JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205

Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

NEW HIGHLY EFFICIENT TECHNOLOGY FOR CHEMICAL TREATMENT OF COTTON PLANTS.

Badalov Sunatullo Mamadievich

candidate of technical sciences, associate professor.

Karshi State Technical University. Karshi. Republic of Uzbekistan.

Tukhtaeva Zarina Olimovna

master's student. Karshi State Technical University.

Karshi. Republic of Uzbekistan.

Abstract: The article presents the results of a critical analysis of the existing technology for processing cotton plants, which is performed by the OVX-600 sprayer and the main disadvantages are indicated. The developed new technology for processing cotton plants, which provides targeted and clear bilateral spraying of a liquid chemical product at a close distance in height or along the tiers of cotton plants, is a highly efficient and highly productive progressive technology.

Key words: sprayer, sprayer, agrotechnical requirements, technical specifications, pump, capacity, filter, frame, cotton.

Introduction. Development and increase of crop yields is the development and implementation of new technologies and machines that allow for better quality treatment of plants against insect pests, diseases and their defoliation and, on this basis, significantly reduce the consumption rate of chemicals on a regular basis.

Chemical plant protection is the main means of combating pests, diseases and their defoliation. According to FAO, crop losses from pests and diseases average 35% each year in the world [1,2].

Currently, chemical treatment of cotton plants is mainly carried out by the OVH-600 sprayer, which has been in production since 1980.

Purpose: The OVH-600 cotton fan sprayer is a fan-type sprayer designed to treat plants using a working fluid sprayed by an air stream created by a fan. Device: The OVH-600 cotton fan sprayer [3] is a mounted machine and consists of the following units and mechanisms: two tanks with a capacity of 300 liters each, suction and discharge hoses, a three-way valve, coarse and fine filters, a pump, a pressure hose, a pressure regulator with a pressure gauge, a fine filter, a sprayer stand, sprayers, a pressure hose, a fan, a nozzle, a water intake hose, a filter with a valve, a water source.

These units are mounted as follows: the tanks with brackets are attached to the tractor side members. The remaining units and mechanisms are mounted on the sprayer frame. The frame is hung on the tractor's mounted system. The sprayer is driven by the PTO (tractor power take-off

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

shaft). Operation: The sprayer is driven through the tractor PTO and the cardan transmission is transmitted to the gearbox, and then to the fan wheel, fan casing and pump, that is, all mechanisms are set in motion. During operation, the fan casing makes an oscillatory motion of 175 degrees, which makes 18 revolutions per minute and it is assumed that this achieves a relatively uniform distribution of the working fluid across the width of the processing capture. Technological process of spraying: the working fluid from the tanks of the OVH-600 sprayer through the suction hoses, three-way valve and coarse filter sucks out the pump. The pump, applying a certain pressure to the working fluid through the discharge hose feeds through the valve chamber of the pressure regulator, the fine filter and through which it is fed to the rack and sprayers, and excess liquid is directed through the pressure hose back to the mixing tanks. The working liquid is sprayed by atomizers into the air flow passing through the nozzles of the sprayer, created by the fan of the sprayer. Thus, the fan of the air flow with chemical preparations sprayed in a misty form arbitrarily directs into the open atmosphere. Particles of the chemical preparation, suspended in the air under the action of their own weight (Archimedes' force) with a certain very low speed, that is, lagging behind the speed of the air flow, move downwards and settle on the surfaces encountered on the path of movement.

We were unable to conduct research and development work to study the technological process of spraying with the OVH-600 sprayer, since we did not have the opportunity due to the complexity of the technological process. The study (theoretical research) and analysis of the OVH-600 sprayer protocols and the tests conducted were unsuccessful, and this data was not studied. Therefore, to date, we do not have the following data:

- what percentage settles on the surface of plant leaves?

- what percentage is carried away by the wind?

- what percentage does not settle at all due to gravity?

- what percentage pollutes the environment?

However, in the Federal State Educational Institution of Higher Professional Education Kuban State Agrarian University, an employee A. V. Palapin [4] presented the work and analysis of the technological process of spraying sprayers used in production, which arbitrarily and unintentionally spray a chemical preparation into the open atmosphere with an air flow. And it has also been established that:

- up to 10% of losses are due to droplets up to 50 microns in size, evaporating in the air up to 50%

- droplets 50-100 microns in size carried away outside the treated area by air currents,

- up to 10% - large droplets larger than 300 microns in size are not retained even on the rough surface of the leaf under the action of gravity, and flow down into the soil, which negatively affects the ecology of nature.

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

Recently, sprayers from foreign countries have been supplied to the Republic. These sprayers are designed for processing

agricultural crops specifically in the conditions of agriculture in these countries, which are different from ours. Also, the disadvantages of imported machines are: high metal consumption, energy intensity and high cost. They mainly spray chemicals horizontally on the top of the plants, and the lower part of the plants is not processed, as a result of which the quality of processing does not meet the requirements of the spraying process.

The main design and technological disadvantages of the OVH-600 sprayer: the complex design of the sprayer during assembly and disassembly work, frequent breakages of the tractor side member due to a large unbalanced load, a large load on the rear drive wheels of the tractor, when the sprayer is operating, the fan creates an air flow directed to the plants from top to bottom, bending the plants against the movement of the tractor, overlapping them, creating a closed continuous environment with plant leaves, which holds the main masses of the chemical preparation transported by the air flow, as a result of which the chemical preparation cannot penetrate inside to the lower part of the cotton plant by volume, in addition, in this sprayer it is impossible to carry out tiered treatment by the height of the plant. Conducted scientific studies show that when treating cotton plants with the OVH-600 sprayer, there are the above-mentioned shortcomings, that is, it inappropriately and indistinctly directs chemicals with an air flow into the open atmosphere, and this pollutes the atmosphere, which negatively affects the ecology of the environment, therefore, it does not fully meet the technical requirements for spraying plants. It should be especially noted here that, based on the conducted scientific studies, scientists have confirmed that harmful insects live and reproduce on the underside of plant leaves. Having studied the structure of plant leaves, we can see the following: plant leaves consist of an upper and lower surface. The upper surface of plant leaves is transparent, hard and poorly absorbs liquid substances. The lower part of the leaves is porous, soft and absorbs liquid substances well. Thus, the process of photosynthesis in plants occurs mainly approximately 90-95% on the underside of the leaves and 5-10% on the upper surface of the leaves. Therefore, harmful insects live and reproduce on the underside of plant leaves, where food and oxygen are available to them.

Hence the conclusion that in order to increase the efficiency of the chemical preparation while simultaneously reducing the consumption rate per hectare of treatment, it is necessary to develop a new technology for treating cotton plants, which is the main problem at present..

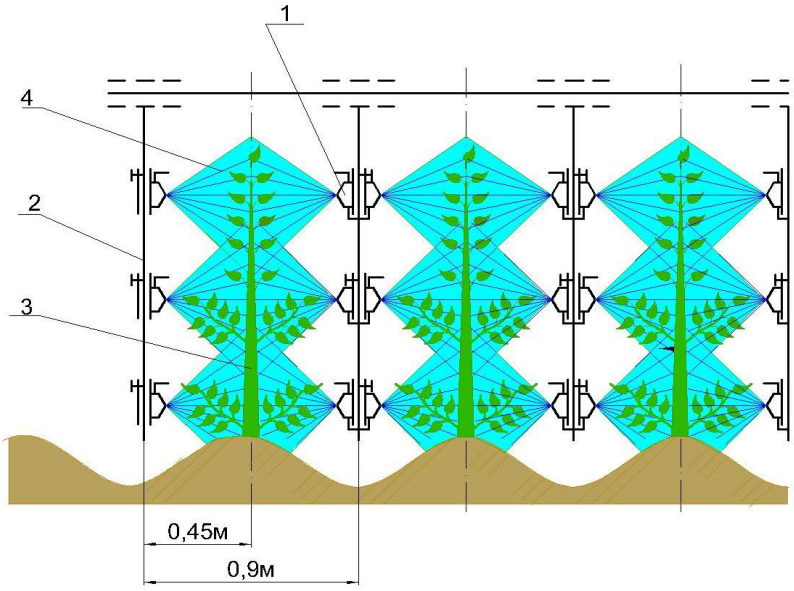
The purpose and objectives of the study: Improving the quality of chemical treatment of cotton plants by developing and substantiating a new highly efficient and highly productive technology of treatment and technical means that improve the quality of the technological process of spraying plants with chemicals [5,6,7].

Research results: Development of a new highly efficient technology of chemical treatment of cotton plants: a new highly efficient technology of spraying cotton plants with a liquid chemical should be carried out at a close distance parallel to the plants along the entire height (from the bottom to the top) or in a separate tier, perpendicular to the plants, on both sides simultaneously

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

with several sprayers.

The technological scheme of processing agricultural plants based on the new developed highly efficient technology [8,9,10] is shown in Fig. 1.



1-sprayer, 2-rod, 3-cotton stem, 4-processing of cotton plants using a new developed highly efficient technology

Fig. 1. Technological scheme of chemical treatment of cotton plants using a new developed highly effective technology.

parallel to the plants along the entire height (from the bottom to the top) or in a separate tier, perpendicular to the plants, on both sides simultaneously with several sprayers. Chemical treatment of cotton plants using the new developed technology is carried out as follows (Figure 1): the sprayer is located in the middle of the row spacing at a distance of 0.45 m from the plant (the width of the row spacing is 0.9 m) and moving parallel to it, perpendicular to the plants, sprays the working liquid in a misty form, evenly according to the established norm, from the foot to the top of the stem. In this case, the sprayed working liquid with the chemical preparation penetrates into the crown of the plants with its inertia, and also settles on the upper and lower parts of the foliage, branches and stems of the plants. Some of the drops that did not settle on the plants are suspended in the air under the action of their own weight, moving downwards again settle on the surface of the cotton plants. Spraying with chemicals is carried out on the weight of the cotton bush volume, so the effect of its action is increased to the maximum. The technology of spraying with chemicals occurs from the side part on both sides along the entire height or along the tiers of plants and sprays perpendicular to the stem, which completely sprays in volume and therefore easily settles on the plant without loss. It should be noted here that with chemical treatment of plants, the developed new technology, the negative impact on the ecology

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

of the environment is minimized, so the developed technology of chemical treatment of plants is called highly effective technology.

Highly effective spraying technology occurs in the volume of plants, but not in the open atmosphere.

A patent of the Intellectual Property Agency of the Republic of Uzbekistan was received for utility model UZFAP 01430 2019 for a new technology and a developed boom sprayer [9,10].

The theoretical and experimental studies conducted on the development of a new technology for chemical treatment of cotton plants allow us to draw the following conclusions.

Conclusions

1. The existing technology for treating cotton plants, spraying chemicals into the air (into the open atmosphere) is inappropriate and ineffective;

2. The developed new technology for treating cotton plants, which provides for targeted and precise two-sided spraying of a liquid chemical at a close distance along the height or along the tiers of cotton plants, is a highly effective and highly productive progressive technology.

3. It is necessary to develop a new design of a trailed boom sprayer, which should ensure and perform the developed new highly effective technology for chemical treatment of cotton plants.

Literature.

1. Mamatov F.M., Temirov I.G'., Rashidov N.Sh, Badalov S.M. Linear-step plow for smooth plowing of field slopes // IOP Conference Series: Materials Science and Engineering. IPICSE 2020. Tashkent – 2021. – P. 341-348.

2. Badalov S.M., Chorieva D.N., Rakhmatov D.B. Egatsiz tekis shudgorlaydigan plug // "Science and innovation" xalqaro ilmiy jurnali. – Toshkent, 2022. – No. – B. 638-640.

3. Mamatov F.M., Raxmatov D.B., Badalov S.M. Takomillashgan egatsiz tekis shudgorlaydigan plug// "O'zbekistonning innovatsion taraqqiyotida yoshlarning o'rni" mavzusidagi yosh olimlar va iqtidorli talabalarning Respublika ilmiy-amaliy anjumani. - Qarshi, 2022. – B. 162-163.

4. Babajanov L, Sharipov Z, Khakimov B, Sobirov E. Badalov S. Plow for processing row spacing of gardens // International Scientific Conference Construction Mechanics, Hydraulics Water Resources Engineering Conmechydro. – Tashkent, 2021. – pp.301-309.

5. Mirzakhodjaev Sh., Shodiev Kh., Uralov G., Badalov S., Chorieva D. Efficiency of the use of the active working body on the front plow// E3S Web of Conferences 264, 04047 (2021). – P. 401-407.

6. Patent for utility model UZFAP 01430RUz. Trailed boom sprayer for chemical treatment of cotton plants. / Dzhuraev D., Fayzullaeva N.S., Mirzaev B.S., Murotov L.B., Badalov S.M.,

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 03, March 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

Toirov I.Zh. / Tashkent. 2019. Bulletin No. 11, pp. 185-187.