

REVIEW ARTICLE

Water pollution due to pesticide use in agricultural areas

Nour Salah Abdeljawad^{1*}¹Department of Business and Health Inspection, Health and Agriculture Sector, Greater Amman Municipality, Jordan***Corresponding author:** noor.salahabdaljawad@ammancity.gov.jo**Article history:**

Received : 2024/02/05

Revised : 2024/02/15

Accepted : 2024/03/25

Available Online : 2024/04/29

DOI : [10.33086/etm.v4i1.6855](https://doi.org/10.33086/etm.v4i1.6855)**Abstract**

Water pollution due to pesticide use in agricultural areas is an increasingly pressing environmental issue. Pesticides are used to control pests and plant diseases, often having negative consequences for water quality and aquatic ecosystems. Method: systematic methodological approach. This study uses a descriptive method to describe the level of river water pollution due to pesticide use. Selection of locations in rivers affected by agricultural activities. Results: Decreased Water Quality, Water quality parameters such as BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand) often exceed the established quality standards. As in the Babon River, BOD and COD levels show an increase from upstream to downstream, reflecting the negative impacts of agricultural activities. Conclusion: the application of sustainable agricultural practices and farmer education, the negative impacts of this pollution can be minimized, thereby maintaining environmental quality and public health. To reduce water and soil pollution due to pesticides in agriculture, several measures can be applied such as pesticide precision, Integrated Pest Management (IPM), and environmentally friendly pesticides. Manage pesticide waste safely, use bioremediation and phytoremediation, and increase farmer awareness.

Keywords: Water Pollution, Pesticides, Agriculture.**INTRODUCTION**

Water pollution due to pesticide use in agricultural areas is an increasingly pressing environmental issue. Pesticides are used to control pests and plant diseases, often with negative consequences for water quality and aquatic ecosystems (Handayani et al., 2023). Uncontrolled use of pesticides can cause water and soil pollution, and affect animal life around agricultural land. Pesticides often enter the water system through various mechanisms such as surface flow, runoff, and soil washing (Yusuf et al., 2023).

Data shows that pesticide use in Indonesia reached around 55.42% in 2012, indicating a high level of use (Sugiono, Saputro, et al., 2016). When applied excessively, pesticides can contaminate groundwater and surface water bodies, which impacts the health of ecosystems and humans. The process of pesticide contamination can contaminate water in several ways, including surface runoff,

rainwater or irrigation that flows on the surface of the land can carry pesticides into rivers or lakes (Eikintawarna, 2023).

Soil leaching, pesticides absorbed by the soil can dissolve in water and flow into the water system. Pesticide infiltration can seep through the soil layer and contaminate groundwater (Ngatimin and SP, 2020). The impact of this pollution is very broad and includes water quality pollution can reduce water quality by increasing the levels of hazardous chemicals that affect aquatic life. The health of the ecosystem of aquatic organisms such as fish and aquatic plants is threatened by the presence of pesticides, which can reduce dissolved oxygen and disrupt the balance of the ecosystem (Alamsyah and Pi, 2024). Human health, water contamination can have a direct impact on human health through the food chain, when contaminated fish or plants are consumed.

Water pollution due to pesticide use in agricultural areas is a complex problem that requires special attention (Sembel, 2015). Efforts to mitigate these negative impacts include educating farmers about the safe use of pesticides, implementing sustainable agricultural practices, and closely monitoring the use of chemicals on agricultural land. More research is needed to fully understand the long-term impacts of this pollution on ecosystems and public health.

MATERIALS AND METHODS

Research on water pollution due to pesticide use in agricultural areas can be conducted with several systematic methodological approaches. This study uses a descriptive method to describe the level of river water pollution due to pesticide use. Selection of locations in rivers affected by agricultural activities. Water sampling was carried out at several points along the river flow, both upstream and downstream, to obtain representative data.

RESULTS AND DISCUSSION

Water pollution due to pesticide use in agricultural areas is a serious problem that affects environmental quality and ecosystem health. Uncontrolled use of pesticides can lead to the accumulation of hazardous chemicals in water sources, which has negative impacts on aquatic life and human health (Syiafullah and Wati, 2023). Pesticides can pollute water through several mechanisms, surface runoff during rain or when irrigation is carried out, pesticides applied to agricultural land can be carried by surface runoff to rivers or lakes. This occurs especially when pesticides are used in excessive amounts (Irianto, 2015).

Soil leaching, pesticides absorbed by the soil can dissolve in water and flow into the water system. Soil erosion processes also contribute to this pollution, because soil contaminated with pesticides can be carried away with flowing water. Runoff, pesticides that are not absorbed by plants or soil can flow directly into water bodies, causing increased concentrations of hazardous chemicals in them. Impact on water quality, the impact of this pollution is very significant (Yuliastuti, 2011). Water Quality Decline, Water quality parameters such as BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand) often exceed the established quality standard limits. As in the Babon River, BOD and COD levels show an increase from upstream to downstream, reflecting the negative impacts of agricultural activities (Ariani et al., 2015).

Water pollution can reduce dissolved oxygen levels which are very important for the life of fish and other aquatic organisms. The death of aquatic plants due to herbicides also contributes to the decrease in oxygen, thus threatening the survival of fish species (Achyani, 2023). Pesticides that contaminate water sources not only affect the ecosystem but also human health. Aquatic organisms exposed to pesticides can enter the human food chain. Consumption of contaminated fish or plants can cause serious health problems, including hormonal disorders and cancer risk (Sahabuddin, 2012). Water pollution can also impact the quality of life of people who depend on the water source for daily needs, such as drinking and agriculture.

To reduce the negative impacts of water pollution due to pesticide use, several mitigation measures

need to be implemented (Budhiawan et al., 2022). Providing training to farmers on the safe and appropriate use of pesticides is essential to prevent further pollution. Encourage the use of organic farming methods and integrated pest management (IPM) techniques to reduce dependence on chemical pesticides (Wahditiya et al., 2024). Conduct regular monitoring of water quality in agricultural areas to detect pollution early and take immediate corrective action.

In addition, some applicable efforts that can be applied including the right target, quality, type, time, dose, and method (Adriyani, 2006). In addition, the application of holistic and sustainable Integrated Pest Management (IPM), the use of environmentally friendly pesticides such as vegetable pesticides, and the optimization of back to nature agricultural systems with minimal or no use of chemical pesticides are also very important (Jamin et al., 2024). Safe pesticide waste management, bioremediation and phytoremediation, as well as increasing education and awareness of farmers about the dangers of pesticides also play a big role.

Furthermore, the utilization of technological innovations such as Internet of Things (IoT) for accurate monitoring of crop conditions, supervision and control of pesticide use by the community, and washing of crops with appropriate methods can reduce pesticide residues. The use of organic fertilizers and good soil quality management also increase crop resistance to pests and diseases, thus reducing dependence on pesticides. With a combination of these measures, water and soil pollution due to pesticide use in agricultural areas can be significantly minimized (Anugrah, 2022).

CONCLUSIONS

Water pollution due to pesticide use in agricultural areas is a complex issue that requires serious attention from various parties. By implementing sustainable agricultural practices and educating farmers, the negative impacts of this pollution can be minimized, thus maintaining environmental quality and public health. To reduce water and soil pollution due to pesticides in agriculture, several measures can be applied such as pesticide precision, Integrated Pest Management (IPM), and environmentally friendly pesticides. Manage pesticide waste safely, use bioremediation and phytoremediation, and increase farmer awareness.

Author contributions

Nour Salah Abdeljawad: Conceptualization, analysis, writing draf, and editing.

Conflict of Interest

There is no conflict of interest in this study.

Acknowledgment

The researcher would like to thank all who contributed to this research.

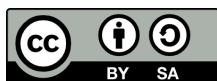
Data availability

Data related to the findings of this study are available at the corresponding author.

REFERENCES

- Achyani, R. (2023). *Ekotoksikologi perairan: Sebuah pengantar*. Syiah Kuala University Press.
- Adriyani, R. (2006). Usaha pengendalian pencemaran lingkungan akibat penggunaan pestisida pertanian. *Jurnal kesehatan lingkungan*, 3(1).
- Alamsyah, R., & Pi, S. (2024). Biologi perairan. *Biologi Perairan*, 32.
- Anugrah, M. (2022). Kiat mengurangi kadar residu pestisida – dinas tanaman pangan dan hortikultura. <https://pertanian.sultengprov.go.id/kiat-mengurangi-kadar-residu-pestisida/>
- Ariani, A. T., et al. (2015). *Penurunan bod (biochemical oxygen demand) dan cod (chemical oxygen demand) pada limbah cair industri tahu menggunakan zeolit teraktivasi* [Doctoral dissertation, UIN SUNAN KALIJAGA YOGYAKARTA].

- Budhiawan, A., Susanti, A., & Hazizah, S. (2022). Analisis dampak pencemaran lingkungan terhadap faktor sosial dan ekonomi pada wilayah pesisir di desa bagan kuala kecamatan tanjung beringin kabupaten serdang bedagai. *Jurnal Pendidikan Tambusai*, 6(1), 240–249.
- Eikintawarna, A. (2023). *Estimasi konsentrasi pestisida dari lahan pertanian kecamatan cangkeringan dan pakem pada limpasan di das opak hulu* [Doctoral dissertation, Universitas Islam Indonesia].
- Handayani, L., Hakim, A. L., & Anwar, M. Y. S. R. (2023). Analisis konten berita pencemaran udara di jakarta melalui media sosial instagram mengingatkan kesadaran masyarakat jakarta. *Prosiding Seminar Nasional Ilmu Ilmu Sosial (SNIIS)*, 2, 1215–1226.
- Irianto, I. K. (2015). Kualitas air menuju pertanian berkelanjutan.
- Jamin, F. S., Kamal, D. M., Auliani, R., Rusli, M., & Pramono, S. A. (2024). Penggunaan pestisida dalam pertanian: Resiko kesehatan dan alternatif ramah lingkungan. *Jurnal Kolaboratif Sains*, 7(11), 4151–4159.
- Ngatimin, S. N. A., & SP, M. S. (2020). *Agrohidrologi senandung kehidupan tentang pencemaran air*. Penerbit LeutikaPrio.
- Sahabuddin, E. S. (2012). Cemaran air dan tercapainya lingkungan sumber daya alam yang berkelanjutan. *Jurnal Publikasi Pendidikan*, 2(02), 102–111.
- Sembel, D. T. (2015). *Toksikologi lingkungan*. Penerbit Andi.
- Sugiono, D., Saputro, N. W., et al. (2016). Respon pertumbuhan dan hasil beberapa genotip padi (*oryza sativa* l.) pada berbagai sistem tanam. *Jurnal Agrotek Indonesia (Indonesian Journal of Agrotech)*, 1(2).
- Syaifullah, Y., & Wati, F. T. (2023). Analisis pencemaran tanah di desa gembol penjawaran banjarne-gara. *MASALIQ*, 3(5), 935–940.
- Wahditiya, A. A., Kurniawan, A., Nendissa, J. I., Meyuliana, A., Yora, M., Jamilah, J., Ilham, D. J., Mufaidah, I., Alaydrus, A. Z. A., Hidayati, F., et al. (2024). *Teknologi produksi tanaman pangan*. Yayasan Tri Edukasi Ilmiah.
- Yulianti, E. (2011). *Kajian kualitas air sungai ngringo karanganyar dalam upaya pengendalian pencemaran air* [Doctoral dissertation, Program Magister Ilmu Lingkungan].
- Yusuf, W. A., Susilawati, H. L., Wihardjaka, A., Harsanti, E. S., Adrian, T. A., Dewi, T., Pramono, A., Kurnia, A., Ferry, I., Al Viandari, N., et al. (2023). *Kerusakan dan pencemaran lingkungan pertanian: Karakteristik dan penanggulangannya*. UGM PRESS.



This is an open access article distributed under the Creative Commons Attribution-ShareAlike 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cite. ©2023 The Author(s)