**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ**
**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ**
**ІНСТИТУТ МЕХАНІКИ ТА АВТОМАТИКИ АПВ НААН**
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## SELF-PROPELLED SPRAYERS: DESIGN COMPARISON

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The chemical method of plant protection is the most popular and effective in protecting plants from both pests and diseases [1]. The main advantages of this method can be identified: instant effect after the first application, versatility and fairly quick payback [2]. With the correct agrotechnical norm for the introduction of plant protection chemicals, the crop does not lose its nutritional value and can be consumed by humans without harm to health. In order to achieve yield increases in both physical and monetary terms, many agrarian farms spend numerous resources in order to obtain a large return on these investments [3]. One of the main components of achieving such a result is a properly selected technique for the introduction of chemical plant protection products [4]. As a rule, sprayers of various types (trailed, mounted or self-propelled) are used, depending on the cultivated areas (Fig. 1). It should be noted that with regular and high-quality maintenance of agricultural sprayers, it increases their performance, which affects compliance with agrotechnical standards [5].

Greater productivity, high-quality work while using fewer machines and completing agricultural tasks in a short time - these are the requirements of modern agriculture. And this is what today allows agricultural enterprises to remain successful in the market in the face of fierce competition. This is increasingly forcing farmers to use more powerful and versatile machines. Therefore, engineers developing agricultural machinery are faced with the task of achieving maximum productivity of agricultural work using the minimum number of technical units. In particular, this requirement of modern farming has prompted the emergence of large heavy-duty field liners, namely self-propelled sprayers. For farmers, when choosing such complex modern machines as self-propelled sprayers, an important criterion is their cost, quality of work, reliability, availability of service from the manufacturer or dealer of equipment. Given the relevance of this issue, we present the main characteristics and advantages of some self-propelled sprayers on the Ukrainian market, which will help farmers navigate the variety of market offers and choose the unit that will best meet the needs of your particular farm.

Fig. 1. Types of sprayers.

The aim of the study is to analyze and evaluate the failures that occur on agricultural sprayers due to improper maintenance. After analyzing the data of service centers and repair shops, there was an opinion that some agricultural enterprises are trying to save on spare parts and on qualified employees. Thereby exposing themselves to economic losses. The most frequent breakdowns of sprayers occur due to untimely passage of various kinds of maintenance. In addition, when operating these types of machines, one should not forget that chemicals are used that expose the main elements of the sprayer to untimely wear. Another possible reason for the failure of such equipment can be a liquid containing abrasive particles. As a rule, many machine operators forget to change filter elements in a timely manner, which leads to contamination of valves and nozzles, as well as rupture of pump membranes (Fig. 2).

In order to timely prevent or correct an already occurring malfunction or breakdown, there are a number of recommendations that the machine operator or service center master should directly follow. Timely replacement of filter elements helps to prevent clogging of atomizers and rupture of membranes. Before replacing the diaphragm, it is necessary to drain the mixture of oil and liquid, flush the inside of the pump with a solvent. Then fill the pump with specialized oil to the required level. Also, the pump must be lubricated by using a specialized syringe through the grease fittings in the covers. We must not forget about the seals, which must be checked in a timely manner for tightness and integrity, and if necessary, replace them with new ones.

Therefore, the choice of the right model of self-propelled sprayer should be approached carefully, having previously analyzed the capabilities and needs of your farm, the volume of processing, the suitability of the characteristics of the unit and its parameters in accordance with the characteristics of the crops you grow, the desired machine power necessary for an effective and cost-effective solution to specific

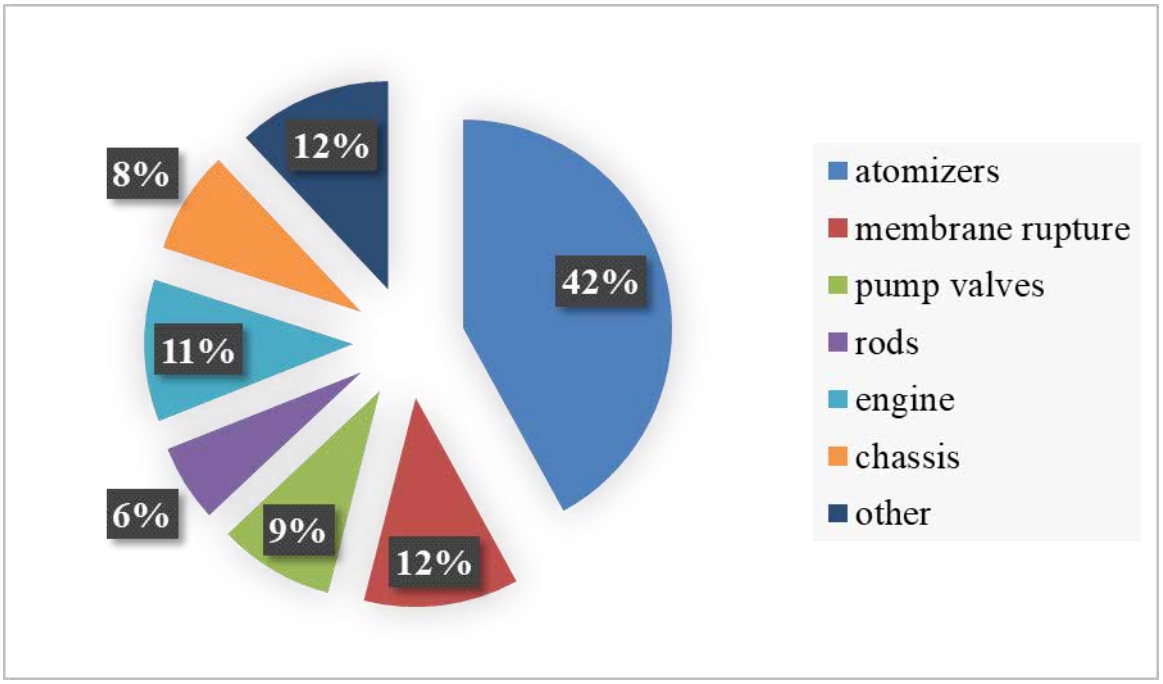


Fig. 2. Failure analysis of agricultural sprayers.

problems in the economy. That is, you should pay attention to all the important technical parameters and choose exactly the model that will work most effectively in your conditions and on your land. Do not forget to take into account the natural, climatic and geographical features of your area and the relief of the fields, because these factors also play an important role in the operation of a self-propelled sprayer! So if your farm has a lot of slopes and hills, you should choose a more powerful machine. Thus, having analyzed and studied the failures of agricultural sprayers, we can conclude that most of the malfunctions occur due to violations of the terms of maintenance and elementary rules of maintenance by the machine operator.

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## STORAGE OF GRAIN HARVESTERS UNDER CANOPY

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On Ukrainian agricultural holdings [1], grain harvesting equipment is usually stored either outdoors (on hard-surfaced sites) or under sheds (Fig. 1). Due to the impressive size of the units in our country [2], they are rarely stored in closed hangars [3]. But, not all owners of combine harvesters pay due attention to the rules of storage under sheds [4]. As a result [5], certain equipment units quickly fail, and the preparation of the combine for the new season ends with large-scale repairs and missed deadlines [6]. Let's figure out how to keep grain harvesters under a canopy and look at a few important rules that will help save expensive combines and put them into operation as quickly and conveniently as possible after off-season storage [7].

Fig. 1. Equipped storage shed for harvesters.