



Quantification of Current use and Management of Pesticides by Farmers in Oriental Morocco: The Case of Berkane District, Morocco

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Abstract

Little is known about agricultural pest management and pesticide uses by farmers in oriental Morocco. No information exists on the quantities of pesticide applications, nor the knowledge and management of these agrochemical products used. Our objectives were to determine the extent of pesticide uses and agricultural pest knowledge of farmers in this region. A structured questionnaire survey was carried out. The area comprises Berkane district, a rural region known by a great agriculture activity. 140 interviewers, including farmers, sellers and producers, using a standardized questionnaire were randomly selected to quantify the pesticides used in this region and to assess the knowledge, attitudes, and practices toward these chemicals. We found that more than 280 tons are used with a ratio use of 7kg/Ha, furthermore the farmers had a low level of education, and lack knowledge on pesticide dangers. In this work we attempt to highlighted the use of contraband pesticides in this area. Besides the misuse of pesticides and the preventive measure taken were low in correlation with the educational level. Pesticide safety education is necessary in order to induce protective behavior among farmers. The government must ensure a proper legislation toward phytosanitary product to fight the use of smuggled product and sensitize the users about their danger.

Keywords: Pesticides, knowledge, preventive measures, contraband pesticide.

Introduction

At the global level, the use of pesticides has proved to assist solving of many problems facing human health and food production. However, such usage has occasionally been accompanied with hazards to man and the environment, and considering their toxicological properties, persistence, presence and concentration in the food chain they constitute a true danger for the environment and the Human well being¹. Even though their ability to protect crops, incorrect or intensively used pesticides, according to many studies, could have harmful effects on human health and environment²⁻⁵.

Farm workers, particularly in developing countries, are at a high risk of experiencing short- and long-term health effects from exposures to pesticides⁶⁻⁷. Many studies indicated that used of pesticides by farmers revealed many incidences affecting human health such as cancer, kidney failure, etc⁸⁻⁹.

Our Objectives was to assess the quantity used in the region, the level of knowledge and practice related to the agricultural workers.

Material and Methods

Area of study: The area of Eastern Morocco is located, as shown in figure-1, in East north of Morocco. It is limited to

North by the Mediterranean, the East and the South by the Algerian borders, in the West by the provinces of Alhoceima, Taza, Boulmmame and Errachidia. The majority of agriculture within the area of Eastern Morocco concentrates on the level of lower Moulouya irrigated perimeter (figure-2) which extends on 160 000 ha of arable land, including 80 000 ha irrigated. The province of Berkane, when we conduct our inquiry, is about 60 000 ha of arable land with 40.000 ha irrigated so the half of irrigated land in this perimeter.

The Principal's Cultures in this area are: Clementine, Cereal cultures and Truck farming (potato, tomato, artichoke....). According to the data provided from ORMVAM (the Regional Office of Agricultural Valorizations of Moulouya).

Inquiry: Our investigation was done in the agricultural campaign during 2008/2009, we elaborate two questionnaire: i. The sellers, who content question about the quantity soled. The data was gathering near 6 societies of pesticides implanted in the area, and 5 resellers of phytosanitary product. The total of person implicated is 11 with an age's bracket between 25 to 63 years. ii. A cross sectional study among 140 randomly selected agricultural workers, was conducted in Berkane region situated in North-East of Morocco.

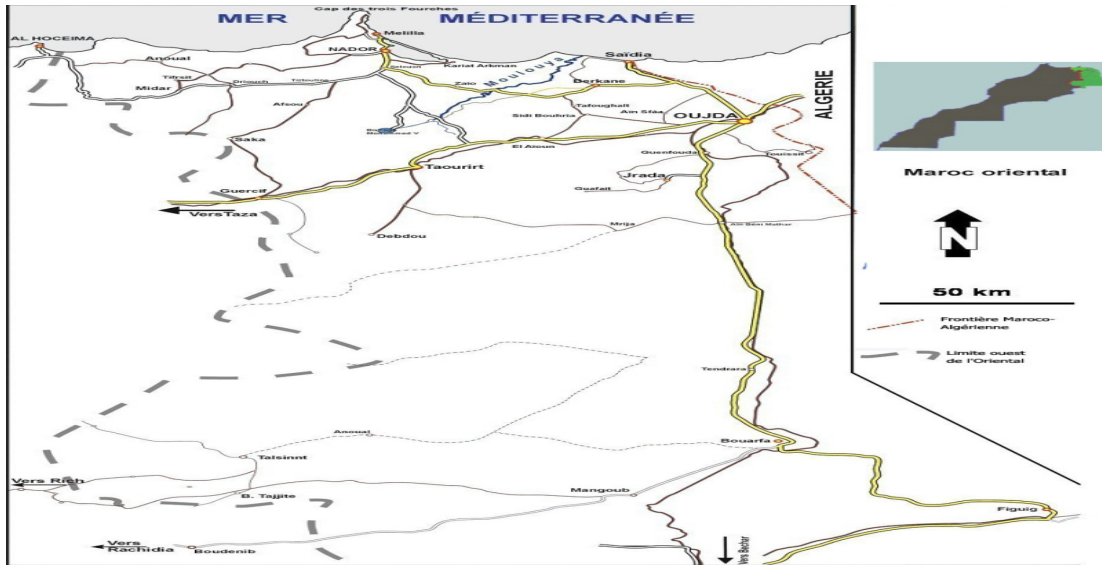


Figure-1
The oriental Morocco

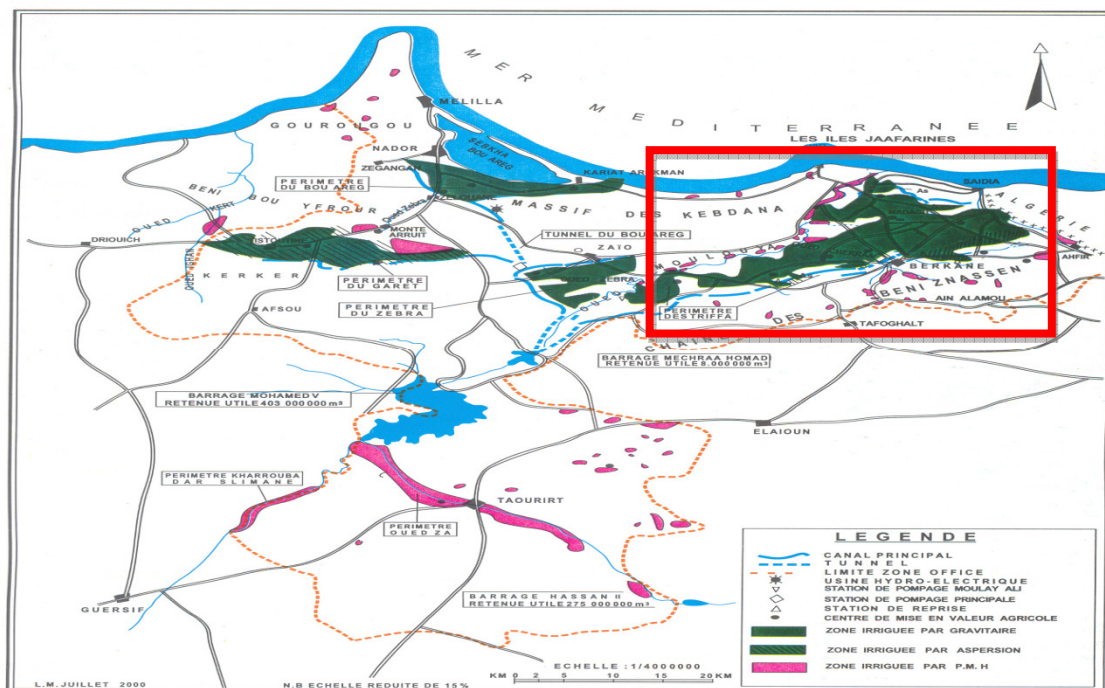


Figure 2
The region of study in the red box

Results and Discussion

Quantity of pesticides used: The quantity found is about 282 tons and the irrigated land in the region of study is 40 000 Ha, and by doing a simple calculus: the quantities of pesticides used (kg) divided by the land (Ha), we found that the application rate of pesticides per hectare are 7 Kg/Ha and the national ratio is

about 8,3Kg/Ha. The insecticides are the most used in the area of study followed by fungicide and herbicide (figure-3)

Demographic of study from farmers: All the participants were male with mean age of 43 yrs. About 26% was illiterate . Around 8% has been in university and only 5% was specialist (agronomy technician or engineer). The global education level

was in relation with the age of the farmers, the more aged was the subject the lower was his level of education figure-4.

Pesticides knowledge and prevention measures: In fact 80% of farmers considered pesticide as toxic product, meanwhile 55% need appropriate education about pesticide, however more than 66% do not use effective measure of security (table 1), and 50% not respect the dose prescript when they spread the phytosanitary product on their crop; only 20% affirmed they respect both the manufacturer notification of use and the dose. More than 40% do not use any special prevention measure while they manipulate the pesticide, and 30% of the farmers affirm they believe that only by washing hand or shower after use avoid the harm effect, and 88% do not know about the list of forbidden pesticide as indicated in official law. In addition

container fate was also investigated indeed 70% of the subjects would dump the container into the environment (soil or water) or with other trash.

Origin of the pesticide used: The smuggling activity is very extended in the area of study, because the vicinity of the region to the Morocco-Algerian frontier. In our inquiry we took account about the origin of the phytosanitary product used, if the purchase of pesticide by farmers has been done legally or using smuggling way (black-market pesticides). In this respect, our results indicate that more than 55% affirmed the use of approved pesticide only, 19% used contraband products and 26% of the farmers combine between an approved and contraband products (figure 5).

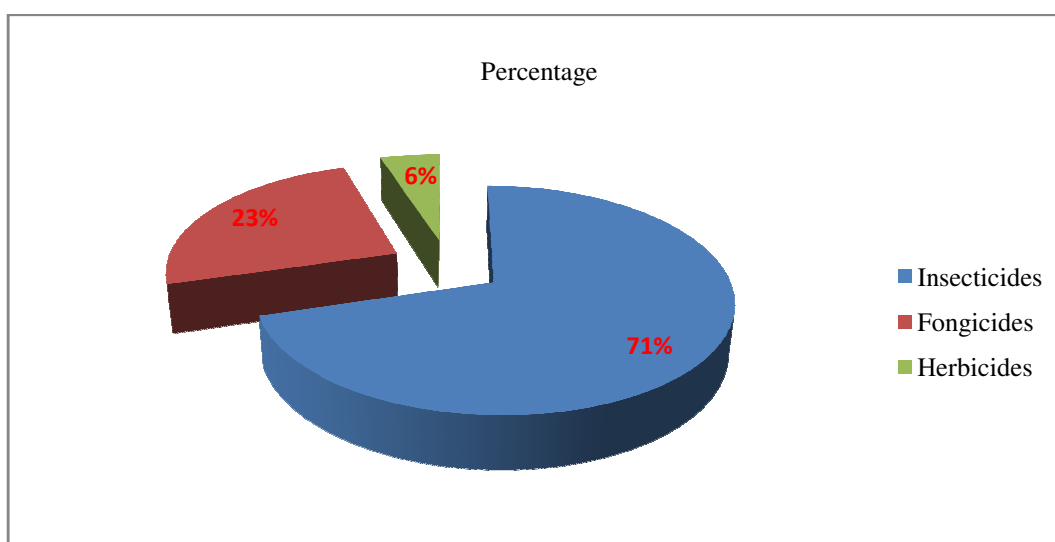


Figure-3
Percentage of classes of pesticides used in Berkane

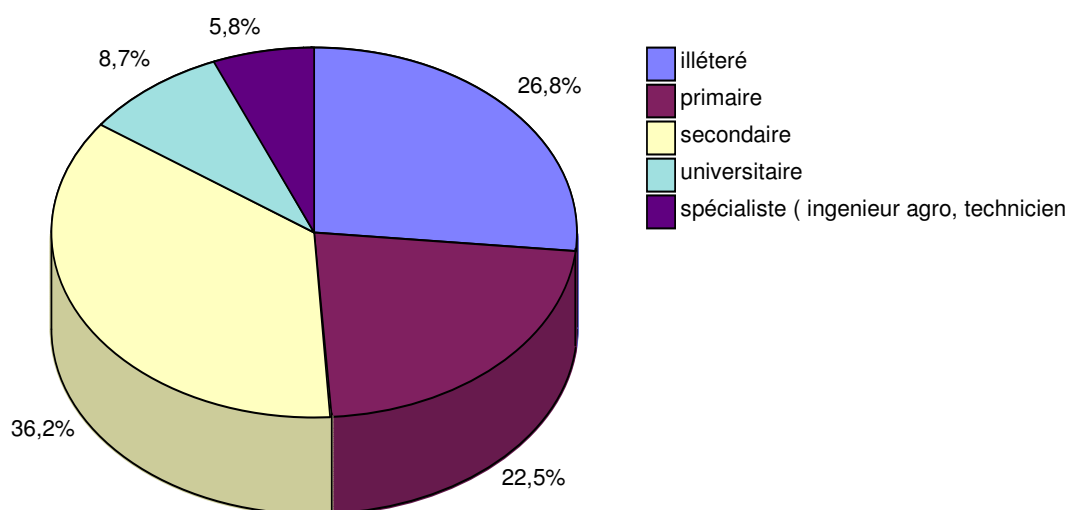


Figure-4
Demographic characteristics of population

Table-1
Pesticide knowledge of the farmers

Know that the pesticide are toxic	N= 140	%
	112	80
Think he need pesticide education	77	55
Respect the manufacturer notification of use and dose	28	20
Respect notification of security of use only	12	8.6
Respect dose only	41	29.3
Do not respect any	59	42.1
Eat and smoke while they use the pesticides	35	25
Take useless prevention measures	42	30
Do not know about the list of forbidden pesticides	123	88

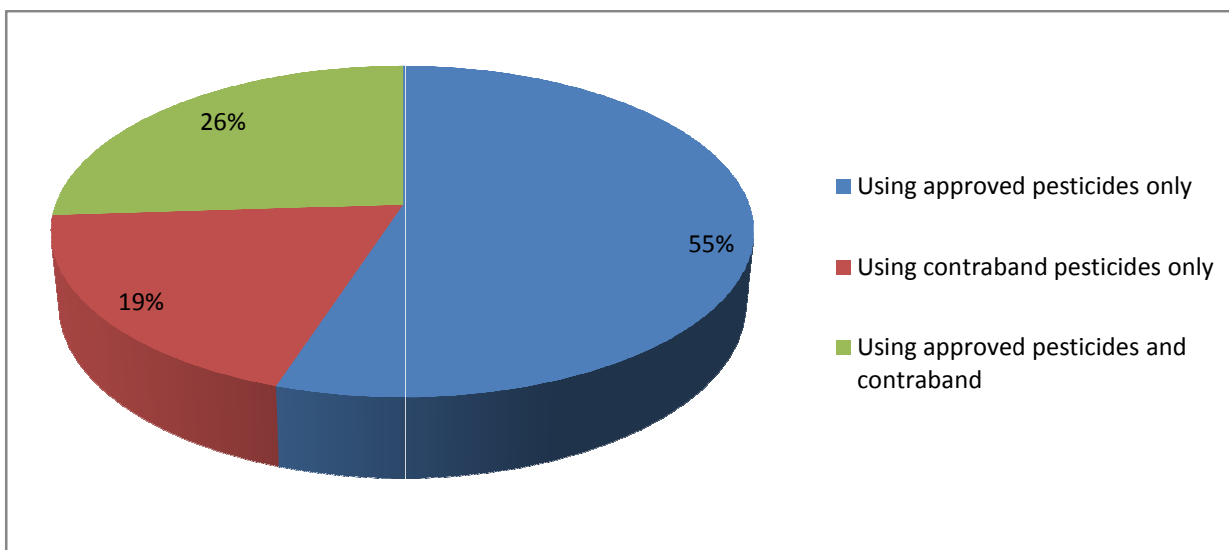


Figure-5
Origin of pesticides used by farmers

Discussion: according to several studies, Moroccan's farmers, used smaller quantities of pesticides than farmers in high income countries, but Moroccan users are more vulnerable to the risks arising from their use than the farmers in developed countries¹⁰⁻¹². This discrepancy is to the misuse of pesticides by Moroccan farmers. Besides the illiteracy, lack of knowledge, and the gap of legislation managing agrochemical product sector stress this phenomena.

Our result indicate that the ration of use in the region of study is about (7kg/Ha), this ratio is lower than the national one (8,3 kg/Ha). This difference is justified by the high cost of approval pesticides and the low income. These parameters lead to the use of smuggled products (low cost) which contain banned pesticides such as dicofol¹³.

Lacking in knowledge and the ignorance of prevention measure about pesticide constitute a potential risk of using this chemical product. In fact the level of education is considered as the main factor in this issue. There is evidence that illiteracy is an important barrier to the adoption of self-protective behaviors in the developing world, including agricultural workers¹⁴⁻¹⁹.

A pressing need of pesticide education and training on the use of these phytosanitary products improve and ameliorate the situation. Indeed the WHO has recommended the use of pesticides only by trained people²⁰. In most developing countries; a number of important obstacles to agrochemical safety can be identified: an insufficient legislation for phytosanitary product use and registration, in addition to a deficiency of technical research facilities to monitor residues of pesticides and their effects¹³.

Conclusion

Although, Morocco has national standards of using the agrochemical products, the farmers, till now, don't respect the national program. Furthermore, the oriental Morocco region is flooded with smuggled improper pesticides which are not comply with quality standards and are prohibited. These applications attribute greatly to the environmental and health hazard, that's why, the law enforcement, for the agricultural sector is essential. In this respect, the government bodies have an important and major role because both producers and users

are not likely to limit themselves in the sales and use of pesticides

References

1. Rakitsky V.N., Koblyakov V.A. and Turusov V.S., Nongenotoxic (Epigenetic) Carcinogens: Pesticides as an Example, A Critical Review, *Teratogenesis, Carcinogenesis, and Mutagenesis*, (2000)
2. Damalas C.A., Understanding benefits and risks of pesticide use, *Sci Res Essays*, **4**, 945–9 (2009)
3. Hvistendahl M., In rural Asia, locking up poisons to prevent suicides, *Science*, **341**, 738–9 (2013)
4. Verger P.J. and Boobis A.R., Reevaluate pesticides for food security and safety, *Science*, **341**, 717–8 (2013)
5. Peshin R. and Dhawan A.K., Environmental and Economic Costs of the Application of Pesticides Primarily in the United States, (2009)
6. Yassin M.M., Abu Mourad T.A. and Saffi J.M., Knowledge, attitude, practice, and toxicity symptoms associated with pesticide use among farm workers in the Gaza Strip, *Occup. Environ. Med.*, **59**, 387–393 (2002)
7. London L., Myers J.E., Nell V.N., Taylor T. and Thompson M.L., An investigation into neurological and neurobehavioral effects of long-term agricultural use among deciduous fruit farm workers in the western cape, South Africa, *Environ. Res.*, **73**, 132–145 (1997)
8. B.S. Kaphalia and T.D. Seth, Chlorinated pesticide residues in blood plasma and adipose tissue of normal and exposed human population, *Indian J. Med. Res.*, **77**, 245–247 (1983)
9. R.S. Battu, B. Singh and B.K. Kang, Contamination of liquid milk and butter with pesticide residues in the Ludhiana district of Punjab state, *Ecotoxicol. Environ. Safety*, **59**, 324–331 (2004)
10. Panuwet P., Prapamontol T., Chantara S., Thavornnyuthikarn P., Montesano M.A., Whitehead Jr. R.D. and Barr D.B., Concentrations of urinary pesticide metabolites in small-scale farmers in Chiang Mai province, Thailand, *Science of The Total Environment*, **407**, 655–668 (2008)
11. WHO, Public health impact of pesticides used in agriculture, World Health Organization, Geneva (1990)
12. Wesseling C., van Wendel de Joode B., Ruepert C., León C., Monge P., Hermosillo H. and Partanen T., Paraquat in developing countries, *Journal of Occupational and Environmental Health*, **7**, 275–286 (2001)
13. Benaboud J., Oujidi J., Elachouri M. and Chafi A., Pesticides used by Moroccan's farmer in oriental Morocco: Case of Berkane region, *Acad. J. Environ. Sci.*, **2**(4), 052–058 (2014)
14. Kimani V.N. and Mwanthi M.A., Agrochemicals exposure and health implications in Githunguri Location, Kenya. *East Afr Med J.*, **72**, 531–5 (1995)
15. Pasiani J.O., Torres P., Silva J.R., Diniz B.Z. and Caldas E.D., Knowledge, attitudes, practices and biomonitoring of farmers and residents exposed to pesticides in Brazil, *Int J Environ Res Public Health*, **9**, 3051–68 (2012)
16. Stadlinger N., Mmochi A.J., Dobo S., Gyllbäck E. and Kumblad L., Pesticide use among smallholder rice farmers in Tanzania, *Environ Dev Sustain*, **13**, 641–56 (2011)
17. Salameh P.R., Baldi I., Brochard P. and Saleh B.A., Pesticides in Lebanon: a knowledge, attitude, and practice study, *Environ Res.*, **94**, 1–6 (2004)
18. Karunamoorthi K., Mohammed A. and Jemal Z., Peasant association member's knowledge, attitudes, and practices towards safe use of pesticide management. *Am J Ind Med*; **54**, 965–70 (2011)
19. Blanco-Muñoz J. and Lacasaña M., Practices in pesticide handling and the use of personal protective equipment in Mexican agricultural workers, *J Agromedicine*, **16**, 117–26 (2011)
20. WHO, Safe use of pesticides, *Technical Report Series*, 813, 1–26, WHO, Geneva (1991)