



**Overview of pesticide management:  
Understanding farmers' decisions to adopt biological crop  
protection approaches in Uzbekistan**



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- Pesticide use issues globally
- Lifecycle management of pesticides
- Methodology
- Pesticide issue in Uzbekistan
- Empirical findings
- Conclusion

- Stressing for pesticide use reduction (Finger et al. 2024, Lefebvre et al. 2024, Möhring et al. 2020)
- Impact on health such as cancer, pesticide concentration in blood (Rosen et al. 2018, Tudi et al. 2021)
- Impact on environment such as biodiversity loss, soil contamination (Damalas & Eleftherohorinos 2011,)
- Pesticide application as a collective action (Prisoner's Dilemma)
- Pests across borders

чермерлардан илтимос қиламиз, дориларни тунда сепиш керак фақат. тунда сепилган дорилар гўзага ҳам кундуздан кўра яхши таъсир қилиш исботланган. Кундузи сепилган дори, албатта, арига таъсир қилмапти. Дори сепилганда ҳам арига таъсир қилмайдиган вариантларни топиш керак.



# Life cycle management of pesticides



- To study the current status of pesticide management
  - Key actors
  - Regulations
- To investigate the possible determinants of farm decision on sustainable plant protection measures
- To conduct impact analysis of sustainable plant protection methods on certain dependent variables such as yield of crops

- *Field visits* during 2023-2025
- *Stakeholder meetings and interviews* (Agency for plant protection and quarantine, Ministry of Agriculture, Farmer's council, pesticide producers, farmers, biolaboratories, households and others)
- Agrichange II data set, collected in Kazakhstan and Uzbekistan in 2019
- *Probit model*, dependent variable is dummy which shows the adopters and nonadopters.
- $$A_i^b = \begin{cases} 1, & \text{if } w_i \lambda + \mu_i > 0 \\ 0, & \text{otherwise} \end{cases}$$
- $A^b$  is dummy dependent variable (adopters and nonadopters),  $i$  indicates the individual farm,  $w$  is a vector of determinants of biologic control methods adoption,  $\lambda$  is a parameter and  $\mu$  is error term.

- Intensive use in cotton sector during the Soviet era, approximately 50–54 kilograms per hectare (ecochem.uz)
- As of 2022, the estimated external cost of pesticide pollution related to cotton production was about 200 million USD (Bilal et al. 2024)
- Mainly import (Russia, Türkiye, Belgium, China, Germany, Japan, France, etc. ) (Interviews)
- Permitted agrochemicals and bioproducts (2418), active substances of pesticides (208) (agrokomakchi.uz)
- Law on Plant protection (2023), Presidential decree to improve plant protection (2021), Resolution of Cabinet of Ministers to improve registration system (2024) and others. What about their realization?



## Key actors

Institution	Role in Pesticide Management
<b>Agency of Plant Protection and Quarantine (APPQ)</b>	Under MoA. Responsible for registration, testing, and control of plant protection products.
<b>Ministry of Agriculture</b>	Agricultural policy, including pesticide use in farming. Food security. Promotes Integrated Pest Management (IPM)? or sustainable practices?
<b>Ministry of Ecology, Environmental Protection and Climate Change</b>	Environmental impacts of pesticide use. Efforts to phase out HHPs. Environmental monitoring and green economy initiatives.
<b>Committee for Sanitary and Epidemiological Well-being and Public Health (under Ministry of Health)</b>	Public health safety related to pesticide residues in food and water.
<b>FAO &amp; EU (as partners)</b>	Provide technical assistance, legal reform support, and capacity building for sustainable pesticide management.

## **Low Awareness and Compliance Among Farmers**

- No reading label instructions, leading to misuse and over-application.
- Protective equipment rarely used, (health risks for applicators and their families).

## **Unsafe Disposal of Pesticide Containers**

- Empty pesticide containers often burned, reused, sold, or discarded with household waste,

## **Limited Laboratory Capacity**

- Limited capacity for pesticide residue analysis in agricultural products.
- Existing laboratories face infrastructure, equipment, and accreditation challenges, hindering compliance with international food safety standards.

## **Lack of Incentives for Biological Control**

- No financial or policy incentives for farmers to adopt biological pest control or Integrated Pest Management (IPM) practices.
- Same registration procedures for both, creating regulatory disincentives for their use.

## **Weak Enforcement and Monitoring**

- Almost no monitoring how farms use pesticides

# Determinants of biologic crop protection adoption decision

Variables	Marginal effect (probit model)	Standard errors
Education level (categorical, 1 = illiterate...8 = university)	0.058	0.049
Experience in agriculture (years)	0.005	0.009
Farm size (ha)	-0.004	0.005
Farm grows cotton (yes=1/no=0)	-0.426*	0.219
Non-farm related income source (yes=1/no=0)	0.297	0.189
Free decision in crop choice, crop rotation (categorical, 1=I cannot decide on my own...5=I can decide always)	0.069	0.087
Willingness to take risks (1=willing, 0=unwilling)	-0.383*	0.205
Perception of plant deceases and pests on crop yield (categorical, 1=very weak...5=very strong)	0.127	0.148
Number of land plots (pieces)	0.056	0.049
Location of plots on water ways (categorical, 1=head, 2=middle, 3=tail, 4= n/a)	-0.061	0.121
Perception of the quality of on farm irrigation (categorical, 1=bad, 2=satisfying, 3=good)	-0.066	0.660
Yield loss due to pests (1=likely, 0=not likely)	0.994***	0.304
Distance from farm fields to dwelling (km)	-0.050*	0.218
Training participation on biological plant protection in the last 3 years (yes=1/no=0)	0.141**	0.489
Water problem in farm (yes=1/no=0)	0.079	0.697
Chi <sup>2</sup>	0.000***	
Pseudo R <sup>2</sup>	0.125	
Number of observations	342	

Note: \*\*\*, \*\*, \* and \* are significant at 1%, 5% and 10% level, respectively.



## Key findings and policy recommendation

Growing *cotton is negatively associated* with biological crop protection methods

*Trainings* on biological plant protection methods leads to more adoption

*Pesticide use in Uzbekistan remains high-risk* due to low awareness, weak enforcement, and limited infrastructure for monitoring and residue testing.

*Adoption* of biological crop protection *is hindered* by lack of incentives, regulatory barriers, and poor access to inputs and training.

Current registration processes *do not differentiate* biologicals from chemical pesticides, slowing innovation and uptake.

Extension services and *laboratory capacity* are insufficient to support Integrated Pest Management (IPM) at scale.

### **Policy recommendations:**

*Establish a separate registration pathways for biological crop protection* products to accelerate their approval and market entry

*Invest in capacity building for IPM* through FFS, trainings programs, seminars for labs staff etc.

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# Thank You!



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