamination (CS Wade, 2003; C. Ahouangninou, 2011) [24, 18]. According to M. Merhi (2008), pesticide residues are found in most foodstuffs. Wheat products purchased in France during different periods contain chemicals. (A. Nougadere, 2015).

The author argues that insecticides are the most detected substances in food. A. Diop (2104) shows, through his study conducted in Senegal, that harvested horticultural crops, namely lettuce, tomato and cabbage, contain variable amounts of insecticide residues. A study carried out in the United Kingdom by (PSD, 1997), quoted by Diop (2104), shows that carrots and apples contain variable residues. Through his study, the active ingredients responsible for the contamination of horticultural products are essentially insecticides of various active ingredients. In Egypt, samples of vegetables collected at local markets contain pesticide residues. (A. Diop, 2104 and A. Nougadère, 2015). Insecticide residues were also found in Ghana with vegetable samples from supermarkets, groceries and markets. (A. Nougadere, 2015).

If the use of pesticides or chemicals has an impact on the production and quality of products, it also negatively affects the health of producers. Indeed, the low level of education and the lack of financial means do not allow farmers to protect themselves against the harmful effects of pesticides use. Producers are exposed to the above-mentioned diseases during fertilizer spreading or spraying in the fields because of lack of appropriate protection (gloves, boots, etc.).

L. Multigner (2005) [20] agrees. The author asserts that pesticides, due to their intrinsic properties, represent a potential danger for humans in the event of unexpected contact. Their use, professional or domestic, raises many questions about the deleterious consequences they could have on health. While the effects of acute poisoning are fairly well known, the long-term consequences following chronic exposure are much less so. In vitro or in vivo toxicological approaches in animals are not always suitable for predicting delayed adverse effects in human populations. The multiple exposures faced by populations often make it difficult to establish a causal link between exposure to a given product and its possible health effect. However, and despite the methodological limitations of epidemiological approaches, convergent data have made it possible to acquire certain certainties and fairly consistent suspicions as to the long-term deleterious effects for certain pesticides or chemical families of pesticides. The fact is that too many uncertainties persist. These can only be lifted by rigorous studies using specific and sensitive measurements of exposure, on the one hand, and health effects, including at early stages, on the other hand. To date, damage to the reproductive function, neurological disorders and cancerous

pathologies are the health effects most frequently mentioned in relation to chronic exposure to pesticides.

Conclusion

The use of pesticides is apprehended differently and interpreted by social actors both as technical (efficiency) and symbolic (agricultural productivity) objects, which are part of an intricacy of economic and social relations. In the pesticide market, farmers buy chemicals based on their empirical knowledge. The uses they make of it obey complex logics which do not agree with the various required recommendations for use. The techniques for using phytosanitary products are intertwined with multiple practices, which the user learns by imitation and personal experience. The manipulations of pesticides are influenced by the market demand for agricultural products. To this end, users are forced to satisfy consumers through the misuse of phytosanitary products. However, the intensive use of pesticides negatively impacts the quality of consumable agricultural products. The practice of sustainable agriculture in the department of Dabou requires a change in agricultural practices, which translates into the conversion of phytosanitary practices to organic farming.

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