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GRAIN SORGHUM CULTIVATION, AS AN ELEMENT OF FOOD SECURITY IN UKRAINE

Mass malnutrition and hunger are among the most important problems that put the world community on the brink of extinction, and to varying degrees, this applies to both economically developed and developing countries. Insufficient food supply negatively affects people's life expectancy, health, physical performance, adaptation to modern high-tech production processes, etc. [1].

In the current conditions of restructuring and reorganization of agricultural enterprises and rising energy costs, another problem of producing enough food and feed grain to meet the ever-growing domestic needs and demand in the international market is becoming more urgent. [2].

Climate change, which is occurring on the planet due to rising temperatures, affects production conditions in the agricultural sector and, today, producers are often experiencing negative consequences of this impact on the development of agricultural production. The range of products produced on farms is mostly formed by traditional temperate crops, whose profitability and yields are declining.

Therefore, modern agribusinesses increasingly prefer niche crops that help out in times of crisis or when looking for new solutions. Growing, processing and selling niche crops is a rather complicated process, as they are popular in a narrow segment of the consumer market.

Today, niche crops in Ukraine are a kind of airbag that guarantees farmers an additional source of income.

Currently, there are a number of crops in Ukraine that tend to grow in popularity: cereals (sorghum, millet, spelt, triticale), exotic grains (quinoa, amaranth), vegetables (Chinese cabbage, broccoli, asparagus, lettuce, kale, celery, onions), oilseeds (flax, sesame, safflower), microgreens, etc. [2].

For a long time, niche crops were grown only by small farms. Today, more and more large agricultural producers are looking for alternatives to traditional crops.

Let us note the main advantages of growing niche crops:

- ✓ low competition;
- ✓ high selling price;
- ✓ large sales market;
- ✓ high business profitability;
- ✓ building an effective crop rotation.

Today, in the continental zone of Ukraine, grain farming is a strategic and most efficient sector of the national economy, as grain crops form the basis of the food supply and security of the state. At the same time, global climate change requires revision of a number of positions regarding the selection of crops in the crop rotation structure, introduction of adaptive technologies, new irrigation

systems, technological, organizational, economic and market factors of the entire complex.

The decline in grain volumes and production in recent years in Ukrainian farms has been significantly affected by a significant increase in prices for fuels and lubricants, irrigation water, electricity and fixed assets.

In the agro-climatic conditions that have prevailed in recent years, it is difficult for traditional grain crops to produce high yields. Therefore, in such conditions, it is important to sow crops that use moisture rationally to form a crop and are resistant to soil and air drought without reducing productivity. Sorghum is such a promising crop (Fig. 1).

Fig. 1. Phytocoenosis of grain sorghum, 2022
(original photo)

In this aspect, sorghum has a high adaptive potential and therefore has a number of advantages over spiked cereals. The high economic value and potential productivity of sorghum is achieved on the basis of:

- ✓ the use of natural resource potential based on the crop's resistance to extreme environmental conditions and high payback of agronomic measures;
- ✓ content of nutrient micro-, macroelements and vitamins in sorghum grain;
- ✓ high nutritional value and low cost as a fodder crop;
- ✓ the possibility of using sorghum as an insurance crop.

That is why grain sorghum is the most important fodder, technical and food crop, which is widely grown not only in Ukraine but also around the world. Over the past 40 years, the global area under sorghum has increased by more than 50%. In terms of gross grain harvest, it ranks third in the world among grain and fodder crops after corn and barley, and third as a food crop after wheat and rice [3].

The global production of sorghum grain is about 70 million tons, including Africa (21.6 million tons), the United States (26.5), Asia (16.2), Mexico (6.4) and Argentina (2.5 million tons). Europe accounts for less than 1% of sorghum acreage, of which only 0.3% is in the CIS countries (Ukraine, Kazakhstan, Central Asia and Moldova). Thus, sorghum cultivation in the world is a leader [1, 3].

To this end, a comprehensive study of the scientific and practical principles of productivity formation, growth and development characteristics, adaptive properties and competitiveness of plants of modern sorghum varieties and hybrids in organic and conventional production has been launched in the training and research field of Polissia National University since 2018. Scientific research has been expanded and continued at Chaykivka PE (Zhytomyr district, Zhytomyr region) and Bel-Agro 3 LLC (Berdychiv district, Zhytomyr region).

In our opinion, a strong argument for the involvement of sorghum in the agrocenoses of Zhytomyr region is its extremely high ecological plasticity, which can be a full-fledged alternative to other spring crops (barley, corn, sunflower, millet) under unfavorable weather conditions during the growing season.

Sorghum is undemanding to soils, it can grow on light and heavy soils with high salinity, but free of weeds. In addition, with its strong root system, it can produce high grain yields when grown in monoculture, but it reacts negatively to cold, wet and acidic soils. Another advantage is its high resistance to damage by pathogens and pests.
The grain contains 12–15% protein, 3.4–4.4% fat, 70–80% MEV, 2.4–4.8%
fiber, provitamin-carotene, B vitamins, riboflavin and tannins. In terms of fodder qualities, sorghum grain even surpasses barley. 100 kg of grain contains 118–130 calories [1].

Currently, sorghum is used in three main areas: the food industry, feed production, and bioenergy. Therefore, there is a huge interest in this crop. The share of high-quality grain is used to produce flour, bread, cereals, extracted products, starch, alcohol, etc.

Sorghum is one of the most cost-effective crops in the green conveyor belt. Its important biological feature as a fodder crop is its ability to grow back quickly after mowing and vegeta.

In modern conditions, sorghum is seen as a highly competitive alternative to corn with a wide growing area and versatility in terms of use.

The crop has a number of advantages over corn: high yields, lower seeding rates (2-3 times) and seed costs, high environmental plasticity, the possibility of later (including post-harvest) sowing and harvesting, versatility of use, etc.

Thus, the natural and climatic potential of the continental zone of Ukraine meets the biological needs of sorghum plants for cultivation in this area. Compliance with the zonal technology of crop cultivation will ensure the full realization of the productivity of varieties and hybrids and high grain yields.

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