



## Challenges of pesticide use and its management in Uzbekistan: Is a green approach to plant protection possible?

### KEY MESSAGE

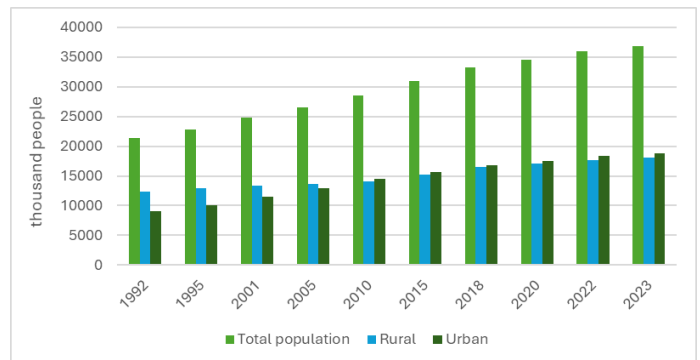
- The path forward for pesticide management in Uzbekistan must balance food security with environmental and public health concerns.
- The long-term applications of green agriculture remain uncertain due to the lack of incentives.
- Long-term success will depend on precise enforcement mechanisms, robust public education efforts, and cooperation to ensure that both food safety and food security goals are met.

### INTRODUCTION

The increasing pressure from population growth and land degradation on agricul-

<sup>1</sup>Piñeiro, V., Arias, J., Dürr, J., Elverdin, P., Ibáñez, A. M., Kinengyere, A., Morales Opazo, C., Owoo, N., Page, J. R., Prager, S. D., & Torero, M. (2020). A scoping review on incentives for adoption of sustainable agricultural practices and their outcomes. Cgspace.cgiar.org. <https://cgspace.cgiar.org/items/fd8afcof-4508-4e8d-a52e-447d16e0a984>

ture necessitates a reevaluation of current agricultural production systems, with a focus on adopting more sustainable practices<sup>1</sup>. About 26 percent of croplands and 17 percent of rangelands in Uzbekistan have suffered from considerable degradation over the years<sup>2</sup>. At the same time, Uzbekistan's population is growing considerably, requiring food security measures (Figure 1).



**Figure 1.** Dynamics of population

Source: Authors` calc. based on [www.stat.uz](http://www.stat.uz)

One of the critical aspects of sustainable agriculture is the reduction of chemical pesticide use which has become a signifi-

<sup>2</sup>FAO (2023). Integrated land use management systems in Uzbekistan – Part 1. Case studies and governance recommendations. Literature review. Tashkent. <https://doi.org/10.4060/cc6132en>

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cant concern due to its environmental and public health impacts<sup>3</sup>. Pesticide terms include insecticides, fungicides, herbicides, rodenticides, nematicides, and other compounds.<sup>4</sup> In many agricultural settings in Uzbekistan, pesticides have been used without proper adherence to hygienic standards or consideration of their harmful effects, especially in the cotton sector<sup>5</sup>. For years, around 50-54 kg of pesticides per hectare had been sprayed in cotton fields<sup>6</sup>. In 2022, the hidden cost of pesticide pollution<sup>7</sup> in cotton production made up around 200 million USD in Uzbekistan, and its intensity was 785 USD per ton<sup>8</sup>.

## METHODOLOGY

The study utilizes qualitative data from several key sources to provide insights into pesticide management in Uzbekistan. A review of normative legislation includes an analysis of existing laws and regulations governing the use of pesticides and biopesticides in Uzbekistan such as the resolution of the Cabinet of Ministers.

<sup>3</sup>Finger, R., et al. (2024). Towards sustainable crop protection in agriculture: A framework for research and policy. *Agricultural Systems*, 219, 104037–104037. <https://doi.org/10.1016/j.agsy.2024.104037>

<sup>4</sup>Aktar, W., Sengupta, D., & Chowdhury, A. (2009). Impact of Pesticides Use in agriculture: Their Benefits and Hazards. *Interdisciplinary Toxicology*, 2(1), 1–12. National Library of Medicine. <https://doi.org/10.2478/v10102-009-0001-7>

<sup>5</sup>Dobson, H. (2024, August 20). Natural Resources Institute - Advancing sustainable crop production in Uzbekistan. Retrieved December 3, 2024, from Natural Resources Institute website: <https://www.nri.org/latest/news/2024/advancing-sustainable-crop-production-in-uzbekistan>

Along with a review of the existing legislature, we utilize the interviews which were conducted with key stakeholders involved in pesticide management, including government officials, regulatory bodies, farmers, and industry representatives. These interviews provided first-hand information about the current challenges, organizational priorities, and practical issues faced in the field. Additionally, we use insights from field visits that were carried out to observe real-world pesticide use, assess the capacity of biolabs, and gather feedback from farmers on their experiences with both chemical pesticides and biopesticides. This practical component helped identify gaps in biopesticide availability and challenges in adopting more sustainable pest management practices at the farm level. This combination of data sources provides a comprehensive understanding of the current pesticide management landscape in Uzbekistan, forming the basis for the recommendations and way forward proposed in the study.

<sup>6</sup>[https://ecochem.uz/upload/iblock/4f9/fzotjewsm6nxmoalzudmlchsj4ooho3/uzbekistan\\_state\\_of\\_the\\_environment\\_EN\\_V11.pdf](https://ecochem.uz/upload/iblock/4f9/fzotjewsm6nxmoalzudmlchsj4ooho3/uzbekistan_state_of_the_environment_EN_V11.pdf)

<sup>7</sup>Pollution from pesticides– is measured by a DALY rate of 0.2 per kg of pesticide and monetization value of USD per DALY as per FAO (2023).

<sup>8</sup>Bilal, M., Mirkasimov, B., Aswaf, E., Djanibekov, N., Useinov, A., Rashitova, N., Rajabova, S., & Abduvalieva, N. (2024). Potential of crop diversification to address the hidden costs of major crop value chains in Central Asia | Agrifood Economics | Food and Agriculture Organization of the United Nations. *Fao.org*. <https://www.fao.org/agrifood-economics/publications/detail/en/c/1724088/>

## PESTICIDE USAGE IN AGRICULTURE: THE GOOD AND THE BAD

Globally, total pesticides used in agriculture made up 3.7 million tons of active ingredients in 2022, which increased by 4 percent compared to 2021<sup>9</sup>. The worldwide application of pesticides per area of cropland was 1.8 kg/ha<sup>10</sup>. Among pesticides, herbicides, fungicides, insecticides are also used in most cases<sup>11</sup>. Pesticides are part of agricultural production. Farmers use them to control weeds and insects, and their usage has increased remarkably. Achieving higher yields is one of the benefits of applying pesticides by farms<sup>12</sup>. Food security could only be provided with increasing production volumes since the population is growing every year. About one-third of agricultural products are cultivated using pesticides. There would be losses, namely 78% loss of fruit production, a 54% loss of vegetable production, and a 32% loss of cereal production without applying pesticides.

<sup>9</sup> FAO. 2024. Pesticides use and trade – 1990–2022. FAOSTAT Analytical Briefs, No. 89. Rome.

<sup>10</sup> FAO. 2022. Pesticides use, pesticides trade and pesticides indicators – Global, regional and country trends, 1990–2020. FAOSTAT Analytical Briefs, no. 46. Rome.

<sup>11</sup> FAO. 2024. Pesticides use and trade – 1990–2022. FAOSTAT Analytical Briefs, No. 89. Rome.

<sup>12</sup> Aktar, W., Sengupta, D., & Chowdhury, A. (2009). Impact of Pesticides Use in agriculture: Their Benefits and Hazards. *Interdisciplinary Toxicology*, 2(1), 1–12. National Library of Medicine. <https://doi.org/10.2478/v10102-009-0001-7>.

<sup>13</sup> Tudi, M., Daniel Ruan, H., Wang, L., Lyu, J., Sadler, R., Connell, D., Chu, C., & Phung, D. T. (2021). Agriculture Development, Pesticide Application and Its Impact on the Environment. *International Journal of Environmental Research and Public Health*, 18(3). <https://doi.org/10.3390/ijerph18031112>

From this perspective, pesticides play a critical role in farm activity to reduce diseases increase crop yields<sup>13</sup>. However, the use of such pesticides poses great danger to not only the environment, but also human health. Several studies have demonstrated correlations between pesticide exposure and health issues. There are several hazardous pesticides that can still be found in water bodies, soil, and the atmosphere worldwide long after their application<sup>15</sup>. In addition to the environment, there are at least two ways that pesticides generate harmful risks to human health. First, food and drinking water residues are transferred to the human body and cause health issues. Second, occupational exposure to pesticides occurs among agricultural workers in fields and greenhouses, industry employees, and pest exterminators. For example, while applying pesticides in the greenhouse, workers are exposed to health risks even though they wear hygiene clothes and other<sup>16/17</sup>.

<sup>14</sup> Midingoyi, S. G., Kassie, M., Muriithi, B., Diiro, G., & Ekese, S. (2018). Do Farmers and the Environment Benefit from Adopting Integrated Pest Management Practices? Evidence from Kenya. *Journal of Agricultural Economics*, 70(2), 452–470. <https://doi.org/10.1111/1477-9552.12306>

<sup>15</sup> Rosen, M. R., et al. (2016). The origin of shallow lakes in the Khorezm Province, Uzbekistan, and the history of pesticide use around these lakes. <https://doi.org/10.1007/s10933-016-9914-2>

<sup>16</sup> Damalas, C. A., & Eleftherohorinos, I. G. (2011). Pesticide Exposure, Safety Issues, and Risk Assessment Indicators. *International Journal of Environmental Research and Public Health*, 8(5), 1402–1419. <https://doi.org/10.3390/ijerph8051402>

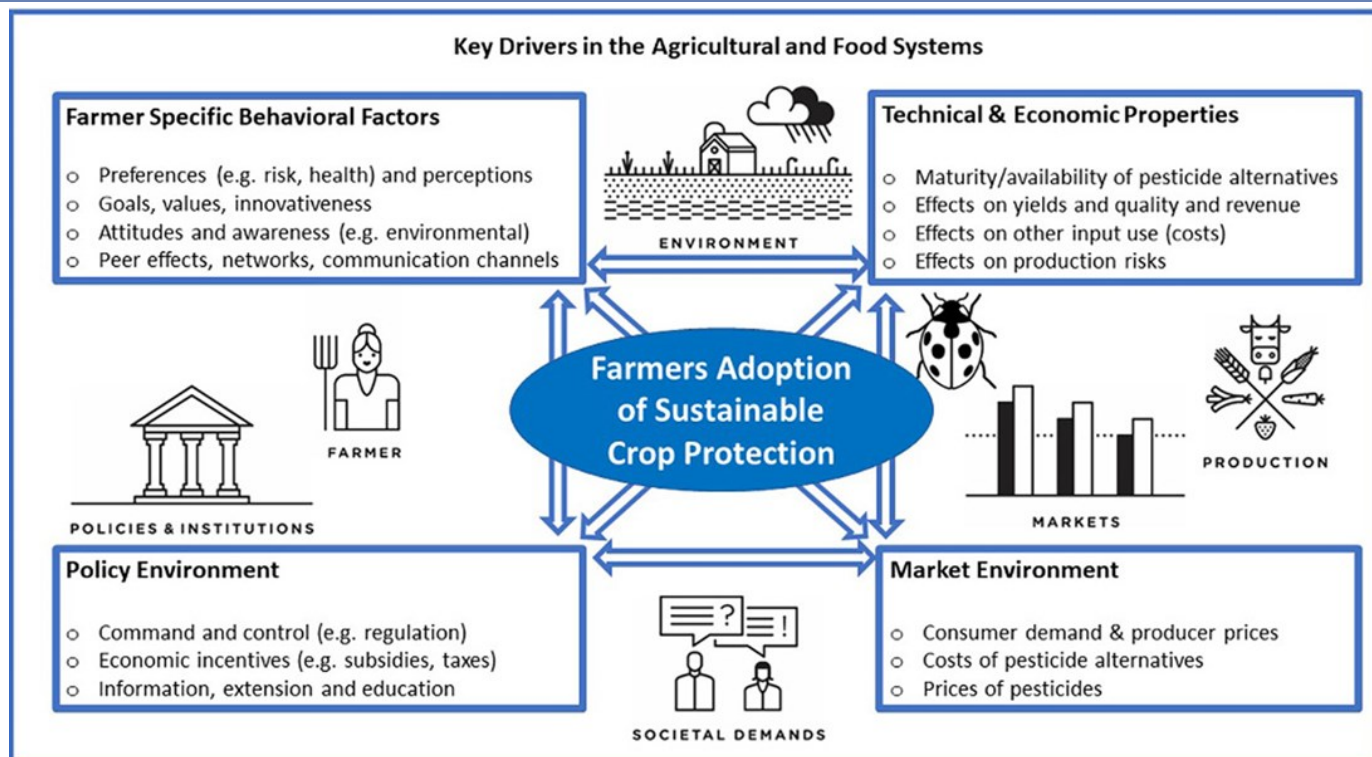


Figure.2 Adoption of sustainable crop protection framework

To mitigate these environmental and health risks, the combination of three factors is primarily used globally by decision makers: comprehensive data on pesticides, farmers' decisions to move towards green practices and effective communication channels. The important factor in analyzing the dangers of pesticides is the availability of comprehensive data regarding the impacts of pesticides on animals and plant species, water, soil and the air, along with their side effects<sup>18</sup>. At the same time, farmers need to transition to

greener plant protection methods. According to the research by Finger, there are several key factors (farm preferences, peer effects, effects on production, price of pesticides, etc.) that influence farmers' decisions to adopt sustainable crop protection methods (Figure 2)<sup>19</sup>.

Finally, improving pesticide risk communication among stakeholders is a crucial step toward safer agricultural practices. This communication enables exchanging information, advice, and opinions between actors in pesticide use and management. By providing necessary information for a better understanding of the situation and reasonable decision-making, pesticide risk communication protects communities from potential hazards<sup>20</sup>.

<sup>20</sup> What is Pesticide Risk Communication (2023). Retrieved December 3, 2024, from ObsoletePesticides website: <https://www.fao.org/in-action/pesticides-central-asia/background/what-is-pesticide-risk-communication/en>

<sup>17</sup> Djumayeva M. K. (2023). QISHLOQ XO'JALIGIDA PESTITSIDLARDAN FOYDALANISHNING ATROF-MUHITGA TA'SIRI. Scientific Impulse, 1(9), 968–985. Retrieved from <https://nauchniyimpuls.ru/index.php/ni/article/view/7982>

<sup>18</sup> Factsheet on Ecological Risk Assessment for Pesticides. (n.d.). Retrieved from EPA United States Environmental Protection Agency.

<sup>19</sup> Finger, R., et al. (2024b). Towards sustainable crop protection in agriculture: A framework for research and policy. Agricultural Systems, 219, 104037–104037. <https://doi.org/10.1016/j.agry.2024.104037>

## PESTICIDES USE IN UZBEKISTAN

The use of pesticides in Uzbekistan is widely practiced by farmers throughout the country, leading to its overuse most of the time<sup>21</sup>. This can be seen in the case of exporting Uzbek agricultural products abroad. Many experts discussed the issue of Uzbekistan's agrarian products needing to meet European market's demand. In most cases, products that do not meet the entry requirements are either destroyed or returned, probably going to the domestic market. The elephant in the room is the pesticides. Around 40 of the 72 active substances registered in Uzbekistan (over 60 percent) are banned in the European Union (EU)<sup>22</sup>. Agricultural products with these pesticides cannot be exported to the EU and many other countries. A significant issue in Uzbekistan is that 90 percent of the pesticides used are generic analogues, while only 10 percent are original formulations. Such agricultural products with harmful toxins fail to qualify for exports to the EU. In comparison, 95% of the pesticides used in Türkiye, a major exporter of agricultural products to the EU, are the original product. Only 5% is analogue<sup>23</sup>.

<sup>21</sup> Interviews

<sup>22</sup> Agrar islohotlarni amalga oshirish yo'lidagi tahdidlar (2022, July 8). Retrieved December 3, 2024, from Газета.uz website: <https://www.gazeta.uz/uz/2022/07/08/agrarian-reforms/>

<sup>23</sup> O'zbekiston dalalarida qo'llanayotgan pestitsidlarning faqat 10 foizi original. Muammo yana nimada? (2024). Retrieved December 3, 2024, from Xabar.uz website: <https://xabar.uz/iqtisodiyot/ozbekiston-dalalarida-qollanayotgan-pesticidlarning>

Uzbekistan mainly imports pesticides from Russia, Germany, Türkiye, Belgium, China, Japan, France and other countries.

As a general guideline, farmers should stop applying pesticides 20-30 days before harvesting, depending on the crop and pesticide type. However, farmers often need to pay more attention to this practice. Starting from the household level, farmers need to follow the official procedures for pesticide control. Although there are alternative means such as biological methods, the farmers must be incentivised to use them. Such methods need to give adequate short-term results. This can be seen from the fact that the number of biological laboratories has decreased from over 1000 to around 600 in recent years<sup>24</sup>. In short, it is obvious that farmers in Uzbekistan increase productivity by applying and overusing pesticides without considering their environmental and health risks.

## CURRENT LEGISLATIVE LANDSCAPE AND KEY ACTORS IN UZBEKISTAN

To analyze the core issues, it is important first to understand how pesticide use is regulated, and which regulatory actors are involved in the process. In Uzbekistan, the management of pesticides is governed by a set of compre-

<sup>24</sup> Agrar islohotlarni amalga oshirish yo'lidagi tahdidlar (2022, July 8). Retrieved December 3, 2024, from Газета.uz website: <https://www.gazeta.uz/uz/2022/07/08/agrarian-reforms/>

hensive regulations (Table 1). Regarding the registration of pesticides, there was an old regulation , No. 765, dated December 2, 2020. However, the government adopted a new resolution No.115 dated March 6, 2024, to improve the regulation of imported pesticides and legislative documents, and to include aspects of the International Code of Conduct in the pesticide regulatory framework<sup>25</sup>.

The recent resolution explicitly addresses the regulation of chemicals and plant protection products, establishing a framework for their testing, registration, and control to ensure their safety, efficacy, and minimal environmental impact. The key aspects include:

- All chemical and plant protection products must be registered, and

Table 1. Lists of recent normative documents on pesticides in Uzbekistan

Legislative documents	Target
Resolution of Cabinet Ministers, No 481, 5 August 2024	Licensing and permitting documents for applicants in the field of plant protection when importing
Resolution of Cabinet Ministers, No 201, 15 April 2024	Procedure for certification of seeds of grain, legumes and oilseed crops intended for export and harvested for consumption purposes
Presidential decree, No 36, 16 February 2024	Measures to ensure food security in Uzbekistan
Law on plant protection No 877, 9 November 2023	Rules and procedures in the field of plant protection
Resolution of Cabinet Ministers, No 460, 19 August 2022	Measures to encourage the use of biological protection methods in the production of export-oriented agricultural products
Resolution of Cabinet Ministers, No 311, 7 June 2022	Approval of regulatory legal acts regulating the activities of the Agency for Plant Quarantine and Protection of the Republic of Uzbekistan
Presidential decree, No 6262, 15 July 2021	Measures to radically improve the system of plant quarantine and protection in Uzbekistan
Resolution of Cabinet Ministers, No 510, 18 June 2019	Measures to improve the system of agrochemical analysis of soil in agriculture and increase soil fertility on arable land
Presidential decree, No 4861, 13 October July 2020	Measures to further improve the activities of the state plant quarantine service

Source: Authors` review

<sup>25</sup> 115-СОН 06.03.2024. Kimyolashtirish va o'simliklarni himoya qilish vositalarini sinovdan o'tkazish hamda ro'yxatga olish tartibi to'g'risidagi nizomni tasdiqlash haqida (2024). Retrieved December 3, 2024, from Lex.uz website: <https://lex.uz/uz/docs/-6831141>

unregistered products are prohibited from production, import, sale, or use in Uzbekistan.

- Registration is valid for five years and requires submission of extensive documentation, including certificates from accredited laboratories and compliance with health and environmental standards
- Testing is required to assess the biological effectiveness, toxicological, hygienic, and ecological properties of the products. The registration process involves various government bodies, such as the Ministry of Health and the Ministry of Ecology, Environmental Protection, and Climate Change.
- The legislation emphasizes strict control over the import, production, and use of pesticides, requiring detailed records and monitoring of pesticide residues in agricultural products and the environment.

The legislation promotes the use of safer alternatives in plant protection and outlines sanctions for violations, including the use of unregistered pesticides or non-compliance with safety standards.

In Uzbekistan, several organizations regulate and oversee pesticide use within a defined regulatory framework, each with

specific roles and priorities. The Ministry of Agriculture is central to agrarian oversight, focusing primarily on enhancing agricultural productivity to bolster national food security. It supports using sustainable practices like biopesticides but often prioritizes immediate food production needs. Within the Ministry, the Agency of Plant Protection and Quarantine (APPQ) handles the registration, distribution, and safe application of pesticides to protect crops from pests and diseases. It aims to minimize crop losses in line with the food security objectives.

The Ministry of Ecology, Environmental Protection, and Climate Change houses the Center for Specialized Analytical Environmental Control, which conducts environmental monitoring. This center assesses pesticide residues in soil and water, identifying contamination and mitigating ecological risks from pesticides. Meanwhile, under the Ministry of Health, the Committee of Sanitary and Epidemiological Well-Being and Public Health, focuses on food safety. This committee advocates stringent pesticide use regulations to protect public health, emphasizing the reduction of chemical reliance to prioritize human safety over agricultural yields. Thus, while the Ministry of Agriculture and the APPQ are inclined towards

<sup>26</sup> [O`zbekiston Respublikasi Qishloq xo`jaligi vazirligi huzuridagi O`simliklar karantini va himoyasi agentligi](https://karantin.uz/). (2024). Retrieved December 3, 2024 from Karantin.uz website: <https://karantin.uz/>

using pesticides to secure food production, organizations like the Center for Environmental Control and the Committee of Public Health prioritize environmental and health safeguards, respectively.

## THE CORE ISSUES

Although the regulatory framework and critical bodies seem to put the basic requirements in place, significant challenges in pesticide management persist. We can broadly classify these issues into three categories: issues related to legislation, institutional arrangement, and farm-level decisions. Each category represents a core area where further reforms and enhancements are necessary to address ongoing concerns effectively.

## ISSUES IN THE LEGISLATIVE DOCUMENTS

While comprehensive, the current pesticide regulation framework in Uzbekistan faces significant implementation challenges that can be categorized into several key areas. An important issue is complex bureaucratic registration processes involving multiple government bodies and extensive documentation requirements. This is particularly cumbersome for smaller businesses or foreign suppliers, as the need for various tests and certifications from accredited laboratories adds to the administrative burden. Also, the effectiveness of the legislation needs to be improved by limited en-

forcement capacity. Many local institutions need more resources or expertise necessary for rigorous testing, inspections, and monitoring of pesticide residues. This is exemplified by the small staff size in departments like APPQ, responsible for pesticide registration, which limits their operational capacity<sup>27</sup>. Furthermore, the legislation suffers from ambiguity in penalties for non-compliance, leading to inconsistent enforcement and uncertainty among stakeholders about the repercussions of using unregistered pesticides or using them too much. This ambiguity undermines the regulatory framework's integrity and effectiveness. Despite encouraging biological pesticide alternatives in legislation, the registration process and requirements remain biased towards chemical pesticides, offering fewer incentives and streamlined procedures for safer, biological options.

## INSTITUTIONAL ARRANGEMENT

The field of pesticide management is marked by a notable gap in coordination and communication among various actors, reflecting organizational disparities that hint at deeper conflicts of interest. These conflicts often arise from the urgent need for food security, which can sometimes conflict with the broader goals of environmental preservation and

<sup>27</sup> Interviews conducted with stakeholders in agriculture



public health protection. Overlapping roles and responsibilities among the different organizations involved exacerbate this discord. The quality laboratory on toxicology that checks pesticide use does not exist<sup>28</sup>. Various organisations' existing laboratories, research centers, and activities are fragmented bodies connected to a common purpose. For instance, the Ministry of Agriculture and APPQ are inclined towards using pesticides to secure food production. At the same time, organisations like the Center for Environmental Control and the Committee of Public Health prioritise environmental and health safeguards. In other words, there needs to be an integrated approach among critical actors to solve the issue of pesticide use in line with the common objectives. Poor communication can result in delays in responding to outbreaks and inconsistencies in implementing control strategies for pesticides in agriculture.

## FARM LEVEL ISSUES

Farmers' interest in dealing with pesticide-free agricultural production could be more substantial<sup>29</sup>.

<sup>28</sup> Agrar islohotlarni amalga oshirish yo'lidagi tahdidlar (2022, July 8). Retrieved December 3, 2024, from Газета.uz website: <https://www.gazeta.uz/uz/2022/07/08/agrarian-reforms/>

<sup>29</sup> Ассоциация “За экологически чистую Фергану” Экофорум Узбекистана Доклад об обращении особо опасных пестицидов в Узбекистане (pp. 1–91). (2020). Retrieved from [https://ipen.org/sites/default/files/documents/inal\\_uzbekistan\\_hhp\\_report\\_19\\_may\\_2020\\_1.pdf](https://ipen.org/sites/default/files/documents/inal_uzbekistan_hhp_report_19_may_2020_1.pdf)

Improving soil quality, biodiversity, and sustainable land use in Uzbekistan hinges on providing farmers with economic independence and secure land use rights. Only such changes encourage the adoption of environmentally friendly practices. Yet, several challenges might still hinder the adoption of greener agricultural practices in Uzbekistan.

The important one is the need for more financial incentives such as subsidies. The lack of finance discourages farmers from adopting environmentally friendly methods and shifting away from traditional, chemical-intensive crop protection. This reliance on chemical pesticides, favoured for their speed and cost-effectiveness, meets immediate production needs but overlooks long-term sustainability.

Also, government oversight and regulatory mechanisms need to be improved; laboratories and government agencies might often fail to perform essential analyses of pesticide levels in agricultural products before they reach the market. This oversight can lead to harmful residues in foods sold in local markets and supermarkets. The consumer preferences within the domestic market might prioritize low prices over high quality, compounding the challenge of introducing more expensive, albeit safer and higher-quality, biological products.

## WAY FORWARD

Managing pesticide use in Uzbekistan is crucial for environmental and public health and enhancing the country's export potential. A comprehensive reform of the regulatory framework is necessary to address the current challenges. It is good that the government started to acknowledge the issue and change the existing regulatory environment<sup>30</sup>. Yet, future reform should prioritize a data-driven analysis of pesticide usage and place farmers at the center of pesticide-related research and policymaking, encouraging the adoption of sustainable practices through targeted incentives.

We believe that the key strategies for reform should include the following points:

- Harmonizing objectives and enhancing coordination: Aligning the roles of the Ministry of Agriculture, Ministry of Health, and Ministry of Ecology, Environmental Protection, and Climate Change to ensure that food security objectives do not undermine food safety and environmental sustainability. Establishing a national committee based on evidence on the ground could foster better collaboration and strengthen coordination.

<sup>30</sup> Uzbekistan updates pesticide regulations for safer agriculture and environment. (2024). Retrieved December 3, 2024, from UzReport.news website: <https://uzreport.news/society/uzbekistan-updates-pesticide-regulations-for-safer-agriculture-and-environment>

- Special regulations for biopesticides: Implementing a separate regulatory framework for biopesticides, recognizing their unique properties and benefits, and involving specialized expertise for their evaluation, potentially leveraging capabilities from institutions like the APPQ Research Institute.
- Public awareness and education: Launching education campaigns to raise awareness about the benefits of biopesticides and the risks of chemical pesticides. Training farmers on the safe and effective use of these alternatives is crucial for widespread adoption.
- Comprehensive pesticide lifecycle management: Developing a robust post-registration framework that manages the entire lifecycle of pesticides—from import and production to distribution, sale, and disposal. This framework should include strict residue monitoring, incident reporting, and effective waste management protocols.

Successful implementation of these strategies will depend on transparent enforcement, financial support for farmers, and continuous investment in research and capacity building, particularly in regulating biopesticides. By adopting these measures, Uzbekistan can better

align economic incentives with environmental and public health goals, fostering the transition to sustainable agricultural practices.

## DISCLAIMER

The findings, interpretations, views, conclusions, and recommendations of the study, as contained in this publication, reflect the views of the authors and do not necessarily reflect the official opinion of WIUT or CPRO.

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