

Role of Communication in the Process of a Better Awareness of Environmental and Health Risks Related to the Use of Pesticides in Off-Season Vegetable Crops in Burkina Faso: Case of the Boulmiougou Dam in Arrondissement N°6, Urban Commune from Ouagadougou / Burkina Faso

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ABSTRACT

The cultivation of off-season crops is encouraged in Burkina Faso as part of its development policy and also to address the food shortage experienced by the country due to its Sahelian location with capricious rainy seasons. Thus, this activity has been intensified around water reservoirs and marshy areas to overcome this food shortage. However, market gardeners are faced with damage caused by pests, which forces them to make extensive use of pesticides. The present study consisted of a process of communication for behavioral change, to offer modern tools (coaching, awareness) for the benefit of market gardeners in the commune of Boulmiougou. This approach is part of a dynamic to familiarize them with good knowledge of pesticides in their diversity, and especially their use in the required scientific standards and in the preservation of our living environment.

Keywords: Market gardening, Communication, Behavior change, Information, Pesticides, Boulmiougou.

SUMMARY

Off-season cultivation is encouraged in Burkina Faso as part of its action policy for development and also to deal with the country's food shortage in view of its Sahelian position with capricious rainy seasons. Thus, this activity has been intensified around water reservoirs and marshy areas to overcome this food shortage. However, market gardeners face damage caused by pests, which forces them to use pesticides on a massive scale. This study consisted, through a process of communication for behavior change, in offering modern tools (supervision, awareness) for the benefit of market gardeners in the commune of Boulmiougou. This approach is part of a dynamic to familiarize them with good knowledge of pesticides in their diversity, and especially of their use in the required scientific standards and in the preservation of our living environment.

INTRODUCTION

Burkina Faso has signed several international and sub-regional decrees which led to the establishment of a commission at the national level in the 2000s (this is the national commission for the control of pesticides) under the supervision of the ministry in charge of

agriculture. This commission was functional only in 2007, its mission is to communicate, inform and raise awareness among the various actors, to examine and adopt preliminary drafts of regulatory texts on pesticide control procedures, the development of a pesticide control and inspection manual in Burkina. However, the technical structures in charge of these activities have neither the material and financial means, nor the necessary political support.

Burkina Faso, like other developing countries, is facing exponential population growth with a growth rate of 3.07% / year (INSD, 2020). This situation requires us to constantly fight against food insecurity through agricultural programs and campaigns. Being in the Sahelian zone, off-season crops (market gardening) are increasingly favored to ensure food security for populations. However, an intensification of agricultural activities implicitly calls for the use of phytosanitary products in order to protect crops against pests and improve yields. This explains the use of pesticides by all market gardeners for a better performance of agricultural activities.

The use of phytosanitary products in the practice of market gardening on the edge of water points raises possible concerns about the risk of pollution of water resources. Farmers use products of which they are often unaware of the composition, toxicity, dosage, frequency of use and instructions for use (Afrique Burkina, 2000). Poor agricultural practices therefore predispose pesticide users to the risk of poisoning. An inventory of water pollution and health risks associated with the use of pesticides, with the practice of market gardening in places with high potential for market gardening activities would be welcome. Pesticides represent a real danger to users in agricultural areas, consumers and the environment (Toe et al, 2002; Toe et al, 2004). Hence the interest in evaluating the environmental and health risks associated with the use of these phytosanitary products through a process of communication and behavior change around small water reservoirs in the district of Boulmiougou, province Kadiogo, Center region in Burkina Faso.

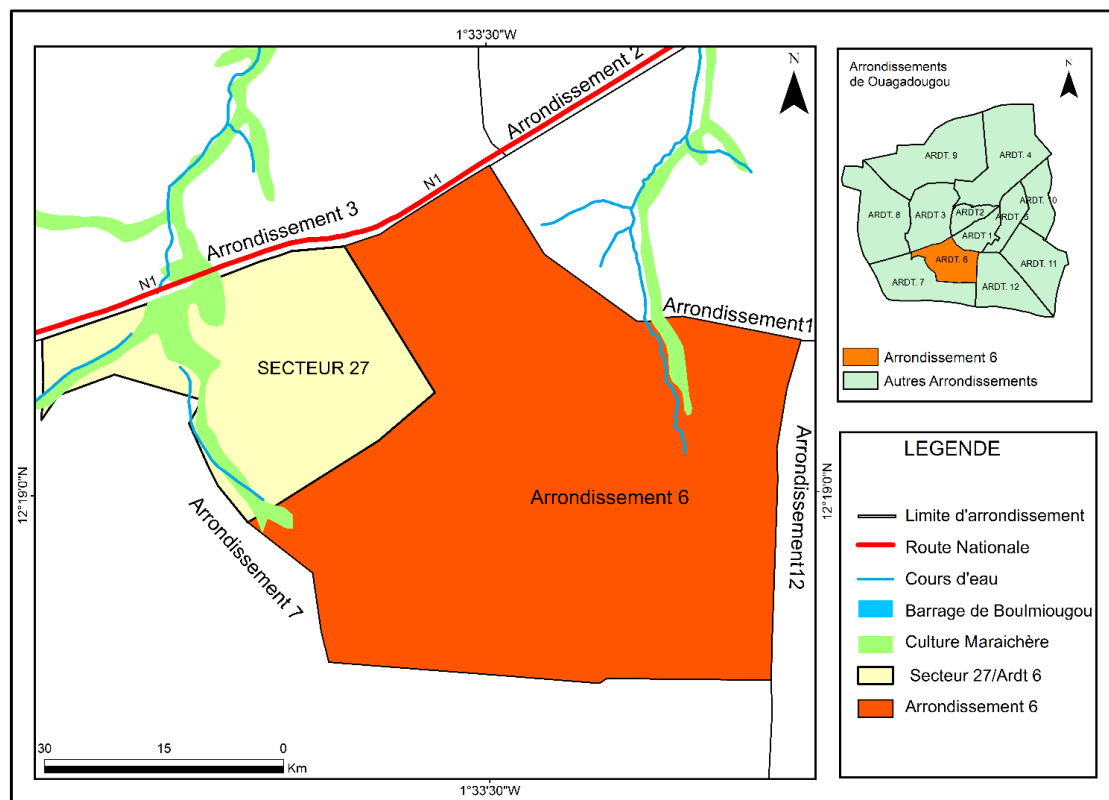
The specific objectives are: 1) the evaluation of the level of exposure of market gardeners to phytosanitary products in particular, and of other users of these products, 2) the identification of the pesticides used around the Boulmiougou site and in the various places of supply, 3) the inventory of pesticide pollution, 4) determine the contribution of communication in its role of education, monitoring and awareness among actors involved in the market gardening chain on the our study site.

MATERIALS AND METHODS

Study site

The study was conducted around the Boulmiougou dam in the urban commune of Ouagadougou, Kadiogo province, Center region. The survey took place in the market garden perimeter of the dam selected on the basis of its agricultural performance attested by the pressing needs of market gardening products in urban areas. A field visit made it possible to retain him. The market gardening perimeter is located on the national road N01 at the western exit of the city of Ouagadougou which connects the two big cities of Burkina, namely Ouagadougou and Bobo-Dioulasso. The site therefore meets the conditions for observing the socio-economic evolution of market gardening. The map below shows the study site.

Map n°1: Location of the study site in the geographical space of the capital



Source: IGB/BNDT 2012

Mars 2022

COMPAORE J.

Tools and Methods

The study was carried out in February 2022 in Ouagadougou in Burkina Faso, particularly in the market gardening site of Boulmiougou on the western outskirts of the city. The choice of this site makes it possible to read the social realities of urban agriculture, the health risks associated with the use of pesticides, the economic contribution of market gardening activity within households and communication strategies between actors in the market gardening production chain.

The research work is based on an inductive qualitative approach. Also, the approach adopted is intended to be descriptive, comprehensive and analytical. The bibliographical review focused on the inventory of documents relating to market gardening activities and pesticides, in particular those used in urban agriculture. It was carried out in particular online thanks to bibliographic portals, bibliographic databases and specialized search engines.

Then, direct observations accompanied by free discussions were carried out with certain producers at the level of the market gardening site. It was a question of appreciating the market gardening activity as a whole, the use of pesticides in the field and the interactions between the different actors. During these observations, images were taken for illustrative purposes.

Finally, in-depth individual interviews were conducted using the Kobotoolbox platform used to design the online questionnaire and subsequently deployed on tablets or smartphones. This allowed us to collect quantitative data with the ODK-Collect application installed on tablets or

smartphones. The data was collected from market gardeners and retailers of market garden products. To better understand and explain the health risks associated with the use of pesticides around the Boulmiougou dam, interviews were conducted in February 2022 with 60 market gardeners representing 40% of the site's producers and retailers. The data collected focused on knowledge of the health risks associated with the use of pesticides, the economic contribution of market gardening activity within households and communication strategies between actors in the market gardening production chain. And in a second step, it was a question of taking water samples from the wells in our study site.

The data collected were analyzed in Excel and their processing was carried out according to the variables noted in the field. Statistical parameters were calculated and used to construct distribution histograms for each of the application practices analyzed.

RESULTS AND ANALYSIS

Identification of the pesticides used around the Boulmiougou site

The study reveals that the pesticides used by market gardeners are numerous, diverse and varied. Despite the existence of laws and regulations, nothing is practically done on the ground to ensure that pesticides are managed safely by market gardeners. Indeed, the products used by market gardeners are toxic, often expired (Photo 1) and not approved. Supply is primarily on the black market (60%) as shown in graph 1. The most used pesticides are, among others, Leradan (50%), Furadan (35%), Attack (15%) and many others.

The producers in the site are either assignee owners or tenants and are foreigners. They have been there for more than twenty years. Most producers are organized in groups in the Boulmiougou site as elsewhere in other market gardening sites in the city of Ouagadougou. Despite the existence of groups, it should be noted that the market gardeners of Boulmiougou affirm that they have not received training on the safe management of these chemicals in their market gardening activities.

The training received generally relates to knowledge of the technical itineraries of market gardening. Market gardeners thus make decisions themselves to treat crops with the chemicals they consider effective. In the event of advanced crop attack by insects, the doses are increased at will or replaced by insecticides that market gardeners describe as "strong" and which are often those of cotton, whereas, unlike cotton, market garden products are ingest. The application of the different products in the perimeter is motivated by the neighborhood according to the advertising made around this or that product. Producers are mostly unaware of the type of chemicals on site. Thus, 80% of respondents use other pesticides whose names they do not know and market gardeners treat their crops at any time of the day but most often in the morning, gives graph n°1 below.

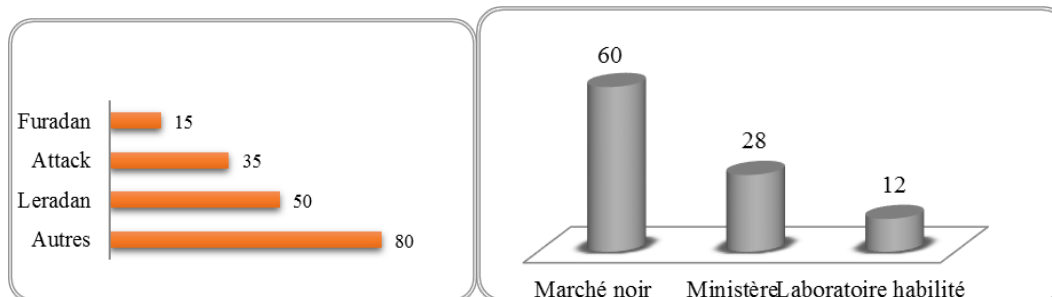
Photos 1 & 2: Sachets of chemical products after use



Graph 1: Chemicals used



Graph 2: Sources of supply of chemicals



Source: Field surveys Mars 2022

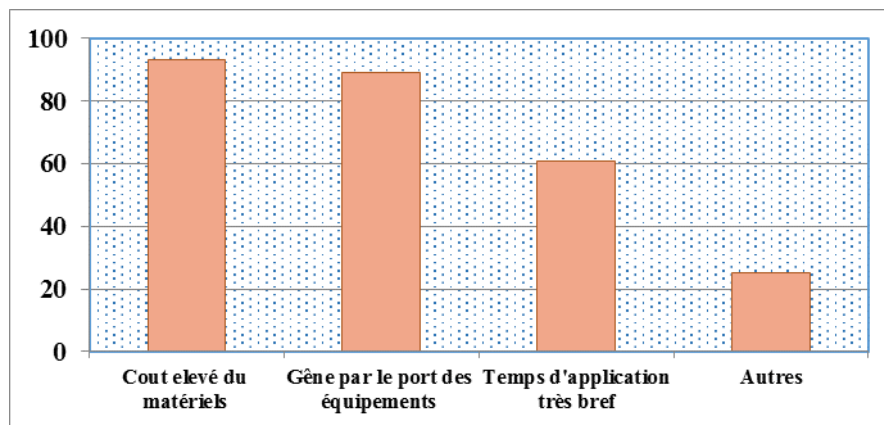
The sachets of pesticides found here and there in the field demonstrate the massive use of pesticides on vegetable crops (Photos 1 & 2) above. However, the products widely used come from local markets which escape the control of the competent authorities (Graph 2) of which 60/ come from the black market, 28/ from the Ministry and 12/ from authorized laboratories.

Inventory of pollution and assessment of the level of exposure of market gardeners to phytosanitary products

In the countries of the South in general, urban agriculture, especially market gardening, is often criticized because of its inconvenient practice due, in large part, to uses contrary to official standards of pesticides on market gardening sites. This state of affairs leads us to consider the risks associated with the use of these phytosanitary products in the market gardening site of Boulmiougou. Thus, the results show that there are innumerable risks associated with the use of pesticides in market gardening. These risks are for the most part intimately linked to the quality of the pesticides used, the behavior and habits of market gardeners when handling these products. In fact, any pesticide spreading activity requires special protection measures. But, through our field trip, it appears that all the market gardeners (100%) hardly protect themselves. Even if market gardeners are convinced of the risks involved in the use of phytosanitary products; several reasons explain this state of affairs: the excessive cost of purchasing equipment (93%), the very short time it takes to apply phytosanitary products (89%), the inconvenience of wearing protective equipment (61%). See Graphic #3 below.

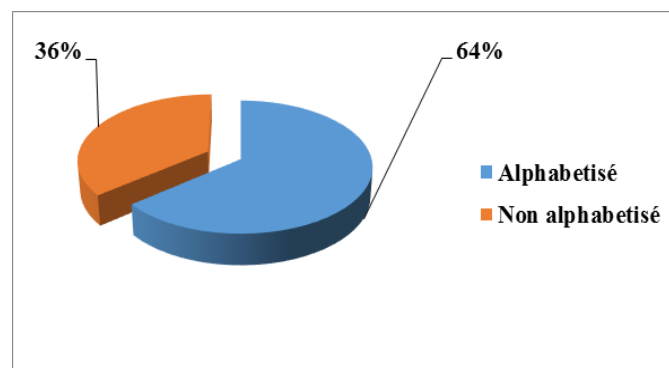
The supply of phytosanitary products for treatments on the sites is not controlled. Producers source more non-approved products (60%) compared to products not recommended by the State or laboratories authorized for treatment. In addition, market gardeners generally do not apply, despite the questionable quality of the pesticides, the application doses prescribed on the packaging by the manufacturer on the packaging. The measuring elements are rather makeshift such as: the caps of the containers of phytosanitary products, the empty tomato cans and the spoons. Several reasons may explain this:

- Illiteracy (only 36% of market gardeners are illiterate) against (64% who can read), which implies difficulties in reading the methods of pesticide use, confers (Graph n°4) below.
- Negligence and self-training, which bring them close or easy-to-reach objects for dosing.



Graph 3: Negligence of phytosanitary protection measures

Source: Field surveys Mars 2022



Graph 4: Literacy level of market gardeners at the Boulmiougou site

Source: Field surveys Mars 2022

The use of chemicals on the market garden site does not respect the barrier gestures and the standards prescribed by the manufacturers (Graph 3). The reasons for this poor use of pesticides are due to the literacy level of market gardeners (Graph 4 above).

Due to the galloping demography, market gardening activities meet the immediate needs of populations in vegetables for urban households. The main products most consumed in urban households are lettuce, cabbage, tomato, onion, etc. as shown in Figure 5.

All the market gardeners surveyed know that it is essential to respect a period between the last application of the phytosanitary product and the harvest. However, festive times are opportunities for these producers to maximize production. These are times when, we observe who there is, an intense application of chemicals to make up for the holidays. Thus, sales are often made before the post-processing date. Very few market gardeners (3%) observe a delay beyond the deficiency indicated on the packaging. This situation makes people much more vulnerable. Numerous publications nowadays show the link between exposure to pesticides and the emergence of numerous human diseases (cancerous, endocrine and neurological pathologies) (Houngnihin et Al, 2001).

The quality of water used for market gardening

Access to clean water for watering market gardening products in urban areas is not easy. Urban spaces used for agricultural purposes constitute unserved spaces, urban lowlands and waterways where the amenities of drinking water services are generally lacking. This situation leads market gardeners to use wastewater from all sources (unbeknownst to consumers) in their market gardening activity. The quantity of waste water is estimated at 600,000 m³ per year in Ouagadougou, from slaughterhouses, breweries and hospitals, which are discharged into the receiving environment without treatment and used by many market gardeners (Golhor, 1995 cited above). by Olahan, 2010). This probably has negative consequences on the health of the population from a pathological point of view. In our study site, the market gardeners dug personalized makeshift wells (Photo 4) here and there in the absence of the watercourse. The water from these wells used to water the plants is usually of questionable quality. Thus, the analysis of water samples from watering wells for market garden products indicates the presence of total coliforms, thermotolerant coliforms, *Escherichia coli* and faecal streptococci, and no presence of helminth eggs. The water samples analyzed therefore do not comply with the potability standards in force in Burkina Faso for drinking water for the bacteriological parameters controlled. The quality of the samples analyzed from a bacteriological and parasitological point of view complies with the microbiological recommendations of the WHO (Blumenthal et al. 2000) for unrestricted irrigation corresponding to category A for market garden crops consumed raw, see Table 1 below.

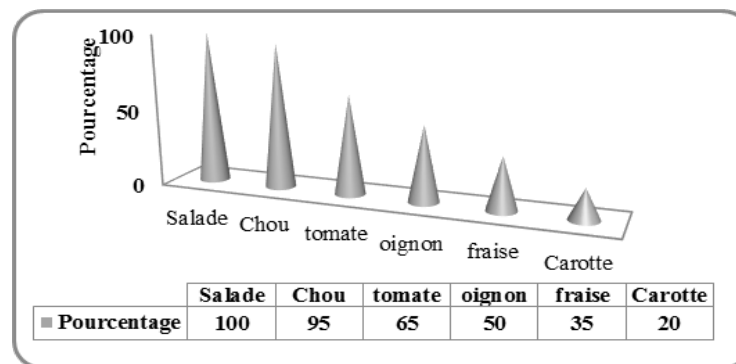
Table 1: Results of microbiological analyzes by the 2IE laboratory of three (03) water samples taken from makeshift wells on the study site

Nomenclature	Unité	Résultats			Normes de potabilité BF	Conditions de Réutilisation Irrigation sans restriction
		E1	E2	E3		
Coliformes totaux à 37°C	*UFC/100 mL	300	315	180	0 UFC/100 mL	
Coliformes thermotolérants à 44°C	UFC/100 mL	208	102	124	0 UFC/100 mL	≤ 10 ³
<i>Escherichia coli</i>	UFC/100 mL	196	42	112	0 UFC/100 mL	
Streptocoques fécaux à 37°C	UFC/100 mL	105	98	115	0 UFC/100 mL	
Œufs d'Helminthes	Œuf/L	0	0	0		≤0,1

*UFC : Unité Formant Colonies



Photo 3 and 4: Salad board & Makeshift well for watering market gardening products
Source: Field survey Mars 2022



Graph 5: Main productions
Source: Field survey Mars 2022

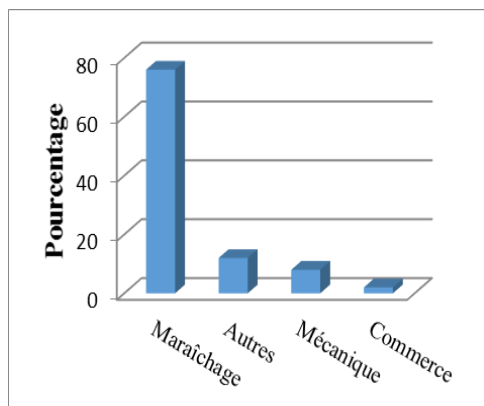
The makeshift wells are dug almost in all the bed of the dam, they make it possible to provide for a time is little with the problem of water which the producers suffered (Photo 4 above).

The market gardening activity feeds its man according to the market gardeners. The products most valued by urban populations are mostly lettuce (Graph 5).

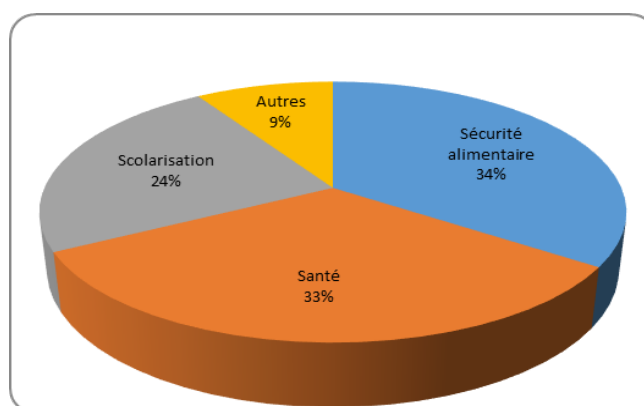
Contribution of communication between actors involved in the market gardening chain:

It appears from this study that most producers are organized in groups in the Boulmiougou site as elsewhere in other sites of the city of Ouagadougou. This form of organization offers more possibilities in terms of awareness and training in the use of pesticides for the benefit of the various actors in the production chain, especially producers. It is therefore an effective communication channel between market gardeners and municipal authorities if these groups were more active in the field. Thus, 100% of the people surveyed find it important to have a communication framework on the use of pesticides. This will also allow them to measure the impact of phytosanitary products on their activities and to sort out the different products used. Market gardening often follows employment problems in urban areas (Moustier, 1999). Market gardening is highly developed (76%) in urban areas and contributes to the most pressing family needs such as food security (34%), health (33%) and children's schooling (24%). Men are generally producers on this site. Women are mostly privileged customers, they are responsible for selling these products on local markets, according to the seasons and the needs of the

consumer. Some farms are also a family business, some men are responsible for production while their wives are responsible for harvesting and selling. This interdependence in the family allows, according to market gardeners, to maximize production. In addition, most of the producers (market gardeners) are an illiterate population who come mainly from our villages and countryside in the form of migration in order to improve their standard of living. This situation favors their ignorance of the risks involved in handling pesticides.



Graph 6: Main activities of producers



Graph 7: Contribution of market gardening

Source: Field survey Mars 2022

The main activity of the workers on the site remains market gardening, even if beyond that they even have other secondary activities (Graph 6). All in all, this activity makes it possible to meet the social needs of market gardeners (Graph 7).

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However, it should be noted that the market gardeners of Boulmiougou affirm that they have not received any training on the safe management of chemicals from their market gardening activities. The training received generally relates to knowledge of the technical itineraries of market gardening. Market gardeners make decisions to treat crops with chemicals. The application of the different products in the perimeter is motivated by the neighborhood according to the advertising made around this or that product. The producers are mostly unaware of the name of the chemicals on the site. The results show that there are innumerable risks associated with the use of pesticides in market gardening. These risks are for the most part intimately linked to the quality of the pesticides used, the behavior and habits of market gardeners when handling these products.

Market gardeners remain convinced that the use of pesticides has a long-term health impact on populations. This suggests that this can be avoided if there was an effective communication plan on the use of pesticides. It is a question of proposing a communication plan on behavior change

in the form of a recommendation for the benefit of the actors and which is broken down into the following points:

RECOMMENDATION

- Provision of approved pesticides
- Provision of a specialist for the use of pesticides;
- Training of market gardeners on the use of pesticides;
- Situation of producers on the good quality of pesticides;
- Delimitation of urban spaces conducive to market gardening activities;
- Availability of protective equipment;
- Establishment of functional groups;
- Orientation of research towards the needs of the population;
- Multiplication of meetings, focus groups for sharing experiences between actors;
- Advocacy with the government to promote the various administrative acts and accompaniments;

CONCLUSION

At the start of this research, the objective was to identify the communication processes in the process of a good appropriation of the uses of pesticides and their dangerousness on health when they are misused. This use requires a minimum of information and knowledge for proper implementation in the field. Under these conditions, it is the role that communication plays in this process that becomes the object of research and the way in which it is organized becomes decisive and practical in the field. The results of the survey made it possible to highlight the challenges of using communication to organize management of the issue of pesticide use in Burkina Faso. This need is based on the fact that market gardening in Burkina Faso is a problem that is both economic and social development, a problem for society in general.

The practice of market gardening is based on several explanations including compensation for seasonal harvests, strengthening the economic and financial fabric of the family, the fight against poverty, food self-sufficiency. For its management, there are communication processes, but which remain embryonic and not formalized. They are the result of a diversity of actors, but who most often focus on issues other than the market gardening activity. This indirect communication has the disadvantage of not enabling all the local opportunities to be set in motion. communication, in terms of tools, actors, context and devices in order to succeed in the challenge of eliminating this form of rampant poverty among our population. The scope of a communicational approach in dealing with the issue will depend on the ability of the actors to formalize a multi-actor consultation framework in order to determine them to act together and to define a common objective for the community around the market gardening activity. This consultation framework would become the locomotive for the production and dissemination of speeches and messages that make sense for society and are oriented towards the progressive elimination of the controversial uses of pesticides that are not recommended in the context of market gardening in our country and which builds loyalty.

The health of both producers and consumers. Also, the role of science in its capacity to organize a constant watch by the production of data on society must be mobilized in order to give meaning to any dynamic of community organization based on the effective knowledge of the

existing, and of promote the possibility of questioning the politicians for appropriate decision-making guaranteeing faith, food security and also a health economy for the entire population of our country, Burkina Faso.

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