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SECTION: AGRICULTURAL SCIENCES

MAIN PROSPECTS FOR CHICKPEA CULTIVATION IN THE FOREST-STEPPE ZONE

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Modern climate changes towards warming have led to the need to review not only the technological methods of growing agricultural crops (timing and methods of sowing, seeding rates, crop care, etc.), but also to seek more adapted crops to climate changes, which will significantly affect the grain farming of Ukraine as a whole [1].

Chickpea is considered a 'niche' crop; however, there has been a trend of increasing demand and expansion of chickpea acreage in Ukraine. Initially, chickpea sowing rapidly spread in the South and then in the Forest-Steppe soil-climatic zone. Over the past 10 years, up to 2022, the area of chickpea sowing has increased more than 10 times and amounted to about 60–70 thousand hectares [8, 10]. Since most of the chickpea cultivation area was in the south of Ukraine, the acreage under chickpea has drastically reduced due to the Russian invasion. An important factor that increases the demand for chickpea is the price of the produced product compared to soy or peas [2].

Chickpea (Cicer arietinum L.) is a valuable food and fodder crop with a protein content of up to 34%, which in quality is comparable to egg protein. Additionally, its seeds contain 50–60% carbohydrates, 2–5% mineral substances, and a relatively high fat content of 4–7%, which significantly enhances its nutritional qualities. The biological value of its protein ranges from 52–78%, with a digestibility coefficient of 80–83% [3, 6].

The biological characteristics of chickpea determine their need for nutrients throughout the growing season. From emergence to flowering, it absorbs a small amount of nutrients as it develops quite slowly. The highest need for nutrients occurs during the flowering-pod formation period (during which about 65–70% of the nitrogen, phosphorus, and potassium from the total requirement is absorbed) [4].

Among scientists from many countries, there is a debate regarding the relationship of leguminous crops to nutrients, especially nitrogen. To date, none of the four main approaches in this regard have been definitively chosen (growing chickpeas without fertilizers, applying only starter doses of fertilizers, applying half of the required fertilizers with the rest obtained through nitrogen fixation, and fully supplying chickpea plants with nitrogen from mineral compounds).

Some scientists believe that it is not advisable to apply nitrogen fertilizer to chickpeas, as well as to all leguminous crops, while others argue that on poor soils, it is worth applying 20–30 kg/ha of nitrogen from mineral fertilizers. If the soil's nitrogen content is average or sufficient, nitrogen fertilizers are not applied due to their negative impact on the effectiveness of the symbiotic apparatus [5, 7].

Phosphorus and potassium fertilizers for chickpeas should be applied taking into account the nutrient removal with the planned yield. Many factors, including the activity of symbiosis, influence the coefficients of nutrient use from fertilizers.

Insufficient phosphorus availability can limit symbiotic nitrogen fixation and consequently reduce plant productivity. Mostly, 30–60 kg/ha of phosphorus fertilizers are applied for primary tillage, calculated as P_2O_5.

Potassium is no less important than nitrogen and phosphorus. It stimulates the normal course of photosynthesis, increases the efficiency of many enzymes, and enhances the flow of carbohydrates to other organs. With sufficient potassium supply, plants retain water better and thus withstand drought better [9].

Therefore, in modern realities, it is important to promptly respond to climate changes and introduce more drought-resistant crops into crop rotations, one of which could be chickpeas. Many questions remain regarding the agronomy of this crop, which determines the relevance of further research.

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