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PESTICIDE USE AND MANAGEMENT IN CANATLAN, DURANGO (MEXICO)

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Abstract: Information on pesticide use and management patterns in agriculture in Mexico is scarce. The objective of this research was to identify the use and management of pesticides used in the municipality of Canatlán (Durango) through the application of surveys to fruit growers and retailers in the region. A total of 104 surveys were administered in two stages using convenience sampling. The total number of respondents applied pesticides three times a year, specifically in the months of May, June and July. The most commonly used pesticides were identified as calypso, malathion, alika, hierbamine, cypemetrin and chlorpyrifus. In terms of the management of pesticide residues, 80% of those surveyed mentioned that they burn them and the rest throw them out in the open.
Keywords: Canatlan**,** pesticides, use.

INTRODUCTION

Pesticides are considered chemical compounds of great interest for agricultural production because they reduce damage and losses caused by the action of weeds, insects and infectious diseases on crops (Ramírez and Lacasaña 2001). However, as a consequence of the indiscriminate use of pesticides, the environment is deteriorated and when they come into contact with the human population, a public health problem is created (Plenge-Tellechea and Sierra-Fonseca 2007). Due to their chemical composition and the alterations they cause, some of them were banned in Mexico although they continue to be used illegally since they can reach lower costs than others that present a lower degree of toxicity (Bejarano, 2017).

Information regarding the patterns of pesticide use and management in agriculture in Mexico are scarce, some studies report their use in states such as Campeche, Chiapas, State of Mexico, Morelos, Nayarit, Puebla, Sinaloa, Sonora, Tabasco, Tamaulipas, Veracruz and Yucatan so there are no national statistics on the use of agrochemicals (Garcia Hernandez *et al.,* 2018). Pesticide use studies have been conducted in the apple-growing region of northwestern Chihuahua, where the presence of parathion, chlorpyrifos, triadimefon, among others, has been reported (Ramírez-Legarreta and Jacobo-Cuéllar, 2002). There is evidence of the presence of pesticides in the melon (*Cucumis melo* L.) growing region of the Comarca Lagunera (Mexico) such as chlorothalonil, elemental sulfur, endosulfan, carbofuran, carbendazim, copper oxychloride and mancozeb, in that study the municipalities of Mapimí and Tlahualilo belonging to the state of Durango are included (Vargas-González *et al.*, 2019).

According to Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA, 2015) the main national apple (*Malus doméstica*) producers with respect to the national planted area are Chihuahua with 43%, Durango 18%, Puebla 14% and Coahuila 12%. Since there are no reports on the sale, use and/or management of pesticides in the apple-growing region of Canatlán (Durango), this study was developed with the purpose of identifying the pesticides that are marketed and used by fruit growers. Therefore, the objective of this research was to identify the use and management of pesticides used in the municipality of Canatlan (Durango) through the application of surveys to fruit growers and retailers in the region.

METHODOLOGY

The study was conducted in the municipality of Canatlán, Durango, which is geographically located between parallels 24° 12' and 24° 51' north latitude; meridians 104° 26' and 105° 31' west longitude; altitude between 1,900 and 3,300 m (Figure 1); according to the National Institute of Statistics and Geography, land use in agriculture is 18.8% (INEGI, 2010).

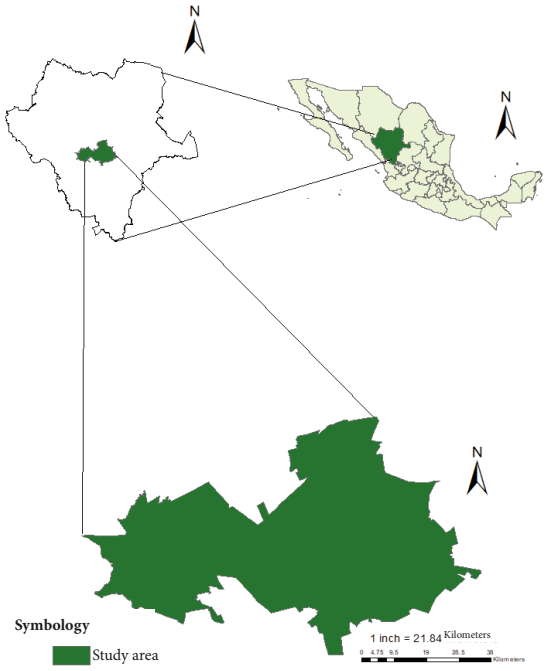

Figure 1. Location of the municipality of Canatlán, Durango, Mexico.

For data collection, 104 surveys were applied in two stages by means of convenience sampling, which consists of selecting the most available cases and the most likely affected population that has constant contact with pesticides. In the first stage, four surveys were applied in person to the owners or managers of agrochemical stores in May 2022 in order to obtain information on the most sold products and to identify whether the stores have protective measures and/or a specific warehouse for pesticides. In the second stage, 100 surveys were applied to fruit growers in the region, 90 of them in person and 10 virtually in June 2022.

With the data obtained from the surveys applied, percentages were calculated for the information collected.

RESULTS

FIRST STAGE

From the surveys applied in the selected stores, it was found that 100% of the distributors recommend new generation pesticides because they are environmentally friendly, and the retailers mentioned that the selection of pesticides is based on the quality, efficiency and price of the product. According to the sales pattern in the municipality of Canatlán, Table 1 shows the most sold pesticides, including organophosphates and pyrethroids.

Pesticides	Percentage of sales (%)
Calypso, malation and alika	98
Hierbamine, cypemetryn and chlorpyrifus	2

Table 1. Most sold pesticides in Canatlán, Durango (Mexico).

With respect to the protective measures used by the vendors to handle pesticides, it was found that the majority (75%) do not have adequate protective measures because they do not consider it necessary, while 25% of the vendors mentioned that they use latex gloves when providing them to the client (Figure 2).

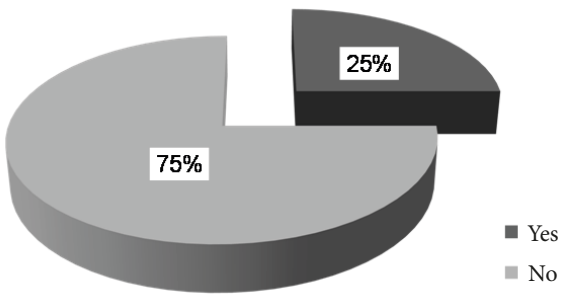

Figure 2. Proportion of vendors using protective measures.

In addition, it was found that most of the stores have an exclusive place to store agrochemicals or a warehouse for this purpose.

SECOND STAGE

The surveys applied to the fruit growers showed that 90% do not know the name of the pesticides and apply those suggested by the retailers, while 10% mentioned that they do know the name of the pesticide they use. When asked about the protective measures they use when applying pesticides, 50% of them indicated that they use gloves and masks, the rest did not use anything.

The survey also revealed that 100% of respondents apply pesticides three times a year, specifically in May, June and July.

Another part of the survey evaluated the management of pesticide residues and as can be seen in Figure 3, 80% of them burn the residues and 20% of them throw them outdoors in the same fields, which implies that some environmental compartments may be contaminated.

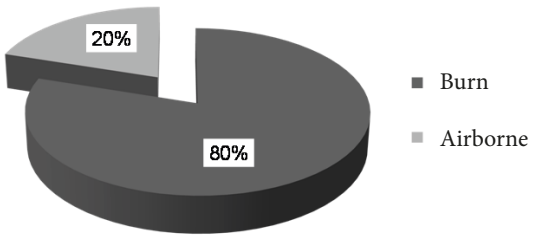

Figure 3. Proportion of pesticide residue management.

When fruit growers were questioned about intoxications, 90% of them mentioned that there have been no intoxications and 10% stated that they have witnessed them. They also commented that households do not take the precaution of separating the products from the areas of greatest concurrence, which implies the risk of intoxication.

According to the results of this study, we found that agrochemical sellers give advice on the pesticides available, so it is suggested that they be constantly trained on their use and handling. The above information is of great importance given that related studies establish that the risk of suffering agrochemical poisoning is associated with technical ignorance, lack of training on the use and handling of agrochemicals, as well as the information that businesses provide to users, which results in a superficial knowledge on the part of farmers that constantly puts them at risk (Guzmán-Plazola *et al.*, 2016).

CONCLUSIONS

100% of interviewees apply pesticides three times a year, specifically in the months of May, June and July.

The most commonly used pesticides were identified as calypso, malathion, alika, hierbamine, cypemetrin and chlorpyrifus.

50% of the respondents revealed that they do not use protective measures when applying pesticides.

Regarding the management of pesticide residues, 80% of the respondents burn them and the rest throw them in the open air.

Agrochemical vendors provide advice on the pesticides available, so it is suggested that they be constantly trained on the use and handling of pesticides.

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