Diagnosis of pesticides use on off-season irrigated crops in Goulbi Maradi Valley, Niger

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Introduction

This study aimed at diagnosing pesticides use on off-season irrigated crops in the Goulbi Maradi Valley, Niger, by particularly considering the educational level of farmers. More specially, it involves characterizing the different pesticides used on the site, estimating the proportions of unsuitable practices related to the use of pesticides, determining the proportion of discomforts and the skills to adopt in this case.

Research questions

Are the main pesticides used in Goulbi Maradi Valley different from others in this region? How do the proportion of unsuitable practices evolve in this area? Are they influenced by education level of producers? Is the relationship between unsuitable practices and education level of farmers significant? What are the types of discomforts inventoried and the skills to adopt as countermeasures?

Theoretical and conceptual framework

According to Youchaou & Alhou (2022), Zabeirou & *al.* (2018), Kanda & *al.* (2013), unsuitable practices of market gardeners have been observed and those are mainly due to their low level of education. Moreover, 100% of farmers use pesticides (including prohibited pesticides) to fight against crops enemies.

Methodology

A survey was conducted in the municipalities of Djiratawa, Maradi 3, and Tibiri (Figure 1) with 692 farmers aged between 16 to 83 years. The information collected related to the socio-demographic characteristics of the respondents, the pesticides used and the practices associated with their handling. To this end, 12 sites were selected, including 3 in Djiratawa, 3 in Maradi and 6 in Tibiri (Figure 1). SPSS 20.0 is used for data processing while the Bayesian Loglinear Model is used for data analysis to determine the correlation between the unsuitable practices and the education level of farmers.

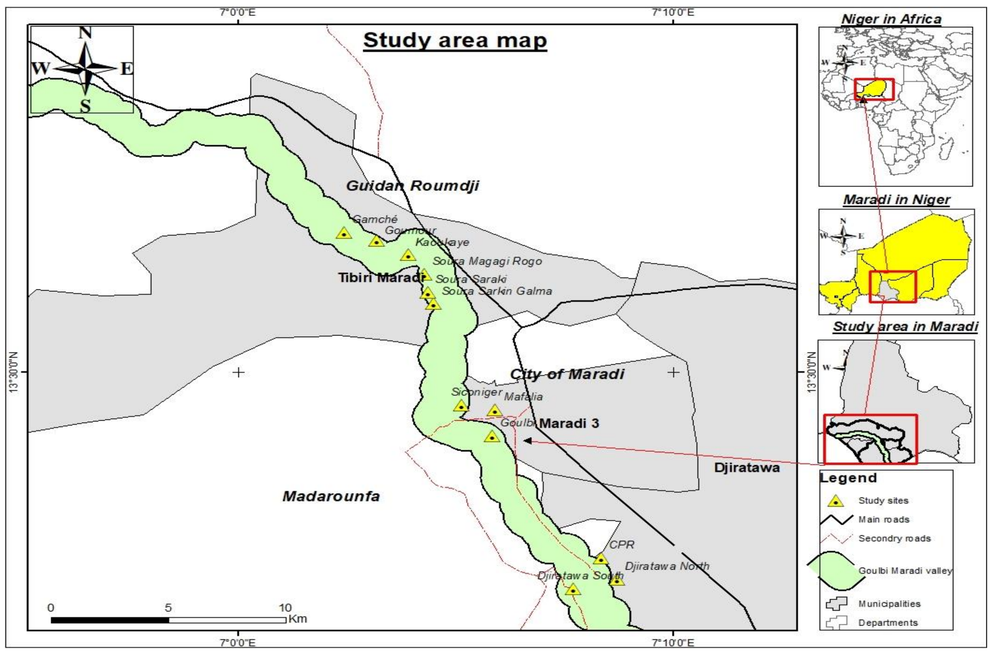


Figure 1: Location of study sites

Findings

Table 1: Chart of pesticides inventoried on the site — Authorized | Unauthorized | Prohibited | Organic

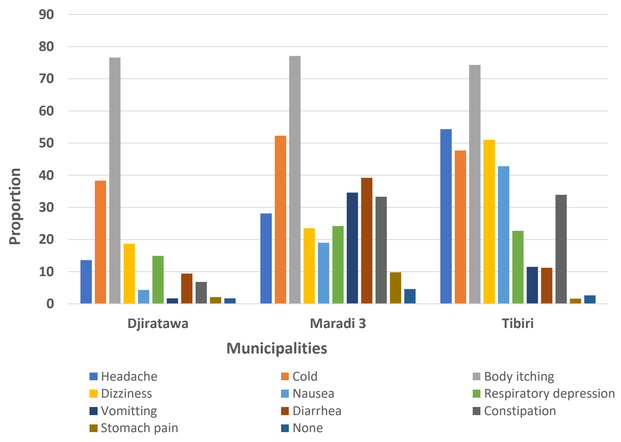
Active ingredient	Chemical family	Category	WHO Class	Citation frequency (%)
Emamectin benzoate	Avermectin	Insecticide	III	56.3
Chlorpyrifos	Organophosphorate + Organochlorate	Insecticide	II	49.9
Abamectin	Avermectin	Insecticide + Acaricide + Nematicide	Ib	41.2
Imidacloprid	Neonicotinoid	Insecticide	II	33.0
Lamda-cyhalothrin	Pyrethroid	Insecticide	II	32.5
Dichlorvos	Organophosphorate	Insecticide	Ib	21.8
Cypermethrin	Pyrethroid	Insecticide	II	14.8
Glyphosate	Organophosphorate	Herbicide	III	12.2
Acetamiprid	Neonicotinoid	Insecticide	II	11.9
Thiram	Carbamate	Fungicide	II	7.1
Mlekovita	Organic (Bio)	Multipurpose	-	7.1
Paraquat Dichloride	Bipyridilium	Herbicide	II	5.4
Mancozeb	Avermectin	Fungicide	U	5.1
Dimethoate	Organophosphorate	Insecticide + Acaricide	II	3.6
Permethrin	Pyrethroid	Insecticide	II	2.0
Profenofos	Organophosphorate	Acaricide	II	1.6
Butachlor	Avermectin	Herbicide	III	0.7
Malathion	Organophosphorate	Insecticide	III	0.4
Tebuconazole	Triazole	Fungicide	II	0.4
Metalaxyl-M	Anilide	Fungicide	II	0.4
Total (%)				307,4

Table 2: Chart of independence test between unsuitable practices and education level of farmers in (left) and proportions of these practices in (right)

	Value	df	Asymptotic Sig.(2-sided)
Bayes Factor	.002[a]		
Pearson Chi-Square	39.799[b]	4	**.000**

a. This analysis tests independence versus association, and assumes a multinominal model and conjugate priors.
b. Cells (10%) have expected count less than 5. The minimum expected count is 2.874.
p-value =0.000 < 0.05 → significant relationship between unsuitable practices (dependent variable) and education level (independent variable).

Education level		Unsuitable practices (%)	Appropriate practices (%)
	Illitrate	87.0	13.0
	Koranic	85.6	14.4
	Primary	85.1	14.9
	Secondry	76.9	23.1
	University	29.4	70.6
Total		82.5	17.5



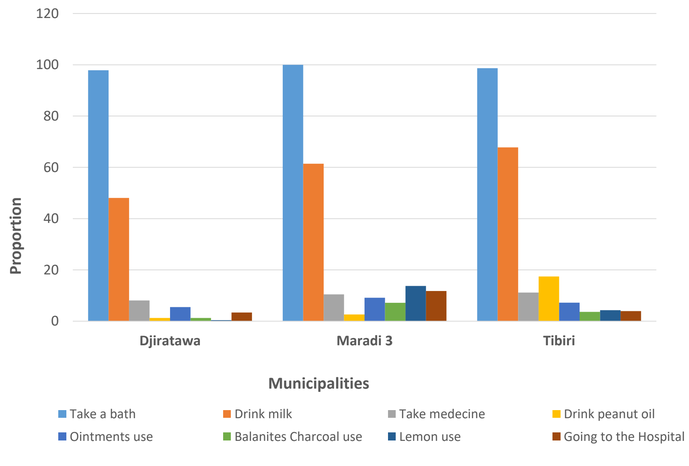


Figure 2: Graph illustrating the type of discomforts (left), and countermeasures (right) inventoried

Conclusion

At the end of this work, it appears that Emamectin, Chlorpyrifos and Abamectin are the most important pesticides used in Goulbi Maradi Valley whereas Malathion, Tebuconazole, Metalaxyl are the least important. This study reveals the using of two active ingredients prohibited by Sahelian Pesticides Committee notably Paraquat Dichloride and Dichlorvos. In fact, there is a significant relationship between unsuitable practices and education level of the farmers and the proportion of these practices increase while the education level of farmers decrease.

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