



USE OF SPRAYING DEVICES IN PLANT PROTECTION

Sattorov Shokhimardon Khushmamatovich

Usmonov Muhriddin Mukhtor o'gli

Abdillayev Marat Ibodillayevich

Kimsanboyev Khujamurat Khamrokulovich

Alamuratov Raimjon Abdimurat Ugli

Scientific Research Institute of Plant Quarantine and Protection

Abstract

The article provides information on the description, classification, use in chemical treatment against harmful organisms, as well as ensuring the safety of sprayers used in agriculture in the Republic of Uzbekistan for the environment and humans.

Keywords: Agriculture, plants, pests, diseases, weeds, spraying equipment, chemical treatment.

Introduction

In the near future, it is necessary to harmonize the Uzbek standards for the safety of technical means of plant protection with European standards, as well as establish a procedure for periodically, once every two years, checking the right to use spraying equipment used on farms. Solving these issues will allow for the production of higher-quality equipment for plant protection, as well as increasing the efficiency and safety of pesticide use.

The main technology for applying plant protection products (PPP) in our country and abroad is spraying using ground spraying equipment. Using spraying technology, all chemical agents included in the "List of chemical and biological protection agents, defoliants and plant growth regulators permitted for use in agriculture of the Republic of Uzbekistan" are applied to approximately 75% of agricultural crops.

The modern range of chemical plant protection products includes a large number of pesticides in various dosage forms (water-soluble granules, emulsion concentrate, suspension concentrate, wettable powder, etc.). The manufactured spraying equipment must ensure the preparation and dispersion of working fluids of various dosage forms of pesticides, as well as their tank mixtures. Currently, the fleet of spraying equipment on farms in the Russian Federation is being formed not only through the purchase of imported and domestic sprayers, but also through the modernization of old equipment using significantly imported components (pumps, pressure regulators, filters, sprayers, hoses, etc.) [2].

Among foreign companies, the market for trailed sprayers is dominated by Amazone (Germany), Hardi (Denmark), Jacto (Brazil), Lemken (Germany) and other well-known global companies, as well as domestic Agro-Tex, Kazanskaya Selskokhoztekhnika, Avtopritsep-KamAZ, Yunaveks, Stavselmash, Guta and others. The share of self-propelled sprayers is also increasing.

Of the domestic machines, the most common is the model with a capacity of 2000 l and a coverage width of 18-21 m (OP-2000 and many analogues). Mounted sprayers are produced in our country





with a maximum tank volume of 600 l, and abroad with a capacity of up to 1000 l. The effectiveness of protective measures, their environmental safety directly depends on the technical and technological level of mechanization for their application. Unlike the Russian Federation, the development, testing, production and use of sprayers in European countries are strictly regulated by regulatory and legislative acts, international standards on design, technological and environmental requirements for ensuring safety for the environment and humans [1]. For example, in European countries EN 12761-3-2001 "Agricultural machinery and forestry machinery. Various devices for applying plant protection products and mineral fertilizers. Environmental protection". In addition, since 2001, the FAO (Food and Agriculture Organization of the United Nations) has adopted regulatory documents regulating the minimum safety requirements for technical means and technologies for the application of pesticides. In order to reduce the risk of pesticide runoff from the treatment area, in 2006, the international standard ISO/DIS 22856-1 was adopted and introduced for assessing the amount of droplet runoff by the working bodies of spraying equipment. The quality of mixing and maintaining the working fluid in the spray tank at a given concentration directly depends on the efficiency of the pump. According to regulatory documents, the hydraulic mixer should receive at least 4% of the liquid per minute (relative to the volume of the tank).

At the same time, some domestic manufacturers install pumps with lower efficiency on sprayers (to reduce the price), as a result of which the same concentration of the drug is not ensured during spraying. As a result, in some areas of the field the dose of the drug is exceeded, and in other areas it is applied at a lower rate. For example, on sprayers with a tank capacity of 2000 l and a boom coverage width of 18 m, a number of companies install pumps with a productivity of 125-130 l per minute, which is not enough for high-quality preparation of the working fluid and maintaining its specified concentration. Foreign manufacturers usually install two pumps on sprayers with a tank capacity of more than 2500 l and a large coverage width: one for transferring the working fluid to the booms, and the second for mixing the working fluid in the tank.

Main part

This year, drones were used to defoliate about 20 thousand hectares of cultivated land in our republic, this indicator is an indicator of the increasing use of advanced technologies in agriculture. When the sprayer placement step is 0.5 m, the height of the boom relative to the treated surface for standard slotted and injector flat torch sprayers should be 70 cm with a torch angle of 80 - 90 degrees, and at an angle of 110 - 120 degrees. Therefore, when choosing a sprayer, it is necessary to pay attention to the height adjustment range. Often, agricultural producers are offered spraying equipment with rigidly welded booms without any adjustments and a fixed installation height of 1.3 m or a minimum adjustment height of 0.8 m. The use of such equipment is unacceptable, since it is impossible to ensure uniform chemical protection of plants.

The length of the boom sections for uniform transfer of the working fluid to the sprayers should not exceed 4.5 m. When the boom coverage width is more than 12 m, their lifting, folding and unfolding should be provided by hydraulics. When the coverage width of the sprayers is up to 18 m, it is advisable to use foam markers to eliminate errors and obstacles during the passage, and when it is more than 18 m, electronic parallel driving systems are used.





Each type of sprayer has a corresponding range of working speeds of the sprayer movement. Most often, sprayers are equipped with standard slotted sprayers with a maximum permissible spraying speed of 12 km/h, but it is recommended to use them at a speed of 30-40 km/h.

For the application of herbicides, standard slotted flat torch sprayers with an optimal working pressure of 1.5 - 2.5 atm are more suitable. These sprayers can be used at wind speeds up to 3 m/sec. For spraying insecticides and fungicides with such sprayers, it is necessary to work in the pressure range from 3 to 4 atm.

In the morning hours, in areas with high air temperatures, low relative humidity and wind speeds up to 5 m/sec, as well as in water protection zones, forest belts, and forest edges, it is necessary to use flat nozzle sprayers with injectors with a working pressure of 1.5 - 2 atm. Unlike standard nozzle sprayers, they contain significantly fewer fine droplets in the spray spectrum, their share does not exceed 0.4 - 0.6%. It is necessary to pay attention to the fact that sprayers with a tank capacity of more than 1000 l are equipped with a receiving mixer for convenient and safe work. The mixer is designed to load the required amount of pesticide, taking into account the working volume of the tank, and is also equipped with a device for washing dishes under the preparations for their subsequent safe disposal. In addition to the main working tank, sprayers with a receiving mixer must necessarily have a second auxiliary tank for clean water. The mixer is not allowed to operate without it. Some domestic companies produce sprayers without the specified tank, but with a mixer.

However, when using rotating disc sprayers, perforated or mesh drums, a number of negative factors affecting environmental safety arise. Their spray spectrum contains a large proportion of fine droplets (3-10% of the volume of the dispersed liquid), which can be removed from the treatment zone. At the same time, in new flat-flare slot injector sprayers, the proportion of fine droplets in the scattering spectrum does not exceed 0.6%. In addition, rotating disc sprayers, perforated or mesh drums provide a higher degree of uneven distribution of the working fluid over the effective coverage width than flat-flare slot sprayers.

Some companies produce notched discs in the form of teeth, which further increases the proportion of fine droplets prone to breakage. Due to the insufficient power of the power generator of the power tool, the rotating disc sprayers on the sprayer boom are placed at intervals of 1.5 - 1.8 to 3 m, which increases the uneven distribution of the working fluid over the effective coverage width. The optimal step for placing the rotating disc sprayers is 1 - 1.2 m. When the disc sprayers rotate, a rarefaction is formed in the outlet zone of the electric motor shaft, where small satellite droplets of the sprayed preparation are sucked in, as a result of which the bearing units of the electric motors are subject to corrosion and they fail after one to one and a half years of operation.

Studies show that in order to eliminate the destruction of droplets and increase the uniform deposition of the working fluid over the effective coverage area, it is necessary to use the principle of separation of droplets or their forced deposition with a directed air flow. Experimental models of such working bodies have been created and technologically evaluated by the institutes of our country.

Conclusion

In conclusion, manufacturers should carefully weigh all the pros and cons when purchasing sprayers, apply all options for rational and effective use of new machines in their fields, in the





specific conditions of their production, which will allow them to achieve high efficiency.

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