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Multiresidual analysis of pesticides in a soil with cacao culture, in Úrsulo Galván, Veracruz

Análisis multiresidual de pesticidas en un suelo con cultivo de cacao, en Úrsulo Galván, Veracruz

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Abstract

In the world and in Mexico, very risky agricultural practices are carried out due to the irrational use of chemical products, many of these practices have as a consequence the contamination of active ingredients of agrochemicals to human beings, after ingesting the foods they consume in their life daily. Unfortunately, only developed countries restrict entry to agricultural products that do not have a certain regulation in their production cycle, an example of this is that they even ask for certifications of good agricultural practices, as well as manufacturing, they even require studies of the products that They are exported to ensure or guarantee that they comply with the norms and harvest intervals of the application of chemical products, an example of all the above is the multi-residual pesticide analyzes, which ensure that the fruit or product, as well as the soils, is found free of the main agrochemicals used for crop production. A very simple practice in the cultivation of Cacao (*Theobroma cacao* L), in the Úrsulo Galván region, would be to carry out multi-residual analyzes on the soils, as we remember that many of the active ingredients of agrochemicals are where they remain the longest, before undergo any change in its process or stop being harmful.

Irrational use, Agrochemicals, Active ingredients, Soils

Resumen

En el mundo y en México se realizan prácticas agrícolas muy riesgosas debido al uso irracional de los productos químicos, muchas de estás praxis tienen como consecuencia la contaminación de ingredientes activos de agroquímicos a los seres humanos, después de ingerir los alimentos que consumen en su vida diaria. Lamentablemente sólo los países desarrollados restringen el ingreso a los productos agrícolas que no cuentan con una determinada normativa en su ciclo de producción, ejemplo de ello es que incluso piden certificaciones de buenas prácticas agrícolas, así como de manufactura, incluso requieren estudios de los productos que se exportan para asegurar o garantizar que cumplen con las normas e intervalos de cosecha de la aplicación de productos químicos, ejemplo de todo lo anterior son los análisis multiresiduales de pesticidas, los cuales aseguran que el fruto o producto, así como los suelos, se encuentra libre de los principales agroquímicos que se utilizan para la producción de cultivos. Una práctica muy sencilla en el cultivo de Cacao (*Theobroma cacao* L), en la región de Úrsulo Galván, sería la realización de análisis multiresiduales a los suelos, pues recordemos que muchos de los ingredientes activos de agroquímicos son donde permanecen más tiempo, antes de sufrir algún cambio en su proceso o dejar de ser perjudiciales.

Uso irracional, Agroquímicos, Ingredientes activos, Suelos

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Introduction

At present, irrational uses of agrochemicals can not only damage or contaminate soils, but also the environment, as well as human beings through the ingestion of food that has not respected the harvest intervals for the application. of inputs or the use of very toxic products. It is because of the above, the importance of the MEXICAN STANDARD NMX-AA-91-1987, because by increasing agricultural production, the times that should be allowed for the application of inputs are not respected. According to Ryan et al. (2008), Human health as well as the well-being of people are strongly affected by factors or lifestyle, among which is smoking, hygiene, food and physical activity, that is, everything that implies behaviors that are potentially controllable by the same human being.

Under this approach, it is necessary not only to have knowledge and experience, but also to use the most friendly products with nature, without neglecting the yield of agricultural crops and preserving the principles of sustainability (Alejo-Santiago et al. 2015).

Although the benefits of pesticides are clear and important in agricultural production, a good use and better management must be made of them, to control the dangers that can originate in the different stages or productive cycles of the crop, such as production, transport, storage or application, the latter being one of the most important due to the risks of contaminating the environment, air, water, soils, as well as food, by being left with active ingredients of the product used, causing severe effects on human health and preventing its commercialization for export (Guerrero, 2003).

An erroneous justification for all this is that due to the low yields obtained in the production cycles, an excessive and irrational use of products must be made, however that is not the case, because despite the fact that technology or resources may be needed to technify In the productive system, there are agricultural practices such as the incorporation of compost into the soil or vermicompost, which also contribute to an increase in enzymatic activity and improve its physical properties (Uribe, 2008).

Something very simple can be very difficult to understand when you do not have enough information or skills in some topics, an example of this is the use of hormones, because it has advantages such as higher quality of commercial product, lower risk of insect bites pollinators and greater vigor of the crop, but it can interact with other foliar chemicals and cause stress to the crop (Tapia-Vargas et al. 2016).

Even pesticides not only produce acute or chronic effects in the environment, but also human health, since many of them can cause alterations or modifications in the genetic material (Benitez-Leite et al. 2012). They also affect the nervous system, damaging the lungs, reproductive organs, dysfunction of the endocrine system, the immune system, birth defects, as well as cancer, additionally some cases of acute poisoning are also attached, which generate a cause of morbidity and mortality throughout the world. world, developing countries are sadly particularly susceptible due to poor regulation or enforcement of the law, a lack of values and inadequate access to information systems (Thundiyil et al. 2008).

Hence the importance of carrying out the present investigation and verifying or knowing that according to the Multiresidual analysis of pesticides, our soil is free from the presence of active ingredients and that therefore the management that has been provided is the optimal one to take care of the health of the consumer, but also to respect the flora and fauna found in this agroecosystem, called cocoa plot or cultivation.

Objectives

Determine if the soil of the experimental cocoa plot (Theobroma cacao L), has the presence of active ingredients of agrochemicals.

Methodology

The experimental research was carried out in the municipality of Úrsulo Galván, Ver, Mexico.

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Location of the experimental area

The experiment was carried out at the facilities of the National Technology of Mexico Campus Úrsulo Galván. In the parallels 19º 24´ 48.91 ”of north longitude and 96 ° 21´ 09.10” of west latitude, with an elevation of 20 meters above sea level (masl).

Climatic characteristics

The climatic conditions present an annual precipitation of 1,350 mm per year, with a greater amount in the months of June to September and the dry period from January to May, has an average temperature of 24 to 25 ° C with a maximum of 35 ° C and a minimum of 16 ° C, the relative humidity is 80% on average.

Vegetative characteristics

In this area there is a predominant vegetation consisting of induced grasslands, low deciduous forest, rain-fed and irrigated agriculture, as well as lesser presence of vegetation, from thickets dominated by legumes to boiling acahuales.

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A soil with a clay crumb texture predominates with an acid pH of 5.5 to 5.9.

Description of the experimental area

The experimental area is made up of 500 m^2 in which the following species are distributed: cocoa, banana, Persian lemon and avocado.

The experimental plot was established since October 2016 and basically the management that is applied is as follows: one application per year of compost (cachaça waste from the La Gloria sugar mill), which consists of making four holes of 50 cm each in the soil, at a distance of 1m from each cocoa tree and add 5 kg of compost for each hole, then cover it; The second fertilization is carried out with vermicompost, repeating the previous procedure, although the amount changes, since only 3 kg tree-1 are applied, while to the foliar application 1kg of Gro-Green® or Byfolan® is supplied, accompanied by 1 lt of Polyquel® Muti and 1 lt of Poliquel® Ca, Mg, B and Mo.

Added with 1 kg of copper oxychloride® and 250 ml of Biozyme® per 200 l drum, these applications are also made twice a year, in case of detecting the presence of red spider, Abamectin® is applied and damage by some insects in the Cypermethrin® or Imidacoprit® is used on the leaf, but it is important to mention that the latter two only if they occur or manifest themselves in the culture.

For weed control, only contact or burning products (Paraquat®) are used, as it tends to be less residual than Glyphosate®, but this alternates, because although in the rainy season it is applied up to twice a year to control the weeds, the rest of the year it is maintained by plowing, leaving the grass that is cut there.

Determination of the sampling design

The sampling that was carried out was a five of golds due to the topological conditions of the area, where subsamples of soil or each point were taken, at a depth of 40 cm by means of the quartering technique, to make a composite sample, it was sent to be analyzed by the Agrolab® laboratory in order to determine the multiresidual analysis of pesticides.

Results

The results presented by the laboratory show that for at least 490 active ingredients no significant pesticide residues were detected in the analyzed sample.

This means that at least for the comparison with the minimum amounts allowed of each one of these compounds, amounts that were equal to or greater than the controls were detected.

Within the agrochemical classifications we can find the following:

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Active ingredient	LCL Analyte (ppm)	Amount obtained in mg / kg (ppm)
Aldrin	0.010	< LCL
Diedrin	0.010	< LCL
BHC lindane alpha	0.010	< LCL
BHC lindane beta	0.010	< LCL
BHC lindane delta	0.010	< LCL
BHC lindane gamma	0.010	< LCL
Dimethoate	0.010	< LCL
Disulfoton	0.010	< LCL
4.4DDD	0.010	< LCL
4.4 DDE	0.010	< LCL
4.4 DDT	0.010	< LCL
Endosulfan I	0.010	< LCL
Endosulfan II	0.010	< LCL
Endosulfan Sulfate	0.010	< LCL
Endrin	0.010	< LCL
Endrin aldehyde	0.010	< LCL
BHC lindane alpha	0.010	< LCL
BHC lindane beta	0.010	< LCL
BHC lindane delta	0.010	< LCL
BHC lindane gamma	0.010	< LCL
Heptachlor	0.020	< LCL
Sulfotep	0.010	< LCL
Lookx	0.010	< LCL
LCL = Lowest Calibration Level. ppm = Parts per million = mg / kg		

Table 1 The products that were analyzed for the classification of organochlorines are shown
Source: Own elaboration

	LCL Analyte (ppm)	Amount obtained in mg / kg (ppm)
Parathion	0.010	< LCL
Fenitrothion	0.010	< LCL
Dimethoate	0.010	< LCL
Methidathion	0.005	< LCL
Trichlorfon	0.010	< LCL
LCL = Lowest Calibration Level. ppm = Parts per million = mg / kg		

Table 2 The products that were analyzed for the classification of organophosphates are shown
Source: Own elaboration

Active ingredient	LCL Analyte (ppm)	Amount obtained in mg / kg (ppm)
Tetradiphon	0.010	< LCL
LCL = Lowest Calibration Level ppm = Parts per million = mg / kg		

Table 3 The products that were analyzed for the classification of organosulfurized substances are shown
Source: Own elaboration

Active ingredient	LCL Analyte (ppm)	Amount obtained in mg / kg (ppm)
Tell me	0.010	< LCL
LCL = Lowest Calibration Level. ppm = Parts per million = mg / kg		

Table 4 The products that were analyzed for the**n**classification of carbamates are shown
Source: Own elaboration

Active ingredient	LCL Analyte (ppm)	Amount obtained in mg / kg (ppm)
Amitraz *	0.005	< LCL
LCL = Lowest Calibration Level ppm = Parts per million = mg / kg		

Table 5 The products that were analyzed for the classification of other groups are shown
Source: Own elaboration

Conclusions

It is concluded that when analyzing the results obtained, it can be said at first that this research is a small island in an oasis, because although there is not much information in the area regarding the issues of pesticide multiresiduality, what was found in allows to be the spearhead to detonate such an interesting subject.

Additionally, obtaining or verifying that the management that is being provided to the cocoa crop, at least for the particular case of the soil, is not found with a record of active ingredients for all the compounds analyzed, the above allows corroborating that we can carry out agriculture cleaner and friendlier with the environment, as well as with the organisms that inhabit it.

Although in this multiresidual analysis of pesticides the presence of any ingredient is not manifested, it will be interesting to do at least two more things; the first, to analyze the fruits of the cocoa cultivation and the second to carry out analysis of the sugarcane soils to know in what state it is or, failing that, if the presence of an active ingredient is detected and what that compound would be, to know in what conditions it is They obtain the products that supply our families' food on a daily basis and the characteristics that they possess.

Finally, it is recommended to continue carrying out research to compare the results and to be able to affirm with more argument what is presented in this work.

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