World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

INVESTIGATION OF CONTAMINATION WITH ALPHA-CYPERMETHRIN MED IN AGRICULTURAL LANDS ON THE LEFT SIDE OF THE CITY OF MOSUL

Esraa ahmed saied ,
Mazin Nazar Fadhel
Department of Environmental Science, College of Environmental Science and Technology, University of Mosul
esraa.20evp4@student.uomosul.edu.iq
Nief Rahman
College of Environmental Science and Technologies

Article history:

Received: 12th February 2022
Accepted: 12th March 2022
Published: 30th April 2022

Abstract:

Alpha-cypermethrin, an important pyrethroid insecticide, has been widely used for pest control in agriculture and parasite control in livestock farms. Major agricultural applications include the protection of oilseeds, pome fruits, peaches, fruit vegetables, berries, leafy vegetables, corn and tobacco. Alpha-cypermethrin has been marketed since late 1983. Concentrations of the pesticide vacypermethrin were determined because it is commonly used in agricultural lands on the left side of the city of Mosul. It is dangerous because of its high acute toxicity even at low concentrations. Therefore, its discovery in the environment is necessary in different environmental samples, including water (Tigris River, Wadi Danfali, Al-Khawser River) and soil samples from different areas of farms on the left side of the city of Mosul (Sherikhan, Rashidiya, Al-Muthanna, Al-Baath, Yaramjah) and plant samples from the same areas, which are (Lahana, cauliflower, beans). A new and highly sensitive spectrophotometric method has been developed for the determination of parts per million levels of the widely used cypermethrin insecticide. The method is based on the alkaline hydrolysis of cypermethrin to the cyanide ion, which also reacts with potassium iodide and the dye crystal violet. The maximum absorption of crystal violet dye formed at 595 nm was measured in acidic medium. Beer's law is subject to a concentration range of 5-20 mcg in a final solution volume of 25 mL. The molar absorbance and Sandell sensitivity were found to range between 0.147 (-0.642) ppm. The method is simple, sensitive and free from the interference of other pesticides and assorted ions. Finally, pyrethroid insecticides do not interfere with the proposed method, the method that was applied to determine cypermethrin in environmental samples was effective and satisfactory.

Keywords: Contamination, Alpha-Cypermethrin Med, Agricultural Lands, City Of Mosul

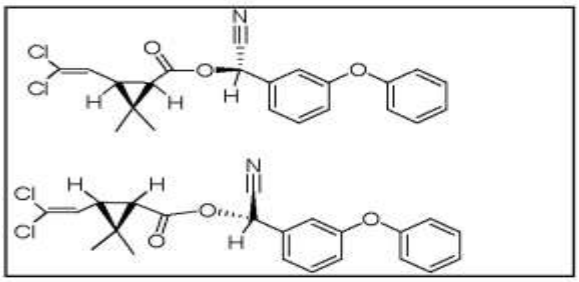
INTRODUCTION

Agriculture and agriculture and agriculture in industrial areas and agriculture and agriculture in developing areas to delegate and inspect the soil nutrients (1). Despite the necessity and importance of pesticides in eliminating various pests and protecting agricultural crops, they are considered the most important and most dangerous environmental pollutants, in addition to their danger to human and animal health, especially in case of misuse. The danger of pesticides and their negative effects on the environment increase through the increase in the use of doses above the permissible limit, non-compliance during safety periods, and the access of pesticides to the soil, irrigation water and water sources (surface and underground), as well as the failure to properly dispose of pesticide containers and residues, or leaving them randomly after Its use in the farm(2). CYP is an environmental pollutant similar to pyrethroid insecticides, widely found in the environment (1). Effective against a wide range of pests, especially leaf- and fruit-eating Lepidoptera and Coleoptera in cotton, fruits, vegetables, vines, tobacco and other crops. Cypermethrin is widely used by farmers to control insect pests of vegetables. The suggested acute oral LD50 for rats of cypermethrin is 251 mg/kg(3). The overuse of these compounds leads to their long-term presence in the soil and directly disrupts soil microorganisms and terrestrial invertebrates, and

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

indirectly has negative effects on human health through pollutants that interfere with the food chain and natural resources Moreover, resistance to insects and pests increases due to the excessive use of these chemical compounds, The hydrophobic property of pyrethroid compounds not only causes them to bind closely to soil organic matter and particles, but also prevents the passage of these compounds into groundwater and thus the formation of residues that ultimately reduce soil fertility, hamper plant growth, and disturb soil microorganisms(4)

Structural formula



AIM OF THE STUDY

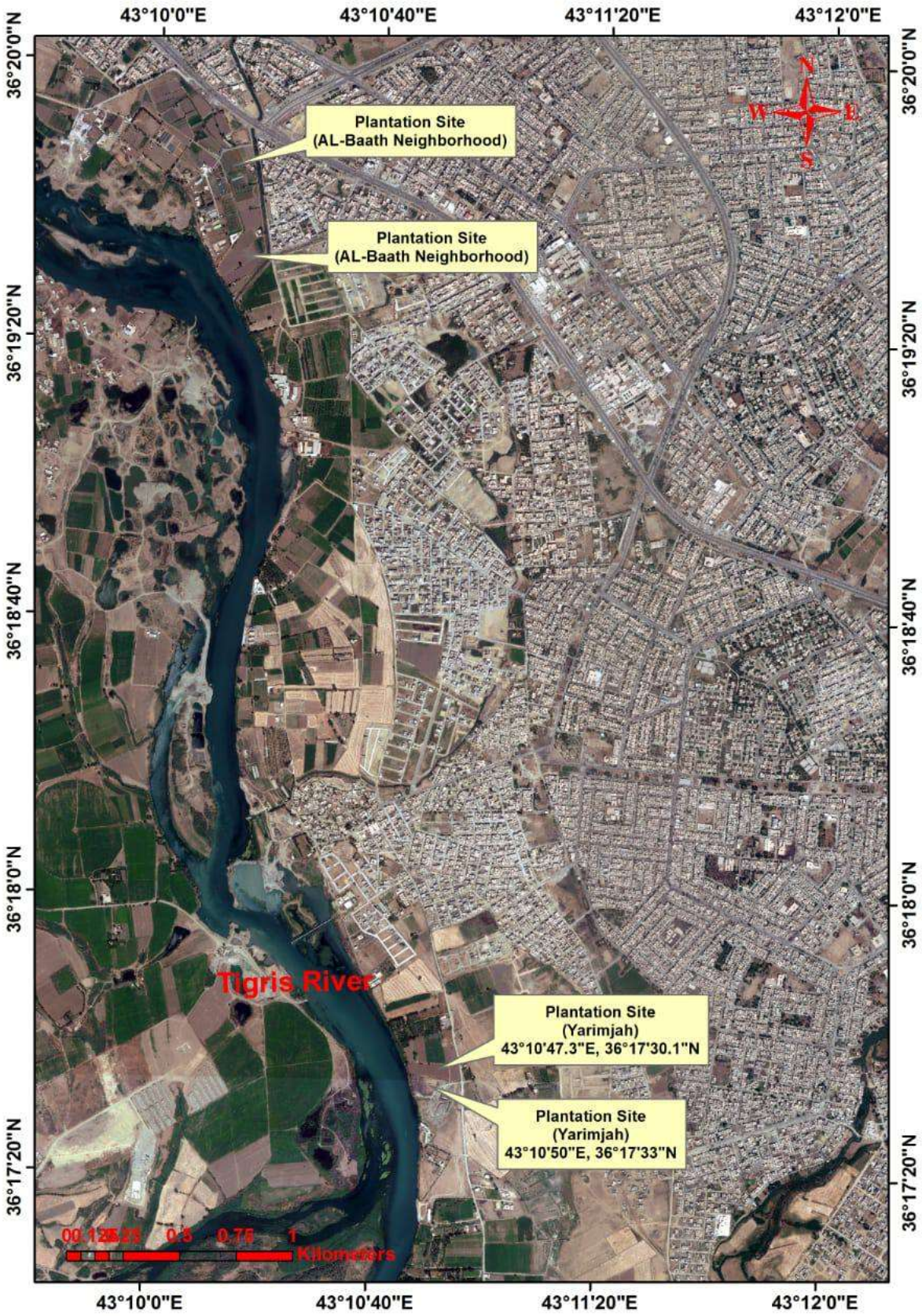
This study aims to protect humans, animals and plants from the dangers of chemical insecticides to which they are exposed in the environment in which they live, and to clarify the phenomenon of environmental pollution with pesticides that are sometimes used, without proper scientific oversight. future generations and live in a clean environment free of pollution.

MATERIALS AND WORKING METHODS

The study included investigation of environmental pollution (water, soil and plants) with the pesticide alpha-cypermethrin on the left side of the Tigris River in the city of Mosul, represented by five areas (Sherikhan - Al Rashidiya - Al Muthanna - Al Baath - Yaramjah). The study began by conducting a questionnaire to know the areas of agricultural lands, the method of irrigation, the quality of crops and the commonly used pesticide. The questionnaire also included personal information about farmers to determine the extent of their environmental awareness. Samples were collected from each area represented by soil, river water and valleys adjacent to the farms, as well as plant samples to estimate the concentrations of the insecticide. The study was conducted during the month of March 2022 in the laboratories of the College of Environmental Sciences and Technologies / University of Mosul. During this period, (15) different samples were collected from the selected areas, and the following figure shows satellite images of the study areas

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X



World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

Sample collection:

Samples were collected from five regions, including a farm from each region on the banks of the Tigris River, during the month of March. Soil samples were collected in clean polyethylene bags with a depth of 0-15 cm from three different locations in each farm and mixed together, each sample weighing about 1 kg. Crushing and sifting these samples with a sieve (2 mm) and placing an identification card that includes the name of the site and the type of sample. Thus, the soil samples have become scientifically prepared for the purpose of conducting the examination(5). 1975. As for the plant samples, samples were collected from the farms. The sample was taken in the form of complete seedlings containing the total Root, vegetative and fruiting and have been prepared for use in the required laboratory tests.

Estimation of the pesticide in plant, water and soil samples according to(6,7,8)

reagents

Distilled (deionized) water was used in all stages of work, as standard solutions of 1mg/ml of ethanol were prepared. Working standard solutions were prepared by appropriate dilution of the standard stock solution with water. A 3% hydrochloric acid aqueous solution was used. An aqueous solution of 20% sodium hydroxide was used. A 0.1% aqueous solution of potassium iodide was used. The dye Leuco crystal violet was prepared. 200 ml of distilled water was poured into a volumetric flask of one liter and 3 ml of 85% phosphoric acid was gently shaken until the dye dissolved, then the dye was diluted. Content of the beaker to one liter of water.

Calibration curve preparation

A portion of the test solution containing 5 to 20 µg of cypermethrin was taken into a 25 ml graduated cylinder and 1.0 ml of 20% NaOH was added to it. The solution was kept for 10 minutes at room temperature for complete hydrolysis. Then, 1 mL of 0.1% potassium iodide was added in an acidic medium to release the iodine and then 1 mL of leuco crystal violet dye was added, shaken well and kept for 15 minutes to develop full color. Crystal violet dye was produced. The solution was then diluted to the mark with water and the absorbance at 595 nm was measured against Planck's reagent.

Determination of the pesticide in the samples

For plant samples, a weight of 20 g was taken and mixed with an electric mixer and homogenized, then 50 ml of distilled water and 1 ml of ethanol were added and left for 10 minutes, then filtered and 10 ml was withdrawn from it and 1 ml of 3% hydrochloric acid 20%, sodium hydroxide, 0.1% potassium iodide, Drops of dye and for soil, a weight of 20 g of the sample was taken, then 50 ml of distilled water was added and shaken for an hour, following the same method used in plants. The water was estimated directly after filtering to get rid of impurities. After preparing the samples, they were examined using a spectrophotometer at a wavelength of 595 nm to measure absorbency.

RESULTS AND DISCUSSION

Concentrations of Alpha-cypermethrin in soil

The main pathway for pesticide dissipation in soil is caused by microbial activities such as catabolism and metabolism, some chemicals degrade easily while others are very persistent and take longer to degrade and for cypermethrin it degrades easily in soil(9).

The results showed a maximum in the two areas of Al-Sherikhan and Al-Yarmjah (0.642,0.584)ppm because the soil type is clay, where the movement is slow, and it remains on the upper surface with a limit of 15 cm and therefore does not pollute the groundwater(10).

Table (1) shows the concentrations of Alpha-cypermethrin in soil samples, estimated in ppm

Sample	Concentration
Shereikhan	0.642
Rashidia	0.336
Muthanna	0.389
Al-Baath	0.402
yarmija	0.584

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

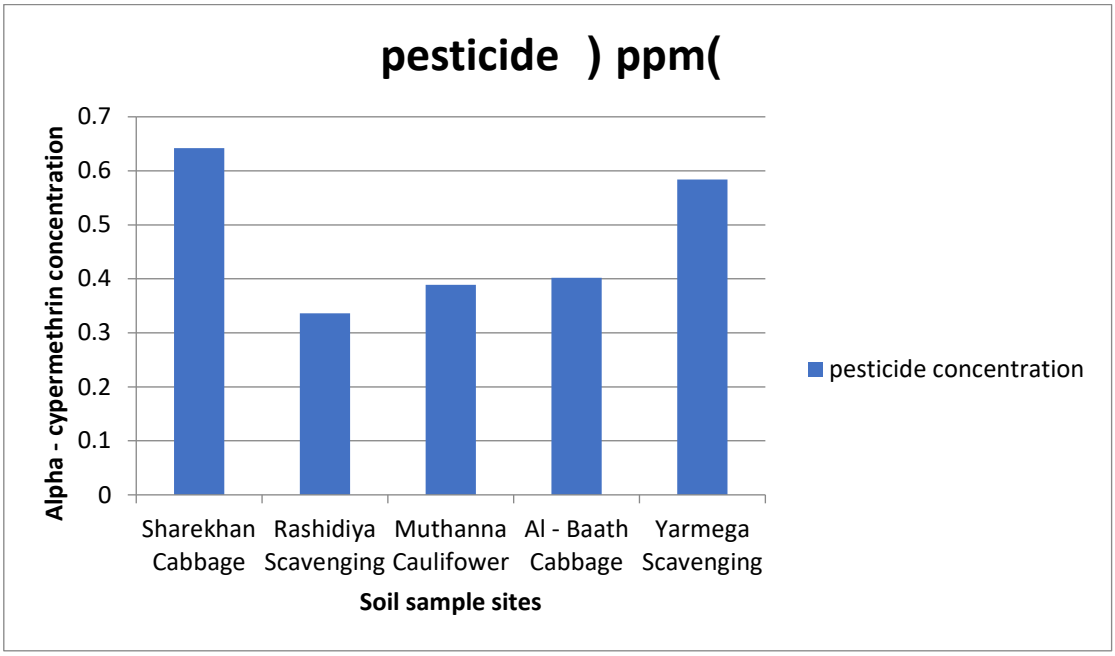


Figure (1) shows the concentrations of the pesticide in soil samples

Pesticide Concentrations In Water

It is considered a pesticide with low water solubility because it is stable in acidic and neutral conditions but hydrolyses at pH 12-13. Decomposing above 220°C in water, alpha-cypermethrin is likely to be degraded by photochemical and biological processes. Alpha-cypermethrin is highly toxic to a number of aquatic arthropod species, but it is less toxic to mollusks, and highly toxic to aquatic invertebrates during 24 and 48 hours is 1.0 and 0.3 µg/l (11). The results obtained indicate that the highest concentration in Muthanna is 0. 462 ppm as it is considered toxic to aquatic invertebrates.

Table (2) shows the concentrations of Alpha-cypermethrin in water samples, estimated in ppm

Sample	Concentration
Sharekhan	0.381
Rashidiya	0.269
Khuser Valley	0.462
Valley of Danfali	0.284
Al-Baath	0.297
Yarmega	0.381

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

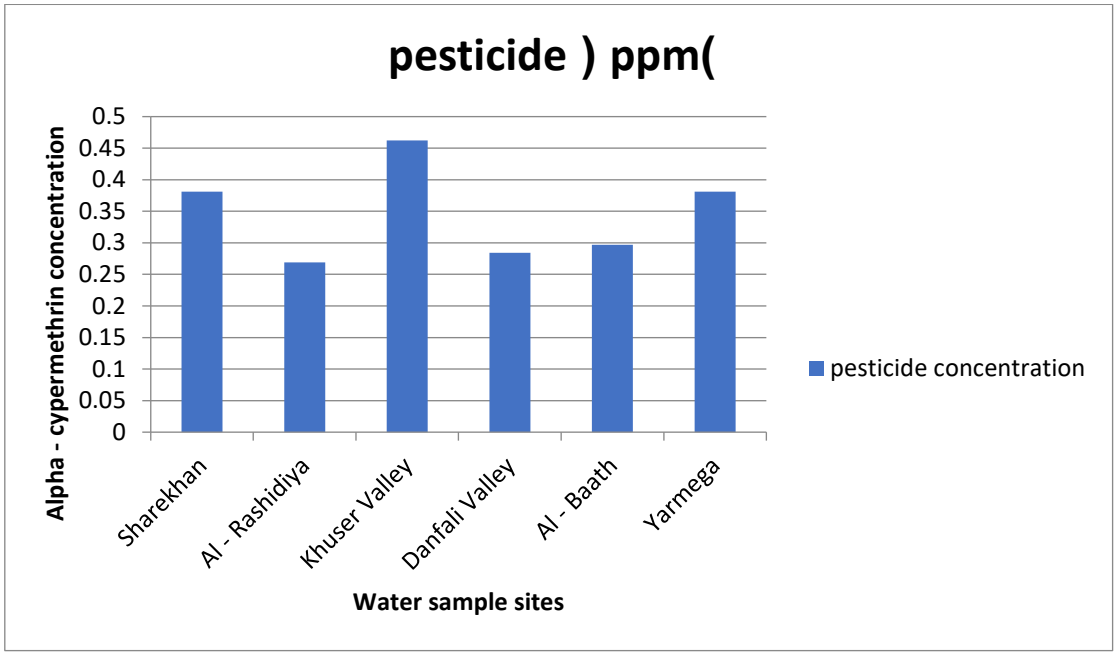


Figure (2) shows the concentration of the pesticide in the water.

Pesticide Concentrations In Plants

Examinations were conducted on three types of crops (Lahana, cauliflower, and kidney beans) within five regions. The results ranged between ppm (0.147-0.521) and they fall within the permissible range, as the concentrations of alpha-cypermethrin residues vary from the recommended use rates from 0.05 to 1.0 mg / kg of product (12).

Table (3) shows the concentrations of Alpha-cypermethrin in plant samples, estimated in ppm

Sample	concentration
Sharekhan cabbage	0.521
Rashidiya scavenging	0.147
Al-Muthanna cauliflower	0.200
Al-Baath cabbage	0.331
Yarmega scavenging	0.434

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

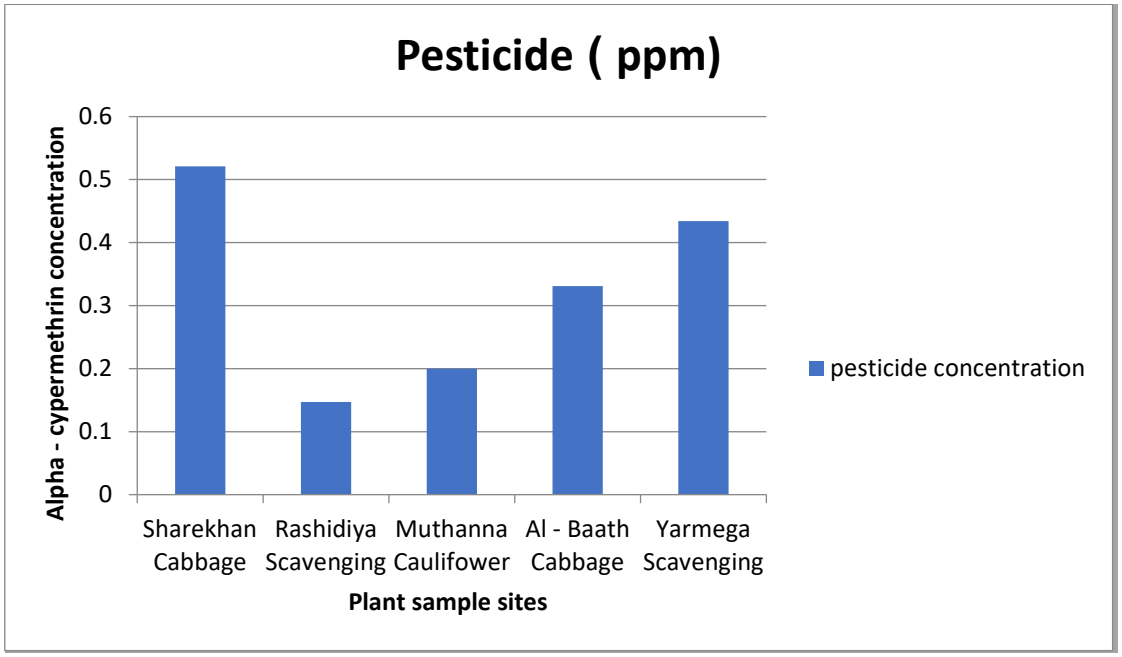


Figure (3) shows the concentrations of the pesticide in plant samples.

CONCLUSION

The proposed method is fast, simple and sensitive and the reagent described here is sensitive and selective to insecticides containing the nitrile group. The minimum method detection is about 0.147ppm. The proposed method was applied for the determination of cypermethrin in different samples of water, vegetables and soil. To investigate the contamination, Leuco crystal violet reagent was used to check the presence of Alpha-cypermethrin in the samples and then it was analyzed by the proposed method.

REFERENCES:

1.Al-Mallah, Nizar Mustafa and Al-Jubouri, Abdul Razzaq Younes (2012). Chemical pesticides, their aggregates and the methods of their effect and metabolism on organisms and the environment, College of Agriculture, University of Mosul: Page 341- 1

2. Al-Hamdany, M. H. S. (2020). KNOWLEDGE MANAGEMENT OF FARMERS'BEHAVIOR AND THEIR REIATIONSHIP TO SCIENTIFIC SOURCES OF INFORMATION AND RECOMMENDATIONS TO REDUCE THE EFFECT OF CHEMICA FERTIIZERS AND PESTICIDES ON ENVIRONMENT AND HUMAN HEALTH. Diyala Agricultural Sciences Journal (DASJ), 12, 1

3. Khan, S. U., Marriage, P. B., & Saidak, W. J. (1975). Residues of paraquat in an orchard soil. Canadian Journal of Soil Science, 55(1), 73- 75

4. Ghazouani, L., Feriani, A., Mufti, A., Tir, M., Baaziz, I., Mansour, H. B., & Mnafgui, K. (2020). Toxic effect of alpha cypermethrin, an environmental pollutant, on myocardial tissue in male wistar rats. Environmental Science and Pollution Research, 27(6), 5709-5717.

5. Janghel, E. K., Rai, J. K., Rai, M. K., & Gupta, V. K. (2007). A new sensitive spectrophotometric determination of cypermethrin insecticide in environmental and biological samples. Journal of the Brazilian Chemical Society, 18, 590-594.

6. - Saied, E., Fouda, A., Alemam, A. M., Sultan, M. H., Barghoth, M. G., Radwan, A. A., ... & Hassan, S. E. D. (2021). Evaluate the Toxicity of Pyrethroid Insecticide Cypermethrin before and after Biodegradation by Lysinibacillus cresolivuorans Strain HIS7. Plants, 10(9), 1903.

7. Janghel, E. K., Rai, J. K., Rai, M. K., & Gupta, V. K. (2007). A new sensitive spectrophotometric determination of cypermethrin insecticide in environmental and biological samples. Journal of the Brazilian Chemical Society, 18, 590-594.

8. -Tamrakar, U., Gupta, V. K., & Pillai, A. K. (2012). A spectrophotometric method for the determination of fenvalerate and cypermethrin in presence of each other. Journal of analytical chemistry, 67(5), 437-442.

9. Kanyika-Mbewe, C., Thole, B., Makwinja, R., & Kaonga, C. C. (2020). Monitoring of carbaryl and

World Bulletin of Social Sciences (WBSS)
Available Online at: https://www.scholarexpress.net
Vol. 9, April,2022
ISSN: 2749-361X

cypermethrin concentrations in water and soil in Southern Malawi. Environmental Monitoring and Assessment, 192(9), 1-14.
10. Rani, M., Saini, S., & Kumari, B. (2014). Leaching behaviour of chlorpyriphos and cypermethrin in sandy loam soil. Environmental monitoring and assessment, 186(1), 175-182.
11. Senoro, D. B., Maravillas, S. L., Ghafari, N., Rivera, C. C., Quiambao, E. C., & Lorenzo, M. C. M. (2016). Modeling of the residue transport of lambda cyhalothrin, cypermethrin, malathion and endosulfan in three different environmental compartments in the Philippines. Sustainable Environment Research, 26(4), 168-176.
12. World Health Organization. (1992). Alpha-cypermethrin. World Health Organization.