Resource-saving technologies - the basis of effective enterprise activity

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Abstract. This article discusses resource-saving technologies, their significance and main features. The authors propose to increase the economic efficiency of an agricultural enterprise by introducing a new resource-saving technology into production. The recommendations obtained are justified and can be useful in the production and economic activities of an enterprise of a certain industry affiliation.

1. Introduction

Agriculture is the primary branch of the agro-industrial complex. The industry provides food to the population, thereby meeting the primary needs. This is one type of industry that cannot be replaced by any other production. In agriculture, production activities come directly into contact with living organisms - these are animals and plants. A separate type of means of production is occupied by land, thanks to such a resource, the value of the industry will never be in decline. The economic efficiency of the agricultural sector and the economy as a whole, as well as further development prospects, depend on the efficiency and rational use of land [1].

However, with all the variety of covered issues of development of agriculture, the vast majority of affected mainly certain aspects of the functioning of agricultural production, where not enough attention is given to the use of agricultural land, resource-saving technologies of their specific characteristics and trends. However, it is resource-saving technologies that are of great importance for any agricultural enterprise, as they help to ensure the production process with minimal consumption of fuel, energy and other various resources.

The aim of the study is to study the importance of resource-saving technologies and their impact on production efficiency.

The results of the study can be used in conducting scientific research on this issue, as well as in the educational process.

2. Materials and methods

In recent years, technologies based on resource-saving methods of tillage, the use of new machines and combined units, and the reduction of technological operations have become widespread [2]. To achieve the best economic effect in such technologies, it is necessary to provide for the mandatory implementation of elements aimed at improving the quality of grain and preserving its harvest and post-harvest period.

Especially the need to switch to modern, less expensive technologies has increased in recent years due to the sharp increase in the cost of fuel and agricultural machinery [3]. Environmental problems...
associated with increasing negative multiple mechanical treatments with annual soil wrapping have also become more acute.

It is fundamentally important that the development of such technologies should be comprehensive. Resource-saving technologies of grain production, based on minimal tillage and the use of a new generation of agricultural machines and aggregates, new high-yielding varieties of grain crops and modern plant protection products, can restore soil fertility, significantly reduce or completely eliminate wind, water or the combined effect of wind and water erosion of the soil.

The main elements of resource-saving technologies are: optimization of the structure of sown areas, crop rotations, a book of field histories, systems of steam, autumn, spring, summer soil treatment and crop care, chemical reclamation, fertilizer system, integrated plant protection from weeds, pests and diseases, variety exchange and variety renewal, drainage and agromeliorative techniques, a system of machines and tools, technological map, economic assessment of technologies.

In 2015-2018, it was shown that the majority of grain-producing farms in Russia clearly chose to switch to resource-saving soil protection technologies, which ensure a reduction in the cost of grain without reducing the yield and quality of products. The leader in production for resource-saving technologies of grain production is JSC "Siberian Agro-Industrial House", which produces combined tillage units "Leader" and tillage sowing machines PPM "Ob".

We offer to purchase a combined tillage sowing machine PPM4 "Ob-4-ZT" - to the Federal State Unitary Enterprise educational and experimental farm of the Tyumen State Agricultural Academy (FSUE Uchkhoz of the Tyumen State Agricultural Academy). This enterprise was chosen not by chance, it has certain resources: land, labor, material, technical, let's take a closer look at Table 1.

Uchkhoz occupies a favorable economic position: it is located within the boundaries of the settlement of the city of Tyumen, where there are points of sale of manufactured products, the presence of profiled roads connecting the enterprise with neighboring points.

| Table 1. Indicators that characterize the size of the enterprise. |
|---------------------------------------------------------------|
| **Indicators**                        | **Data**                  |
| Gross output, thousand rubles          | 191281                    |
| Commercial products, thousand rubles  | 105453                    |
| Average annual cost of fixed assets, thousand rubles         | 394867                    |
| The cost of working capital, thousand rubles.                | 127865                    |
| Average annual number of employees, people                   | 3418                      |
| Total area, hectare                                      | 4641                      |
| including: agricultural land                            | 4641                      |
| of these: arable land                               | 3418                      |
| Power capacity, hp                                    | 25063                     |

The company is subordinate to the Ministry of Agriculture of the Russian Federation. The functions of the founder are performed by the Ministry of Property Relations of the Russian Federation and the Ministry of Agriculture of the Russian Federation.

The company was created in order to meet the public needs for the results of its activities and profit [4-5].

The company carries out the following activities:

- Conducting the educational process in production conditions together with the departments of the educational institution;
- Conducting experimental research work, testing of scientific developments;
- Practical training of students who improve their skills according to the programs of the educational institution;
- Production of elite seed and breeding products, development of new technologies, creation of new varieties and hybrids of agricultural crops of plants, breeds and lines of livestock;
- Production, processing and sale of crop and livestock products;
- Holding exhibitions, auctions, fairs, and promotions.

3. Results
Resource saving is one of the most profitable forms of increasing production efficiency, which can significantly save resources, thereby reducing the cost of production. There are a number of advantages that an enterprise can get when introducing resource-saving technologies into production, figure 1.

![Figure 1. Features of the use of resource-saving technologies in the enterprise.](image)

The capacity at the recommended speed of 12 km/h for one Ob-4-ZT (in the unit with K-700) is 9.5 ha/h. The daily output will be 200 hectares. This ensures a fuel consumption of no more than 6 kg/ha.

As practice shows, with a rational crop rotation, the unit consisting of a K-700 tractor and two Ob-4-ZT PPM can provide the necessary types of work on tillage and sowing on an area of up to 6000 hectares. The area of agricultural land is 1375 hectares, an aggregate consisting of DT-75 or K-701 with one "Ob-4-ZT" is required. As a result of application, there is an increase in yield by 2-5 c/ha, the level of costs is significantly reduced, which will certainly affect the effective operation of the enterprise.

4. Discussion
The domestic technologies used in agricultural production are much simpler, because of the acceptable price category and technical equipment [6-7]. Production is usually based on traditional technologies, in rare cases highly efficient resource-saving technologies. The level of technical means of the Russian type is inferior in a number of indicators of foreign models [8]. The low liquidity of the machine and tractor fleet is obvious, and the incoming modern equipment to the domestic market does not meet the requirements of agricultural producers in a number of characteristics. This implies such urgent tasks as the use of new technologies, technical equipment of agricultural sectors, improving the quality of
personnel, the growth of market infrastructure, reducing production costs, increasing labor productivity, increasing the number of products sold.

Technological breakthrough together with innovation policy is an effective way to solve problems. The main proposals for improving resource-saving technologies are presented in figure 2.

| Training of specialists to work with modern, advanced resource-saving technologies |
| The interest of managers and leading specialists of agricultural enterprises in equipping them with modern resource-saving technologies |
| Development and implementation of internal rules and regulations for operation with the latest technologies at each agricultural enterprise |

**Figure 2.** Proposals for the improvement of resource-saving technologies.

During this period, the following types of technologies are observed in terms of production intensity.

Traditional – used in enterprises with low income and human resources, present in arid, steppe regions. As a rule, inexpensive equipment from the 1970 is used here, and the grain yield is approximately from 8 to 19 c/ha.

Intensive – require the use of mineral fertilizers, plant protection products, the use of drugs that promote the preservation and growth of plants in their various life cycles. In such regions, the grain yield will be 29-40 c/ha.

High – designed for areas with a favorable climate, where the grain yield is 50-60 kg/ha.

It should be noted that the modernization of the industry should be combined with resource conservation, that is, equipping the enterprise with the latest resource-saving technologies, as the main factor in the growth of the agricultural sector [9-10].

**5. Conclusion**

Resource-saving technology of wheat production "Tyumenskaya -80" and the effectiveness of its implementation is presented in table 2.

**Table 2.** Efficiency of implementation of resource-saving technology.

| Indicators                       | The fact | The project |
|---------------------------------|----------|-------------|
| Area, ha                        | 1375     | 1375        |
| Yield, c/ha                     | 30       | 34          |
| Gross volume, centners          | 41250    | 46750       |
| Costs per 1 hectare, rub.       | 15298.8  | 16424.8     |
| Cost of 1 centner, rub.         | 509.96   | 483.1       |
| Sale price, rub.                | 1449.5   | 1449.5      |
| Product price per 1 hectare, rub.| 43485   | 49283       |
| Profit per 1 hectare, rub.      | 28188    | 32857.6     |
| Payback period of the new technology, years | -       | 0.3         |
The main tillage is deep soil loosening in a pair to a depth of 25-27 cm: DT-75, deep digger PG-3-100. Spring and pre-sowing tillage – early spring harrowing of the soil on dump backgrounds with tooth harrows in 2-3 tracks: DT-75, PPM-4 "Ob-4".

According to the data obtained, it can be seen that using a new resource-saving technology, the yield increases, therefore, there is an increase in the gross harvest. The cost of production is reduced. Despite the additional investment (the new technology requires additional cash investments), we get additional products from 1 hectare. The new technology will pay off in 3 months. The calculations show that the use of resource-saving technologies will have a positive impact on the effective operation of the enterprise.

Resource-saving technologies are the basis for the efficiency of the production process, so the introduction of advanced resource-saving technologies into production activities will always be one of the main vectors of development, both in an individual enterprise and in the region as a whole.

References

[1] Ermakova A M and Zubareva Y V 2017 Strategic development of rural areas in the South of the Tyumen region (Tyumen: Tyumen industrial University) 86
[2] Ermakova A M and Nurullina T S 2020 Taking into account environmental factors when setting the price of land in the city of Tyumen. Moscow economic journal 1 10
[3] Ermakova A M 2019 Influence of price-forming factors on the cost of land in the city of Yekaterinburg. Moscow economic journal 10 50
[4] Kirilova O V and Chuba A Y 2018 Features of effective use of competitive advantages of land resources in agriculture. Economics and entrepreneurship 10 1255-1258
[5] Kirilova O V and Chuba A Y 2018 Features of the effective use of GIS technologies in the digital economy of agriculture. Economics and entrepreneurship 11 1000-1003
[6] Kustysheva I, Sibanbayeva A and Dubrovsky A 2018 Influence of zones of priority development on social and economic efficiency of territories. IOP Conference Series: Materials Science and Engineering 451 012143
[7] Kustysheva I N and Ostarkova D A 2018 Implementation of the program "far Eastern hectare" as a way of development of the territory of the Far East. International agricultural journal 2 69-71
[8] Kryakhtunov A, Chernyk E and Ainullina K 2018 Consolidation of land management and town planning activities the municipal level. In the collection: IOP Conference Series: Materials Science and Engineering 451 012142
[9] Dvoryadkina E B 2019 Local finance of rural areas: is a course for economic growth possible? In: Architecture of Finance: Illusions of Global Stabilization and Prospects for Economic Growth. Collection of materials of the VIII International Scientific and Practical Conference. Under the scientific editorship of I A Maksimtsev, V G Shubaeva, I Y Evstafyeva 140-143
[10] Dvoryadkina E B and Belousova E A 2020 Management of economic and spatial development of rural municipalities: theoretical aspect. In the book: Competitiveness and development of socio-economic systems. Collection of abstracts of reports of the IV International Scientific Conference in memory of Academician A I Tatarkin. Edited by V I Barkhatov, D A Pletnev, O V Brizhak, G P Zhuravleva 134-135