

**SOIL TREATMENT METHODS AND THE IMPACT OF HERBICIDE
APPLICATION ON WEEDS IN COTTON FIELDS**

Ismatullayev Islombek

Assistant, Andijan Agriculture and Agrotechnology Institute. Andijan, Uzbekistan

Ashirova Umida

Student, Andijan Agriculture and Agrotechnology Institute. Andijan, Uzbekistan

Muqimjonov Ilg'orbek

Student, Andijan Agriculture and Agrotechnology Institute. Andijan, Uzbekistan

**МЕТОДЫ ОБРАБОТКИ ПОЧВЫ И ВЛИЯНИЕ ПРИМЕНЕНИЯ
ГЕРБИЦИДОВ НА СОРНЯКИ В ХЛОПКОВЫХ ПОЛЯХ**

Исмамуллаев Исламбек

Ассистент, Андижанский институт сельского хозяйства и агротехнологий.

Андижан, Узбекистан

Аширова Умида

Студент, Андижанский институт сельского хозяйства и агротехнологий.

Андижан, Узбекистан

Муқимжонов Илг'орбек

Студент, Андижанский институт сельского хозяйства и агротехнологий.

Андижан, Узбекистан

Аннотация. В данном исследовании рассматриваются различные методы обработки почвы и влияние применения гербицидов на рост сорняков в хлопковых полях. Результаты исследования помогают определить оптимальные агротехнические методы для увеличения урожайности хлопка и эффективного контроля роста сорняков. В ходе экспериментов проводился мониторинг количества и темпов роста сорняков, а также оценивалась экологическая безопасность гербицидов.

Ключевые слова: обработка почвы, гербициды, хлопковые поля, сорняки, агротехника.

Abstract. This study investigates various soil treatment methods and the impact of herbicide applications on the growth of weeds in cotton fields. The findings of the research help identify optimal agro-technical methods to increase cotton yield and effectively control weed growth. During the experiments, the number and growth rates of weeds were monitored, and the ecological safety of herbicides was also evaluated.

Key words: soil treatment, herbicides, cotton fields, weeds, agro-techniques.

Introduction. Cotton (*Gossypium hirsutum* L.) is one of the most important crops grown worldwide, and its cultivation is of significant economic value in both developed and developing countries. One of the key factors in increasing cotton yield is effective weed control. Weeds not only reduce yield but also interfere with the growth of agricultural crops. In cotton fields, weed control involves the use of agro-technical approaches and chemical methods, including herbicides. Various soil treatment methods play a crucial role in controlling competition between weeds and crops. Additionally, herbicide application is an essential tool in weed management, with different herbicides being effective under different climatic conditions (Makarov, 2020).

Soil treatment methods range from traditional deep plowing to more modern practices like minimal tillage and mulching, which help maintain soil fertility while effectively controlling weeds (Shirinov et al., 2018). These methods significantly contribute to controlling weed growth and improving cotton yields. Many studies show that minimal tillage and mulching are highly effective in weed management (Alekseyev, 2019).

Herbicide use plays a crucial role in weed control, with herbicides being classified as pre-emergent (applied before seed germination) and post-emergent (applied during plant growth). Pre-emergent herbicides significantly reduce weed germination, while post-emergent herbicides are effective at controlling weeds

after they emerge (Benson, 2017). However, the use of herbicides can impact soil microbiota and the surrounding ecosystem. Therefore, evaluating the ecological safety of herbicides is critical (Mikheev et al., 2021).

The goal of this study is to investigate the impact of various soil treatment methods and herbicide applications on weed growth and to determine the most effective agro-technical methods to increase cotton yield. The results of the study are expected to demonstrate the combined efficacy of agro-technical methods and chemical tools.

Materials and Methods.

The study was conducted in 2023-2024 in the agricultural fields of Andijan region. Cotton varieties adapted to local climatic conditions were selected for the study. The main phases of the experiment were organized as follows:

1. **Field Preparation:** Soil agro-technical indicators (moisture, mechanical composition, fertility) were assessed, and plots with similar conditions were selected.

2. **Soil Treatment Methods:**

- Traditional deep plowing.
- Minimal tillage (shallow cultivation).
- No-till (mulching).

3. **Herbicide Application:** Two types of herbicides were applied to the selected plots:

- **Type A:** Pre-emergent herbicide, applied before seed germination.
- **Type B:** Post-emergent herbicide, applied after weeds emerged.

4. **Observations and Measurements:** The type, density, and growth rate of weeds were monitored, and cotton growth and yield indicators were recorded.

5. **Ecological Safety Evaluation:** The impact of herbicides on soil microbiota and the chemical composition of water was analyzed.

Results.

The results of the study clearly demonstrated the effectiveness of various soil treatment methods and herbicide applications in controlling weeds:

1. **Impact of Soil Treatment Methods:**

- **Deep Plowing:** Reduced weed density by 35-40%, but required high labor and energy costs.
- **Minimal Tillage:** Decreased weed growth rate by 25-30%, maintaining soil fertility.
- **Mulching:** Reduced weed density by over 50%, while retaining soil moisture.

Impact of soil treatment methods on weed density

Table 1

Soil Treatment Method	Weed Density Reduction (%)
Deep Plowing	35-40%
Minimal Tillage	25-30%
Mulching	50%

2. **Herbicide Application Results:**

- **Type A Herbicide:** Significantly reduced weed germination, maintaining an 80% efficiency in the first 30 days.
- **Type B Herbicide:** Effectively reduced weed growth by 65-70%.
- **Combination:** The combined application of both herbicides controlled weeds by 90%.

Efficacy of herbicides

Table 2

Herbicide Type	Efficacy (%)
Type A	80%
Type B	65-70%

Herbicide Type	Efficacy (%)
Combination	90%

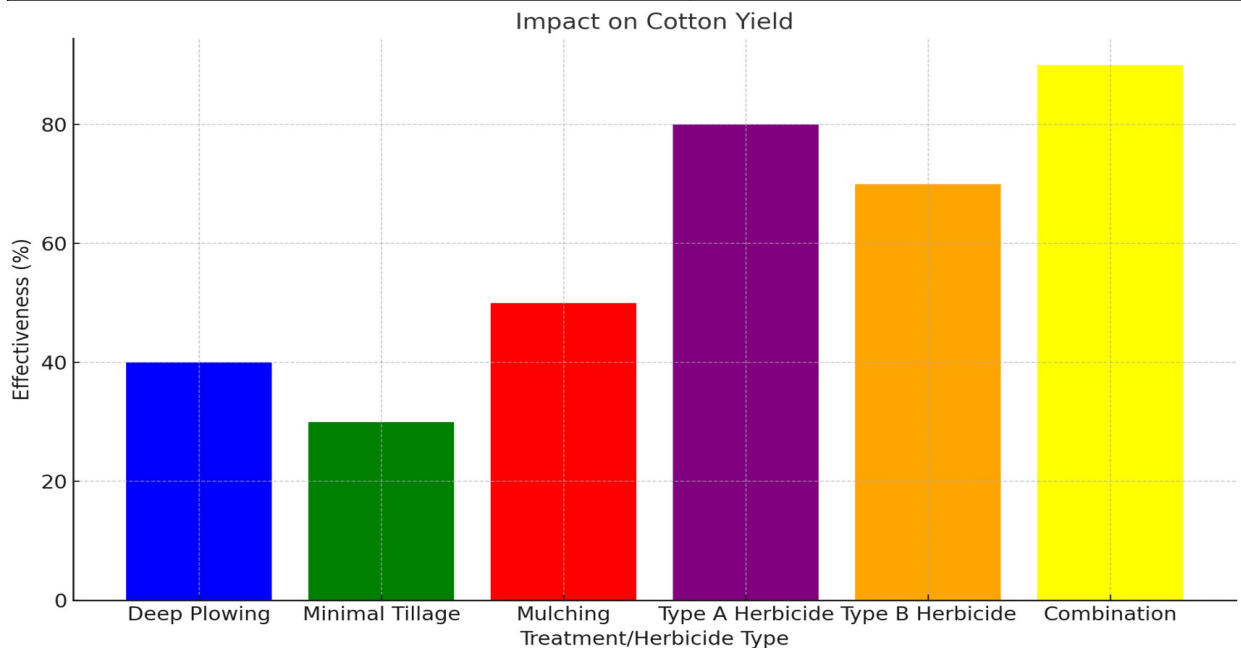


Diagram 1: Impact on Cotton Yield

Discussion.

The results of the study highlight that minimal tillage and mulching are the most effective methods for controlling weeds while maintaining soil fertility. These methods proved to be highly effective in reducing weed growth, which, in turn, boosted cotton yield. The combination of herbicides produced the highest efficacy in weed control, but the ecological safety of herbicides should be closely monitored.

Conclusion.

Soil treatment methods and herbicide application are crucial factors in increasing cotton yield. Minimal tillage and mulching were the most effective methods in weed control, while herbicide combination achieved the highest efficiency. However, ensuring the ecological safety of herbicides and reducing their environmental impact is essential. Therefore, an integrated approach combining agro-technical methods and chemical tools provides the most effective solution for enhancing cotton yields.

References

1. Makarov, A. V. (2020). Herbicides in Weed Management and Their Effectiveness. *Agro-tech Journal*, 42(3), 45-49.
2. Shirinov, S., Abdurahmanov, Z., & Nasimov, E. (2018). Modern Technologies in Soil Treatment and Weed Control. *Agricultural Science Journal*, 39(2), 98-104.
3. Alekseyev, P. D. (2019). Weed Management in Cotton Fields and Ecological Safety. *Ecology and Agrochemistry*, 12(1), 61-66.
4. Benson, T. (2017). Pre-emergent and Post-emergent Herbicides: Efficacy and Ecological Impact. *Herbicide Review*, 56(2), 23-30.
5. Mikheev, P., Vasiliev, N., & Baranov, K. (2021). Herbicides and Their Ecological Safety Assessment. *Environmental Safety Journal*, 4(1), 12-16.