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**МАГІСТЕРСЬКА КВАЛІФІКАЦІЙНА РОБОТА**

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**МУХИ КОСТЯНТИНА МИКОЛАЙОВИЧА**

**2023 р.**

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# НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ

Факультет аграрного менеджменту

УДК

**ПОРОДЖЕНО**  
Декан факультету  
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Анатолій ОСТАПЧУК  
(підпис) (ПП)

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адміністративного менеджменту та ЗЕД  
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«\_\_» \_\_\_\_\_ 2023 р.

«\_\_» \_\_\_\_\_ 2023 р.

# МАГІСТЕРСЬКА КВАЛІФІКАЦІЙНА РОБОТА

на тему «Експортний потенціал зернової галузі України»  
Спеціальність 073 «Менеджмент»  
(код і назва)

Освітня програма

«Менеджмент зовнішньоекономічної діяльності»  
(назва)

Орієнтація освітньої програми освітньо-професійна

# Гарант освітньої програми

К.Є.Н., доцент  
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# Керівник магістерської кваліфікаційної роботи

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# КИЇВ – 2023

# КИЇВ – 2023

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ  
І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ  
Факультет аграрного менеджменту

ЗАТВЕРДЖУЮ

Завідувач кафедри

адміністративного менеджменту та ЗЕД

Віталій ЛУЦЬК

(шляховий ступінь, вчене звання)

(підпис)

(ПІП)

«

»

2023 року

ЗАВДАННЯ

ДО ВИКОНАННЯ МАГІСТЕРСЬКОЇ КВАЛІФІКАЦІЙНОЇ РОБОТИ СТУДЕНТУ

Мухи Костянтину Миколайовичу

(прізвище, ім'я, по батькові)

Спеціальність

073 «Менеджмент»

(код і назва)

Освітня програма

«Менеджмент зовнішньоекономічної діяльності»

(назва)

Орієнтація освітньої програми

освітньо-професійна

Тема магістерської кваліфікаційної роботи  
України

«Експортний потенціал зернової галузі

затверджена наказом ректора НУБіП України від «12» січня 2023 р. №69 «С»

Термін подання завершеної роботи на кафедру

2023.11.10

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Вихідні дані до магістерської кваліфікаційної роботи: Закони України, укази Президента

України, постанови Кабінету Міністрів України, матеріали Міністерства аграрної політики і  
продовольства України, статистична інформація Державної митної служби України, FAO та  
Міністерства сільського господарства США (USDA), власні спостереження автора.

Перелік питань, що підлягають дослідженню:

1. Теоретико-методичні аспекти формування та функціонування експортного потенціалу
2. Аналіз сучасного стану експортного потенціалу зернової галузі України
3. Перспективи відновлення та нарощування експортного потенціалу зернової галузі України

Перелік графічного матеріалу (за потреби):

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Керівник магістерської кваліфікаційної роботи

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Завдання прийняла до виконання

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(прізвище та ініціали студента)

## РЕФЕРАТ

**Структура магістерської кваліфікаційної роботи.** Магістерська кваліфікаційна робота на тему «Експортний потенціал зернової галузі України» викладена на 106 сторінках друкованого тексту, включає 10 таблиць і 21 рисуноків. Робота складається зі вступу, трьох розділів і висновків. Для написання магістерської роботи використано 86 літературних джерел.

**Основний зміст кваліфікаційної магістерської роботи.** В першому розділі кваліфікаційної магістерської роботи «Теоретико-методичні аспекти формування експортного потенціалу» розглянуто економічний зміст та узагальнено основні методичні підходи до системи формування та оцінки експортного потенціалу, визначене його місце в структурі економічного потенціалу.

У другому розділі «Аналіз сучасного стану експортного потенціалу зернової галузі України» проаналізовано ресурсний потенціал зерновиробництва в Україні, визначено особливості кон'юнктури світового ринку зерна та проведена оцінка експортного потенціалу зернової галузі України.

У третьому розділі - «Перспективи відновлення та нарощування експортного потенціалу зернової галузі України» обґрунтовані стратегічні напрями відновлення та розвитку експортного потенціалу зернової галузі, проведена оцінка рівня державної підтримки зерновиробництва в Україні та експорту в умовах воєнного стану.

**Мета і завдання кваліфікаційної магістерської роботи.** Метою дослідження є обґрунтування теоретико-методичних підходів та науково-практичних рекомендацій щодо формування, нарощування та реалізації експортного потенціалу зернової галузі України.

Відповідно до поставленої мети в роботі передбачено вирішення наступних завдань:

- визначити економічну суть поняття «експортний потенціал»;
- опрацювати методичні підходи щодо оцінки експортного потенціалу галузі;

- провести аналіз ресурсного потенціалу виробництва зерна в Україні;
- проаналізувати кон'юнктуру світового ринку зерна та визначити місце України на ньому;
- оцінити сучасний стан експортного потенціалу зернової галузі України;
- обґрунтувати стратегічні напрямки відновлення та розвитку експортного потенціалу зернової галузі України;
- визначити рівень державної підтримки зерновиробництва та експорту в умовах воєнного стану;
- обґрунтувати напрями забезпечення експортної логістики зерна з України в умовах обмеження логістичних можливостей.

**Об'єктом дослідження** є процес формування експортного потенціалу зернової галузі.

**Предметом дослідження** є теоретичні, методичні та практичні аспекти впливу внутрішніх і зовнішніх факторів на формування експортного потенціалу зернової галузі.

**Методи дослідження.** Теоретичною і методологічною основою проведених в кваліфікаційній магістерській роботі досліджень стали основні положення теорії формування експортного потенціалу. Із спеціальних методів дослідження в роботі використані абстрактно-логічний, монографічний, розрахунково-конструктивний, економіко-статистичний, а також табличний і графічний методи відображення інформації.

**Наукова новизна одержаних результатів** полягає у здійсненні комплексної оцінки експортного потенціалу зернової галузі України в результаті якої отримані положення, що визначають наукову новизну: визначені особливості функціонування зернової галузі і факторів, що негативно впливають на формування та реалізацію експортного потенціалу, основними з яких є втрата обсягів виробництва, зменшення експортних поставок зерна та порушення експортної логістики зерна внаслідок військової агресії росії проти України.

**Практичне значення одержаних результатів** полягає у можливості ефективного використання методичних підходів, аналізу та комплексної оцінки

експортного потенціалу при плануванні та обґрунтуванні підприємствами зернової галузі експортно-імпорتنих операцій, розробки заходів щодо диверсифікації транспортних логістичних маршрутів експорту зерна в умовах обмеження логістичних можливостей.

**Апробація результатів магістерської кваліфікаційної роботи.** Основні положення та результати, викладені в магістерській кваліфікаційній роботі були оприлюднені на IV Міжнародній науково-практичній онлайн-конференції студентів, аспірантів і молодих вчених «Сучасний менеджмент: виклики та можливості». (м. Київ, НУБіП України, 25-26 жовтня 2023 р.).

**Публікації.** Основні положення та результати дослідження були відображені у матеріалах конференції:

1. Муха К.М., Ліброва Л.В. Сучасний стан експорту зерна з України та перспективи його розвитку. Матеріали IV Міжнародної науково-практичної конференції студентів, аспірантів та молодих вчених, присвяченої 125-річчю НУБіП України «Сучасний менеджмент: виклики та можливості»: 25-26 жовтня 2023р. – К.: НУБіП України, 2023.

**КЛЮЧОВІ СЛОВА:** ЕКСПОРТНИЙ ПОТЕНЦІАЛ, ЗЕРНОВА ГАЛУЗЬ, ЕКСПОРТНА ЛОГІСТИКА, РЕСУРСНИЙ ПОТЕНЦІАЛ.

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AND ENVIRONMENTAL SCIENCES OF UKRAINE  
Faculty of Agricultural Management  
UDK 339.564:633.1:631.576.3

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**APPROVED BY**  
Dean of the Faculty  
of agrarian management

**IS ALLOWED BY**  
Head of the Department of  
administrative management and foreign  
economic activity

\_\_\_\_\_  
**Anatolii OSTAPCHUK**  
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(signature)

«\_\_» \_\_\_\_\_ 2023 р. «\_\_» \_\_\_\_\_ 2023 р.

# НУБІП України

**MASTER'S THESIS**

Topic «Export potential of grain industry of Ukraine»

Specialty 073 «Management»

Educational program «Management of foreign economic activity»

Orientation of the educational program educational and professional

**Guarantor of the educational program:**  
PhD in Economics, Associate Professor \_\_\_\_\_ Larysa DIBROVA

**Head of the master's of qualification work**  
PhD in Economics, Associate Professor \_\_\_\_\_ Larysa DIBROVA

**Performed by:** \_\_\_\_\_ Kostiantyn MUKHA

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KYIV - 2023

## ABSTRACT

**The structure of the qualifying master's thesis.** The qualifying master's thesis on the topic «Export potential of grain industry of Ukraine» is laid out on 106 pages of printed text, includes 10 tables and 21 figures. The work consists of an introduction, three sections and conclusions. 86 literary sources were used to write the master's thesis.

**The main content of the master's thesis.** In the first chapter of the qualifying master's thesis «Theoretical and methodological aspects of the formation of export potential» the economic content is considered and the main methodical approaches to the system of formation and evaluation of the export potential are summarized, its place in the structure of the economic potential is determined.

In the second chapter, «Analysis of the current state of the export potential of the grain industry of Ukraine», the resource potential of grain production in Ukraine was analyzed, the peculiarities of the global grain market were determined, and the export potential of the grain industry of Ukraine was evaluated.

In the third chapter – «Prospects for restoring and increasing the export potential of the grain industry of Ukraine» the strategic directions for the restoration and development of the export potential of the grain industry are substantiated, an assessment of the level of state support for grain production in Ukraine and exports under martial law is carried out.

**The purpose and tasks of the qualifying master's thesis.** The purpose of the study is to substantiate the theoretical and methodological approaches and scientific and practical recommendations regarding the formation, expansion and implementation of the export potential of the grain industry of Ukraine.

In accordance with the set goal, the work envisages solving the following tasks:

- to determine the economic essence of the concept of «export potential»;
- develop methodical approaches to assess the export potential of the industry;
- analyze the resource potential of grain production in Ukraine;
- analyze the state of the world grain market and determine Ukraine's place on it;
- assess the current state of the export potential of the grain industry of Ukraine;

justify the strategic directions of recovery and development of the export potential of the grain industry of Ukraine;

determine the level of state support for grain production and export under martial law conditions;

justify directions for providing export logistics of grain from Ukraine in the conditions of limited logistics capabilities.

**The object** of the study is the process of forming the export potential of the grain industry.

**The subject** of the study is the theoretical, methodical and practical aspects of the influence of internal and external factors on the formation of the export potential of the grain industry.

**Research methods.** The main provisions of the theory of export potential formation became the theoretical and methodological basis of the studies conducted in the qualifying master's thesis. Among the special research methods used in the work: abstract-logical, monographic, calculation-constructive, economic-statistical, as well as tabular and graphic methods of displaying information.

**The scientific novelty of the obtained results** lies in the implementation of a comprehensive assessment of the export potential of the grain industry of Ukraine, as a result of which the provisions that determine the scientific novelty were obtained: the peculiarities of the functioning of the grain industry and the factors that negatively affect the formation and realization of the export potential, the main of which are the loss of production volumes, were determined, reduction of grain export supplies and violation of grain export logistics as a result of Russia's military aggression against Ukraine.

**The practical significance of the obtained results** lies in the possibility of effective use of methodological approaches, analysis and comprehensive assessment of export potential when planning and substantiating export-import operations by enterprises of the grain industry, development of measures to diversify transport logistics routes of grain export in conditions of limited logistical capabilities.

**KEY WORDS:** EXPORT POTENTIAL, GRAIN INDUSTRY, EXPORT LOGISTICS, RESOURCE POTENTIAL.

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## OVERVIEW

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## INTRODUCTION

**Relevance of the research topic.** The grain branch of the agrarian sector, without a doubt, is of exceptional strategic importance for our country and is one of the most priority branches of the national economy with a powerful untapped potential for development. In the conditions of the strengthening of globalization processes, as well as the deepening of Ukraine's integration into the world economic system, the products of this industry are becoming the most important object of foreign trade, which encourages the constant increase in the volume of grain production, the improvement of its quality characteristics, the maximization and deepening of internal processing, the expansion of existing segments and development of new sales markets.

The relevance of the research topic is due to the fact that increasing export volumes and increasing export potential is one of the most important priorities for the development of foreign economic activity of each country.

The grain industry of Ukraine is a strategic branch of the country's economy, it determines the volume of supply and the cost of food for the Ukrainian population, primarily grain processing products and animal husbandry products; determines a significant share of agricultural income, determines the general condition and development trends of agricultural areas, forms foreign currency income at the expense of exports. The grain industry of Ukraine has always occupied a leading position in the domestic agricultural market and the entire economy of Ukraine. In modern conditions, the sustainable development of grain production, efficient and stable functioning of the grain market are priority levers that determine the solution to the problems of ensuring food and national security of the state.

**The purpose** of the qualifying master's thesis is to substantiate the theoretical and methodological approaches and scientific and practical recommendations for the formation, expansion and implementation of the export potential of the grain industry of Ukraine.

To achieve the goal, the following **tasks** were set in the work:

- to determine the economic essence of the concept of "export potential";
- develop methodical approaches to assess the export potential of the industry;

- analyze the resource potential of grain production in Ukraine;
- analyze the global grain market situation and determine Ukraine's place on it;
- to assess the current state of the export potential of the grain industry of Ukraine;

- justify the strategic directions of recovery and development of the export potential of the grain industry of Ukraine;

- determine the level of state support for grain production and export under martial law conditions;

- justify directions for providing export logistics of grain from Ukraine in the conditions of limited logistics capabilities.

**The object of the study** is the process of forming the export potential of the grain industry.

**The subject of the study** is the theoretical, methodical and practical aspects of the influence of internal and external factors on the formation of the export potential of the grain industry.

**Research methods.** The theoretical and methodological basis of the studies carried out in the qualifying master's work were the main provisions of the theory of exports potential formation. Among the special research methods used in the work:

abstract-logical, monographic, experimental, calculation-constructive, economic-statistical, as well as tabular and graphic methods of displaying information.

**The scientific novelty** of the obtained results lies in the implementation of a comprehensive assessment of the export potential of the grain industry of Ukraine, as a result of which the provisions that determine the scientific novelty were obtained: the peculiarities of the functioning of the grain industry and the factors that negatively affect the formation and realization of the export potential, the main of which are the loss of production volumes, were determined, reduction of grain export supplies and violation of grain export logistics as a result of Russia's military aggression against Ukraine.

**The practical significance of the obtained results** lies in the possibility of effective use of methodological approaches, analysis and comprehensive assessment

of export potential when planning and substantiating export-import operations by enterprises of the grain industry, development of measures to diversify transport logistics routes of grain export in conditions of limited logistical capabilities.

**The structure of the qualifying master's thesis.** The total volume of the qualifying master's thesis is 100 pages of printed text, consists of an introduction, three sections, conclusions, a list of used sources, which includes 60 items. The work contains 13 tables and 19 figures.

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## CHAPTER I. THEORETICAL AND METHODOLOGICAL ASPECTS OF THE FORMATION OF EXPORT POTENTIAL

### 1.1. The role and significance of foreign trade for the socio-economic development of the country

Foreign trade is considered the first form of economic relations between countries, primarily it consisted in the exchange of goods and services. Today, trade occupies a decisive place in the system of international economic relations. Since ancient times, international trade has been used for the specialization of individual economies and their development. It contributed to more effective and productive use of available resources and is a strategic direction of development of all countries of the world.

Considering the importance of foreign trade, and its influence on the socio-economic development of the country, it is increasing significantly. The issues of international trade, economic development and the relationship between them have gained importance worldwide with the introduction of liberalization policies in developing countries. International trade and its impact on economic growth are significantly dependent on the process of globalization. Scientists, economists and politicians of the developed countries of the world are divided into conditional two groups according to their views and have different opinions about how international trade affects economic growth.

The first group, which did not agree with the traditional classical and neoclassical concept of international trade in relation to developing countries, believes that international trade has led to adverse changes in the economic and financial spheres of developing countries. In their opinion, the main benefits from international trade have been received to a greater extent by the developed countries of the world, as such trade is considered a special way of redistributing income from developing countries to developed countries. This accelerates the economic growth of already

developed countries, and at the same time is the reason for the slowdown of economic growth in developing countries.

In addition, trade policy liberalization, globalization, and tariff reductions have had a negative impact on the industrial structures of underdeveloped and developing countries. The result of liberalization was that most of the industrial sectors in these countries ceased their activities [1].

The second group of economists, who are in favor of globalization and foreign trade, have a more positive view of trade and its impact on economic growth, including that of developing countries. They believe that developing countries and those of them that followed trade liberalization were able to feel the favorable effects of globalization and international trade [2, 3].

In relation to economic growth, international trade can be considered both as a driver and as a derivative. This is confirmed by numerous theoretical and empirical studies of famous world economists. Stepanov E.O. in his works [3, 4] considered the mechanism of direct influence of international trade on economic development, empirically tested the formulated hypothesis of the relationship between international trade and economic growth, including in the transitive economy, based on the developed hypotheses, tested the relationship of international trade and increasing the main indicators characterizing the improvement of the country's economic condition, as well as conducted a regression analysis of the relationship between exports, imports and GDP in countries of different levels of development and highlighted the results of the conducted research, which showed that GDP growth rates and export/import growth rates strongly interrelated. The conducted regression analysis [3, 4] confirmed the formed hypotheses that there is a direct linear relationship between the amount of exports and economic growth, *ceteris paribus*, in developed countries (Austria, Great Britain, Italy, Canada, USA, France, Switzerland, Sweden, Japan) and countries with a transition economy (Latvia, Poland, Slovenia, Slovakia, Russia).

Regarding these countries, another hypothesis is confirmed, that the volume of imports of the countries in the previous year has a positive effect on economic growth in the current year, and there is a linear relationship between them. Therefore, as the

research results confirm, international trade has a significant positive impact on economic growth. As for Ukraine, the results of the regression analysis indicate the average strength of the influence of international trade on economic development.

International trade contributes to the economic development of the countries of the world, because it creates great opportunities for the realization of significant comparative advantages of the countries of the world and the creation of new ones. Also, trade stimulates a change in the approaches to the use of internal resources of countries towards their efficiency and makes it possible to receive the benefits and advantages of specialization and benefits from participation in the international division of labor.

For many countries in the world, the transition from low-income to middle-income and upper-middle-income status, improving their economic situation, is largely dependent on successful international trade. After all, by participating in international trade, countries are given great opportunities: to satisfy their own needs in raw materials, capital goods, technologies that are not produced by local enterprises, or are produced, but at high costs, to increase production taking into account the demand of the world market for those goods, in relation to which they have comparative advantages of specialization, to export goods, in the production of which the resources available to them in relatively large quantities are more widely consumed, to import goods, for the production of which it would be necessary to spend a large amount of their limited resources, and also receive the effect of savings on large scale of production, while specializing in a narrower set of goods or services [5].

International trade contributes to the internationalization of the world economy and the economic life of individual countries, integrating them into the world economic system. In particular, the role of export is that it is the main source of foreign exchange earnings, which is observed even in highly developed countries with an extensive system of foreign economic relations. Commodity export has social significance – it increases employment and income in export industries, which has a positive impact on the country's economic situation. In turn, imports increase the selection of goods of the

same name, offer goods that are not produced in the country, thereby attracting consumers to the achievements of the global NTP.

From the point of view of general national interests, imports have a positive effect on national production. It allows you to reduce production costs and increase profits due to the use of cheaper foreign raw materials, energy resources, components, and more efficient foreign equipment. By strengthening competition in the domestic market, imports affect the reduction of commodity prices, increase the purchasing power of consumers, improve the level and quality of life of the population, and also stimulate the modernization of production, the creation of new industries [6].

Over the past half century, international trade has become a fairly important factor in economic growth for many countries and plays a major role in economic development. The leading role of international trade in world economic development is confirmed by its outpacing expansion compared to the growth of world GDP and production.

The value of world trade increased 10 times, thus exceeding the scale of world GDP growth, which indicates the importance of international trade as one of the main factors of world economic development. In today's conditions, the development of globalization and integration of the world economy cannot help but affect Ukraine, whose economy is open and whose development vector can be defined as euro integration. The entry of our state into the world economic community and its active participation in the international division of labor is of great importance in the development of our state and the improvement of the economic and social condition

[7].

The review and analysis of the dynamics of international trade over the last dozen years, as well as the analysis of Ukraine's foreign trade activities since its independence, show that the growth rates of international trade actually coincide with the growth rates of the world economy and even outpace them, so we can talk about the important key role of international trade in economic development. The currently increasing dynamics of export and import indicators, the growth of their annual indicators, the growth of export and import quotas, the increase of export/import

indicators per capita testify to the constant growth of the role of international trade in world economic development [8].

Therefore, international trade has a beneficial effect on economic restructuring, which is confirmed by the international experience of the last decades, which shows that countries in which well-developed market institutions are present, a mechanism for regulating foreign trade is established, and an open policy in the field of foreign affairs is formed, trade and investment usually succeed. And contrary to this, countries whose activities are mostly focused on internal trade in combination with significant state regulation of economic processes show weak and slow growth rates. Therefore, international trade as a factor of economic development played and plays an important role in the formation and further development of the world economy, and is also an integral component of international relations and world economic development, and its economic, social and political significance will only grow.

## **1.2. Export potential as a component of the country's economic potential**

At the current stage of economic development, Ukraine is trying to form an export-oriented model, in which the strategic role of exports is that it should be a means of promoting economic growth, a tool for activating existing and potential competitive advantages in order to overcome lagging behind developed countries in basic socio-economic parameters [ 9].

Export potential can be considered the most important characteristic of the economic power of any country, including Ukraine. Export potential is one of the components of economic potential, which provides, unlike other components (production, labor, natural, financial, information potential, etc.) not the production process, but the consumption process, that is, the process of selling products on the foreign market.

Attempts to determine the export potential by domestic scientists date back to the 90s of the 20th century. with the beginning of the development of market relations,

when the results of business entities are determined not only by production capabilities, but also by product sales capabilities.

When entering foreign markets, the main prerequisite for the development of foreign economic relations is the development of foreign economic potential, a component of which is export potential. The approaches of modern scientists to the definition of export potential do not always coincide and, as a rule, only certain aspects of the studied phenomenon are considered in them. Therefore, a comprehensive analysis of the concept of «export potential» is necessary.

Before considering this concept, we will define its components: "export" and "potential". If we consider export as an important influential factor of economic growth and integration of the country into international economic relations and the world economy, then it already acquires the characteristics of potential, that is, a hidden ability to ensure the achievement of defined goals and solve problems of social development [10].

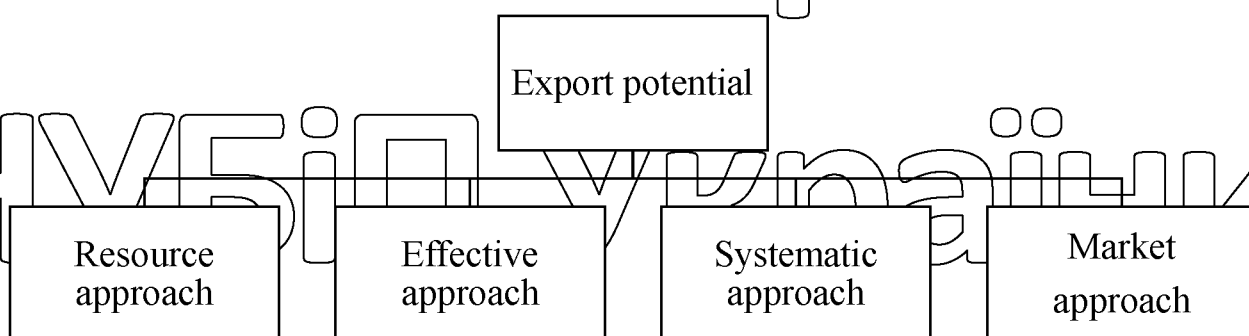
In modern scientific literature, there is no unanimous definition of the concept of export potential. Therefore, the disclosure of the content of the specified category should be started by understanding the meaning of the concepts of export and potential as separate parts. The term potential comes from the Latin word "potential" and is interpreted as strength, power. The dictionary of foreign words defines potential as opportunities, available forces, stocks, means that can be used for a certain purpose [11, p. 455].

According to A.V. Cherep and Y.O. Zubyska, the potential contains at once 3 aspects of relations - the consequences of the past, the present state and orientation towards the future. We can say that the potential includes previously accumulated properties, has practical use in the present time, as well as their development and acquisition of new abilities in the future.

According to the definition placed in the dictionary of foreign words, export is 1) Export of goods, capital, securities for their sale on the foreign market. 2) Quantity and value of goods exported abroad [11, p. 192].

According to the Law of Ukraine «On Foreign Economic Activity», export is the sale of goods by Ukrainian subjects of foreign economic activity to foreign subjects of economic activity (including with payment in non-cash form) with or without export of these goods through the customs border of Ukraine, including re-export of goods [12].

The dictionary of market economy terms defines export as «the export of goods, capital», and securities from the country for their sale on the foreign market, as well as the provision of services to foreign countries. The quantity and value of goods exported abroad. [13, p. 81]. After the analysis of scientific evidence, it is worth noting some ambiguity regarding the definition of the concept of export potential. Figure 1.1 summarizes the approaches to defining this category.



**Fig. 1.1. Approaches to defining the concept of export potential**

Source: compiled by the author based on the source [14]

The interpretation of the main approaches to defining the concept of export potential is given in Table 1.1.

Given the fact that there are different approaches to defining the concept of "export potential", it is worth analyzing the sources for each of them.

So, from the standpoint of the resource approach, the essence of export potential is defined as the possibility of using resources in the structure of international cooperation.

Table 1.1

<b>Approaches to determining export potential</b>	
<b>Name of the approach</b>	<b>Explanation</b>
Systematic	export potential is defined as a real, complex, dynamic system of interacting and interconnected elements of internal economic relations and external relations that are subordinate to the realization of the subject's goals.
Effective	Export potential is defined as the ability to produce the maximum amount of products under the condition of the most complete and productive use of available resources
Resource	an approach in which the export potential is determined by the set of resources necessary for the functioning and development of the system. Thus, the export potential of the subject of economic activity is actually identified with its export resources
Market	Export potential is defined as the ability of an economic entity to control the maximum possible market share

Source: created by the author based on the source [14].

Table 1.2

<b>Analysis of scientific sources regarding the definition of the concept of «export potential» from the point of view of the resource approach</b>			
<b>No.</b>	<b>Authors, scientific sources</b>	<b>Keywords</b>	<b>Definition</b>
11	Bestuzheva S.V. [15, p.76]	Ability to use resources	The degree of participation of the region in the system of international division of labor is determined by the possibilities of using technological, labor, intellectual, natural and other resources of the region in the structure of international cooperative relations.
22	Pirog O.V., Zatepilo A.I. [16, p. 145]	Opportunity, use of resources	It is determined by the possibility of using the natural, production, technological, labor, and investment resources of the region in the structure of global economic relations
33	Bayrak V.M. [17, p. 5]	Amount of accumulated resources	The cumulative amount of accumulated resources of the country (industry), which can be used to achieve the maximum possible amount of demand satisfaction in foreign markets

Source: created by the author based on the source [14].

Table 1.3

### Definition of the concept of export potential from the point of view of a productive approach

N o.	Authors, scientific sources	Keywords	Definition
1	Lazarev O. V. [17, p. 103]	Volumes of production and sales, national economy	Volumes that the national economy can produce and realize outside its borders
2	Maniv Z. O., Lutskiy I. M., Maniv S. Z. [18]	Volume of goods and services	It is determined by the volume of goods and services that can be produced in the economic and social spheres and sold on the world market with maximum benefit for the country
3	Filipenko A. S. [19, p. 159]	Export of resources or manufactured products	The potential ability of a particular country to export its resources or manufactured products

Source/ created by the author based on the source [14]

The effective approach involves revealing the essence of the concept of export potential as the total number of goods and services that the country is able to produce and sell on the foreign market while obtaining maximum income.

The systematic approach involves revealing the essence of the export potential as a complex characteristic, which includes financial, resource-raw material, industrial, personnel, technical, marketing, innovative, etc.) and takes into account the factors of the strategic growth of the country: the efficiency of the use of resources, overcoming prohibitions and ensuring economic security.

Having analyzed the given definitions, it is possible to generalize the interpretation of export potential as the real or possible ability of economic entities (enterprises, industries, sub-industries, regions, countries) to produce goods and services that will be competitive on the world market, with their further realization on

potential foreign markets; to overcome internal and external constraints, as well as to strive for the maximization of one's own profit. At the same time, subjects can use not only their own resources, but also borrowed ones.

Table 1.4

**Analysis of sources regarding the definition of the concept of export potential from the point of view of a systemic approach**

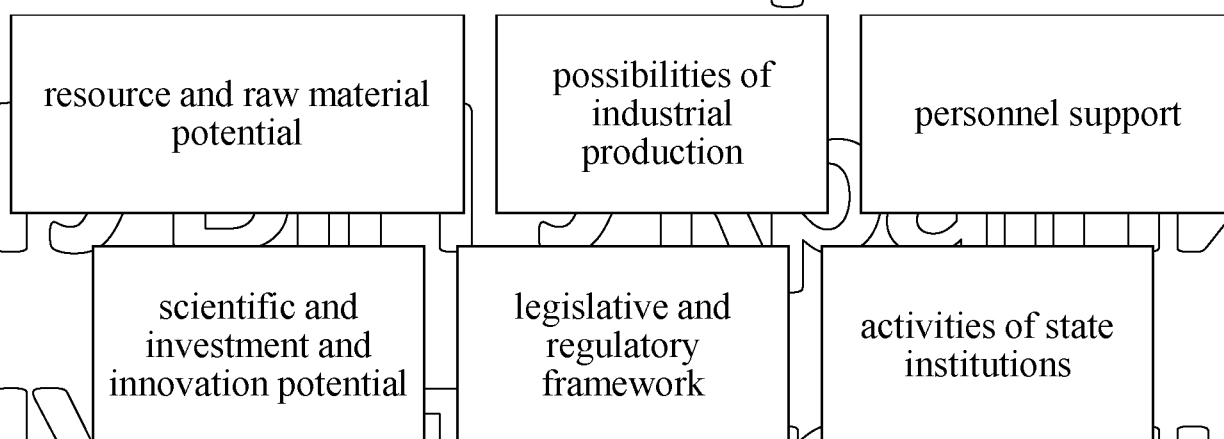
	<b>Authors, scientific sources</b>	<b>Keywords</b>	<b>Definition</b>
1.	Seyfullaeva M. E., Kapitsyn V. M. [3, p. 94]	Complex characteristics, component potentials	A comprehensive characteristic that includes a number of components: resource and raw material, industrial, financial, organizational and technical, marketing, personnel, social and cultural, infrastructural, investment, scientific and innovative potentials
2.	Baban T. O. [2, p. 14]	Ability, economic entity, competitive goods, resources, external markets, overcoming constraints, profit	The real or possible ability of an economic entity (enterprise, industry or sub-industry, region, country) to produce goods and services competitive on world markets, using at the same time both its own and borrowed resources (natural, production, scientific and technical, labor, financial, informational, etc.), and sell these goods and services on potential foreign markets, overcoming both internal and external limitations and striving to increase profits
3.	Zinoviev F.V., Yakushev O.O. [20, p. 403]	Opportunity, national economic complex, competitive goods and services, international market, resources, efficiency,	The ability of the national economic complex to produce competitive goods and sell them on international markets under the conditions of sustainable growth in the efficiency of using natural resources, development of scientific and technical potential, currency and financial and credit systems, as well as service and sales infrastructure to support exports while simultaneously ensuring the economic security of the country as a whole

economic  
security

Source: created by the author based on the source [14]

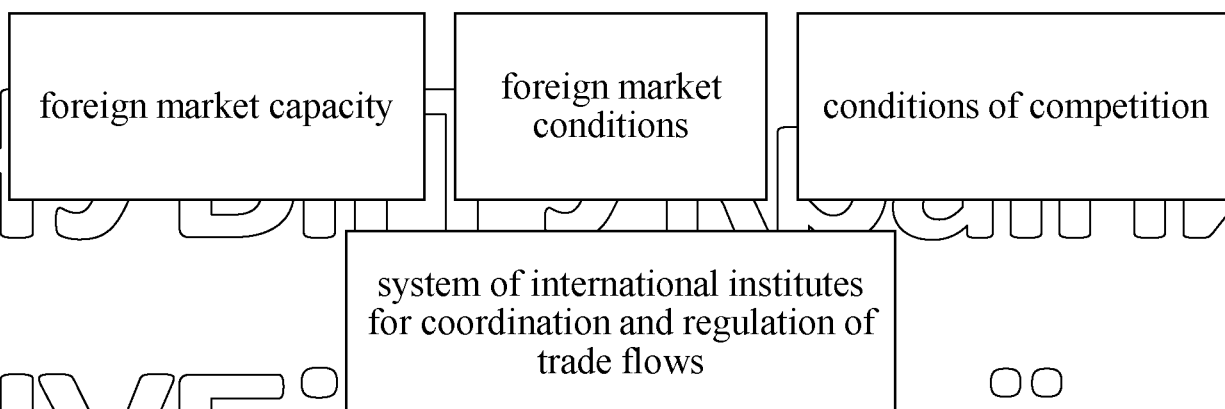
Depending on what level (micro-, macro-, meso-level) the export potential is formed, it is possible to single out the potential of the country, industry, region of a particular enterprise. If we take the enterprise level, the export potential there may be completely absent. However, at the state level, the export potential is strategically important, as it is a source of income generation for the countries of the world.

Export potential is considered a component of the country's economic potential. Factors affecting the competitiveness of the economy have an impact on the development and formation of export potential. In order to characterize these factors, it is worth dividing them into internal and external.



**Fig. 1.2 Internal factors influencing the formation of export potential**

Source: summarized by the author



**Fig. 1.3 External factors influencing the formation of export potential**

Source: summarized by the author

State institutions embody in their activities the provision of a legislative environment for national producers and exporters, as well as importers of products that are necessary for production. Their competence includes the development of the Economic, Civil, Budget, Tax, Customs Codes, laws and legislative acts related to the economic activity of business entities and making changes to them.

The institutional factor is decisive in the development and implementation of state economic policy, primarily industrial, foreign trade, and monetary policy. This factor can promote, and in certain periods, inhibit the development of export potential.

Concluding consideration of the essence of the export potential and the factors influencing its formation, it is worth noting that it is realized in the actual volume of foreign trade, in which the competitive advantages of the national economy are manifested. At the same time, export potential and foreign trade are a tool for promoting national interests on the scale of the global economy [18].

Summarizing the above, it is worth noting that export potential is inherent in economic entities at all levels.

So, from the given definitions of export potential, at least two conclusions can be drawn: firstly, export potential is inherent in economic subjects of all levels - an enterprise, industry or type of activity, region within the country, national economy, grouping of several states that realize this potential through the development of foreign trade, primarily exports. That is, the country's export potential consists of the export potential of individual industries, first of all industry as the most important producer of finished products, and the export potential of the industry - of the export potential of individual enterprises; secondly, export potential is objectively related to the competitiveness of products intended for sale on the world market.

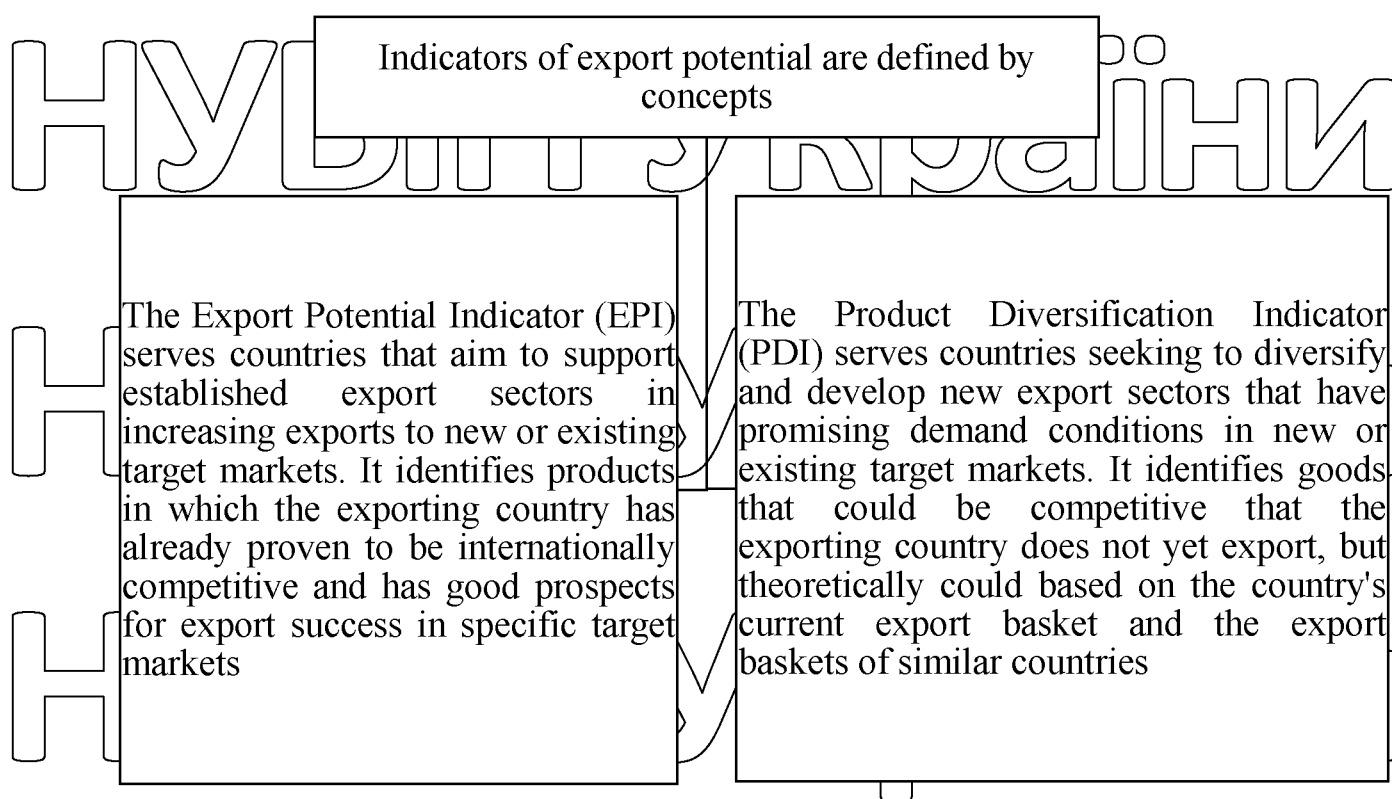
Considering that national competitiveness has a three-level structure - country, industry, individual enterprise [18], it can be argued that there is a close relationship between increasing the competitiveness of domestic products on the world market and increasing the export potential of the national economy. The connection between the potential of the economy as an opportunity to produce goods that are in demand on the

domestic and foreign markets and the competitiveness of the national economy can be traced in the definitions of the competitiveness category of many authors. Thus, V. Novytsky considers the competitiveness of the national economy as an integrated concept, which includes the ability to produce goods that are in demand on world markets, to attract foreign capital due to a favorable business climate, the attractiveness of the national territory for human life, and the presence of highly qualified specialists [18].

### 1.3 Methodological approaches to the assessment of export potential

Export potential is part of the country's economic potential and is the result of the competitiveness of its products on foreign markets. Formation and implementation of export potential is a complex process that is influenced by external and internal factors. Research and evaluation of indicators of the country's export potential is an important issue at the macroeconomic level. This is due to the fact that when the export potential increases, the net export increases, which is included in the GDP structure of the countries of the world. The methodology for assessing export potential is practically not covered in the domestic scientific literature.

In accordance with the concepts of the interaction of demand, supply and easy access to the market during the determination of export potential, foreign economists distinguish two indicators, shown in Fig. 1.4. Export Potential Assessment is a quantitative approach to identifying promising export sectors and markets on a global scale based on trade and market access data. In addition to the quantifiable components of export potential, there are many other, often intangible factors that should be taken into account when choosing which sector and products to target through trade development programs and support for the export of competitive products.



**Fig. 1.4. Indicators of export potential**

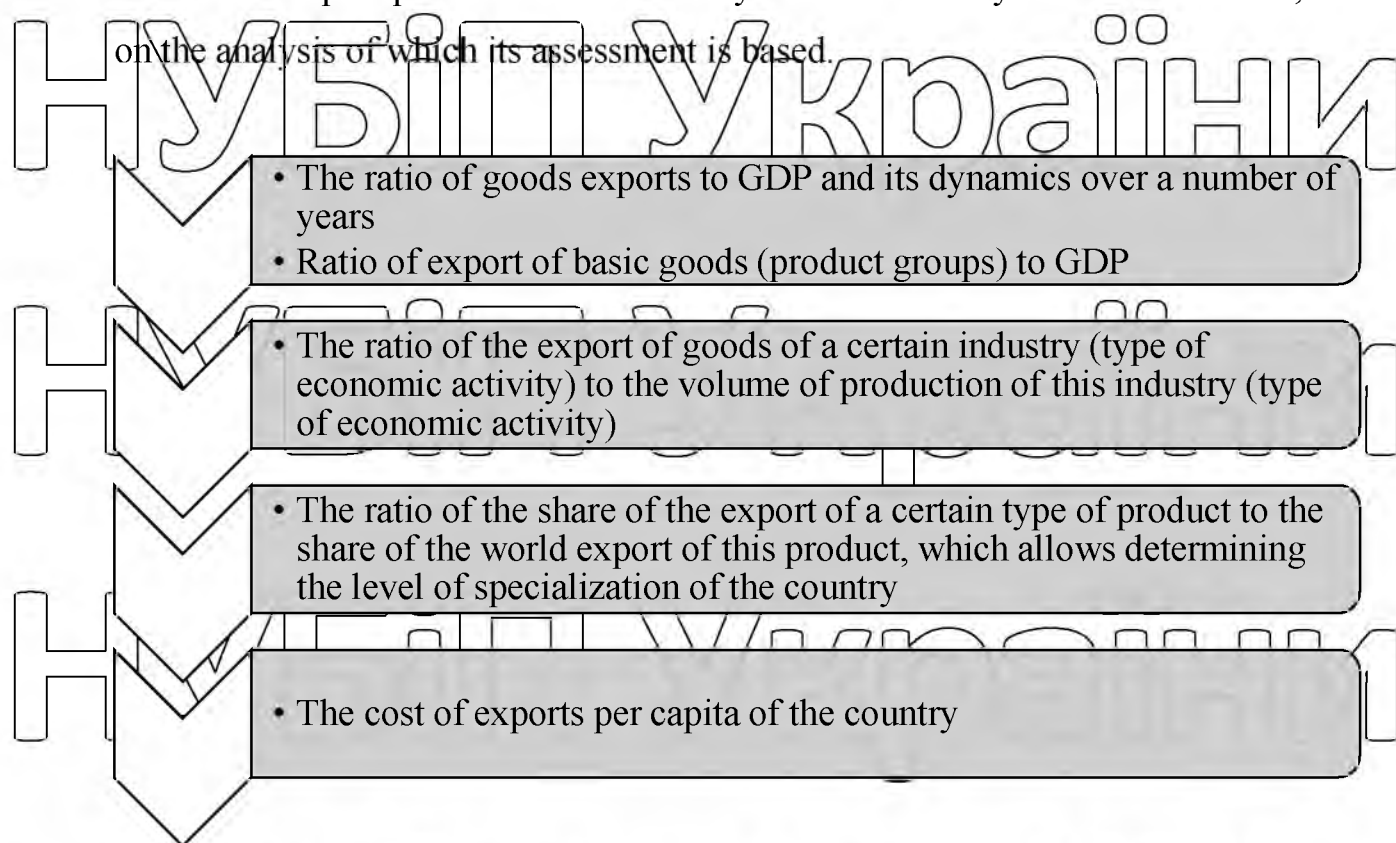
Source: created by the author based on the source [19]

Among them, it is worth noting the readiness and possibility of attracting direct foreign investments, marketing opportunities and the influence of a powerful brand, the existence of synergistic development plans or industry strategies. Estimates of export potential are abstracted from costs associated with export promotion activities. In addition to economic indicators, there are also those that measure the social effect of the likely growth of exported products. Western literature also identifies the effects on social life, namely the effect of export growth on the uneven distribution of income and earnings of the population. However, most aspects of the development of social life cannot be evaluated by quantitative indicators, or are not covered in commercial databases, which causes difficulties in their analysis.

One of the methodological approaches to assessing the export potential of the country can be the ratio of the export quota  $Ex/GDP$  and the population size:

# НУБІП України $\frac{ExP_i}{GDP_i} / ChNi$ (1.1) [19]

The study of the role of export in the economic development of the country shows that export potential is traditionally characterized by a set of indicators, based on the analysis of which its assessment is based.



**Fig. 1.5. A list of indicators when forming an assessment of the export potential**

Source created by the author based on the source [19]

This list should be supplemented with a number of indicators (Table 1.5).

With the help of these indicators, it is possible to carry out an analysis of the country's commodity exports and characterize the realized export potential. However, a more realistic assessment will be when the main indicators are compared with the indicators of the countries that are the main trading partners.

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Table 1.5

## Characteristics of export potential indicators

Indicator	Justification
Coefficient of participation of the country in the international division of labor	$CPCD_i = \frac{Ex/EEc}{GDP/GDPc}$ where GDP is the country's gross domestic product, Ex – export of the country, Exc - world export GDP c –
The coefficient of export efficiency - shows the relative value of revenue per capita from each exported percentage of GDP compared to the average educational value taken as 100%	$\frac{EX}{ЧЧ} * \frac{EX}{BBП} * 100$ $\frac{Exc}{ЧЧc} * \frac{Exc}{BBП}$ where Ex – the efficiency of the country's exports; Ex/ЧЧ – country's exports per capita; Ex/GDP – he share of the country's exports in the world GDP; Exc/GDP – the share of the country's exports in its GDP
Indicator of revealed relative advantage (or comparative advantage)	$КП_{ij} = \ln [(Ex_{ij}/Im_{ij}) / (Ex_i/Im_i)],$ де КП <sub>ij</sub> – indicator of the comparative advantage of the i-th country for the j-th product Ex <sub>i</sub> , Im <sub>i</sub> – export and import of the i-th country Ex <sub>ij</sub> , Im <sub>ij</sub> – export and import of the j-th product of the i-th country

Source: compiled by the author based on the source [19].

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## CHAPTER II. ANALYSIS OF THE CURRENT STATE OF THE EXPORT POTENTIAL OF THE GRAIN INDUSTRY OF UKRAINE

### 2.1. Ukraine's place in the world grain market

The Ukrainian agricultural sector occupies an important place in the structure of gross production in general and in the structure of export revenue in particular. Before Russian aggression, the agricultural sector accounted for 20% of GDP and almost 40% of all export earnings. Only for the 2021–2022 marketing year, the export of grain and oilseeds amounted to 61,5 million tons or \$22,2 billion, of which more than \$12 billion went to the export of grain crops. According to statistical data for 2019–2021, the volume of domestic consumption of all types of grain in Ukraine is 15,0–16,0 million tons, and the rest of the produced grain is exported. Thus, in 2020, in the total structure of grain exports of 52,2 million tons, the following were unloaded: wheat – 26,7 million tons, corn – 35,1 million tons, barley – 8,4 million tons. In 2021, a total of 86,01 million tons of grain was produced in Ukraine, and as of February 21, 2022, 42,54 million tons were exported, and about 27 million tons of grain remained in warehouses and elevators, which could be exported. However, the war started by Russia blocked the export of grain through the Black Sea [1; 2]. In 2021, Ukraine grew the largest wheat crop in the entire history of independence – 33,01 million tons, which is 7,59 million tons more than in the 2020 season and ranked 7th in the world. Australia, the USA, Russia, India, China and the EU are ahead in the ranking of the largest wheat producers. The largest wheat producers in the world are China with a harvest of 135 million tons and India – 108 million tons. However, these countries are not significant exporters because they consume more than their own production, i.e., they are net importers. The countries producing and exporting wheat at the same time include the EU with a share of production in the world market of 16,3%, Russia – 11%, the USA – 6,4%, Australia – 4,3%, Ukraine – 3,3% and Argentina – 2,3%. Australia has the greatest export potential with an export-to-production ratio of 74,4%, Argentina – 72,1%, Ukraine – 57,6%, the USA – 48,7%, Russia – 43,9% (Table 2.1).

Table 2.1

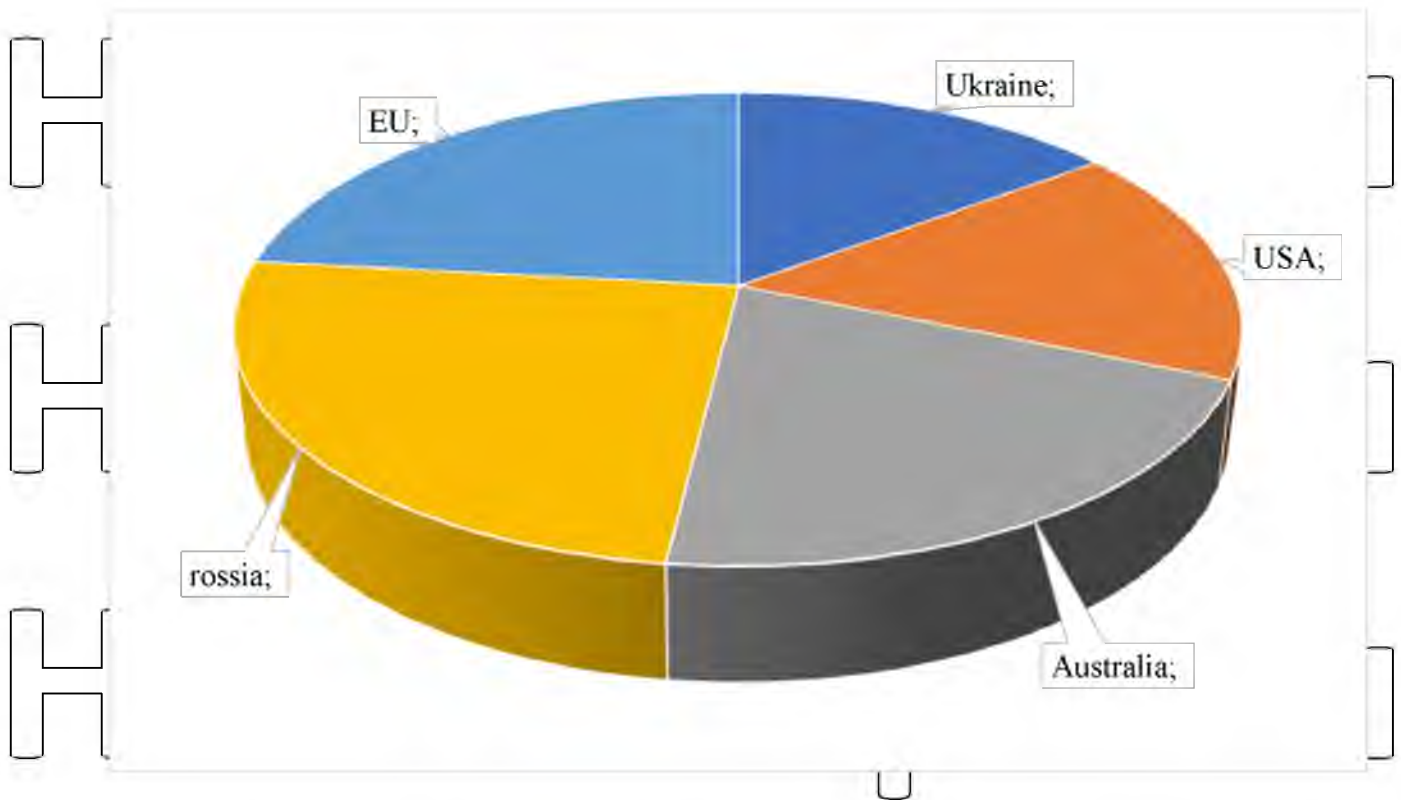
## Dynamics of wheat production and export in the world and Ukraine for 2020–2022 (million tons)

№ п/п	Countries	2020	2021	2022 May	Export/Production 2022, %
Wheat production					
1.	Argentina	19,8	17,6	22,2	72,1
2.	Australia	14,5	33,3	36,3	74,4
3.	EU	138,8	126,7	138,4	24,6
4.	russian federation	73,5	85,4	75,2	43,9
5.	USA	52,6	49,8	44,8	48,7
6.	Ukraine	29,2	25,4	33,0	57,6
7.	World production	762,4	776,3	779,3	-
8.	Ukraine's share	3,8	3,3	4,2	-
Export of wheat					
1.	Argentina	13,6	9,6	16,0	-
2.	Australia	10,1	19,7	27,0	-
3.	EU	39,8	29,7	34,0	-
4.	russian federation	34,5	39,1	33,0	-
5.	USA	26,4	26,7	22,0	-
6.	Ukraine	21,0	16,9	20,0	-
7.	World production	194,4	198,7	204,8	-
8.	Ukraine's share	10,8	8,5	9,8	-

Source: FAO; State Statistics Service of Ukraine

This can be explained by the significant potential of the countries in terms of sown areas, yield and insignificant use of wheat for food and fodder needs of the population within the country. The countries of the European Union, occupying a significant place in world production (16%), occupy only 6th place among the main exporting countries with a potential of 24,6%, i.e. they export every 4 tons of wheat to the world market. Starting from March 2022 and until August, Ukraine's wheat export market was not very active, while sea routes were blocked by Russia, and export via alternative routes through Poland and Romania remained quite limited and was complicated by the seasonal increase in the load on all supply chains.

Russia, the EU, Australia, the USA, and Ukraine belong to the TOP-5 countries of wheat exporters according to the results of the 2021–2022 marketing year (Fig 2.1).



**Fig. 2.1. TOP-5 wheat exporting countries in the world in 2022 (million tons)**

Source: FAO; State Statistics Service of Ukraine

Despite restrictions on the export of grain, disruption of logistics routes and the high cost of fuel as a result of the war unleashed by Russia, Ukraine maintained its position in the world export of wheat, its share was 14.4% or 19 million tons. In the total volume of wheat exports, the largest specific weight belongs to Russia – 24.9%, the countries of the European Union – 23.4%, Australia – 20.8%, the USA – 16.5%. In terms of corn production, Ukraine ranks 6th in the world. More corn was grown from mid-2021 to mid-2022 only in Argentina, the EU, Brazil, China and the USA. If we analyze the dynamics of corn production and export, according to the FAO, China is the world's largest producer – 272.5 million tons, but almost the entire volume of production is used for domestic needs and has no effect on export positions in the world. In the ranking of the largest exporters of corn, Ukraine ranks 4th in the world, second only to the USA, Brazil and Argentina (Table 2.2).

Table 2.2

### Dynamics of corn production and export in the world and Ukraine for 2020–2022 (million tons)

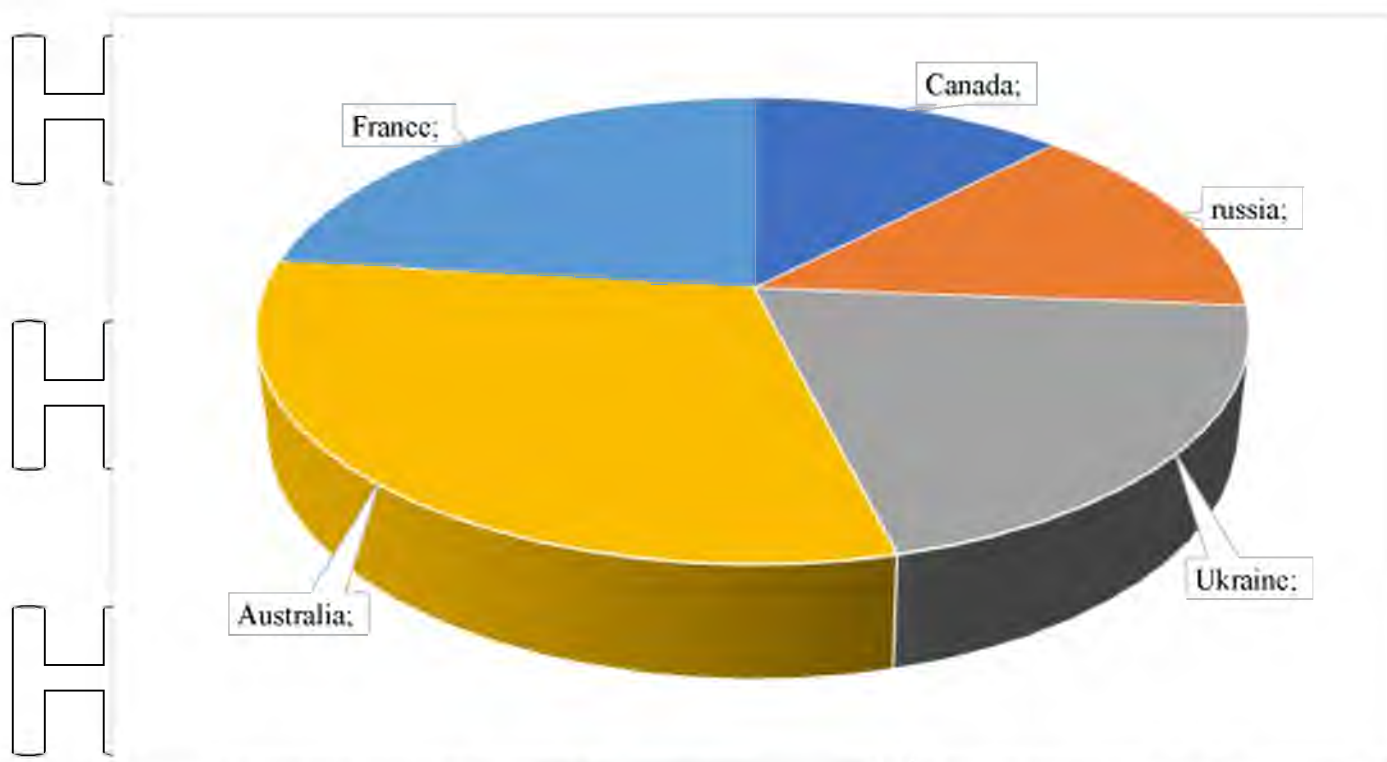
№ п/п	Countries	2020	2021	2022 May	Export/Production 2022, %
Corn production					
9.	Argentina	51,0	52,0	53,0	80,2
10.	Brazil	102,0	82,0	116,0	29,3
11.	EU	66,7	67,1	70,5	7,4
12.	India	28,8	31,6	32,5	10,2
13.	USA	346,0	358,4	383,9	16,5
14.	Ukraine	35,9	30,3	42,1	64,8
15.	World production	1120,1	1125,9	1215,6	-
16.	Ukraine's share	3,2	2,7	3,5	-
Export of corn					
9.	Argentina	39,9	36,5	42,5	-
10.	Brazil	34,1	27,5	34,0	-
11.	EU	5,4	3,7	5,2	-
12.	India	1,1	3,7	3,3	-
13.	USA	47,0	68,6	63,5	-
14.	Ukraine	28,9	23,9	27,3	-
15.	World production	175,7	183,7	192,6	-
16.	Ukraine's share	16,4	13,0	12,1	-

Source: FAO; State Statistics Service of Ukraine

If we take into account the ratio of exports to production, then Argentina (80,2%) and Ukraine (64,8%) have the largest export opportunities for corn. Currently, there is a shortage of corn in the world, as a result of which we can expect growth in demand and prices for it. Such a change in the global corn market is in favor of Ukrainian products. The export of corn from Ukraine intensified in December 2022, and its volume may increase to 2 million tons per month. If such rates are maintained in the future, the monthly export of corn from Ukraine may reach the maximum mark of 2,5 million tons.

In the structure of grain production and export in Ukraine, barley ranks 3rd after corn and wheat. Due to low production costs and a wide market, barley is an attractive crop for export. In terms of barley harvest, Ukraine ranks 4th in the world, behind

Australia, Russia and the EU. In terms of barley exports, in 2020 Ukraine ranked 4th in the world, exporting more than 5 million tons of barley, in 2021 it took 3rd place with export volumes of 5,7 million tons, while annually sending 50% of the total to foreign markets production. It is worth noting that before the start of the war, Ukraine managed to export the entire amount of barley grown in 2021 intended for export. Thus, in the 2021–2022 marketing year, Australia was the largest exporter of barley with a share in world exports of 30,8%, the second and third places were occupied by France – 23,1% and Ukraine – 19,9%. And the last in the ranking of TOP-5 world exporters of barley were Russia - 14% and Canada – 12,2% (Fig. 2.2).

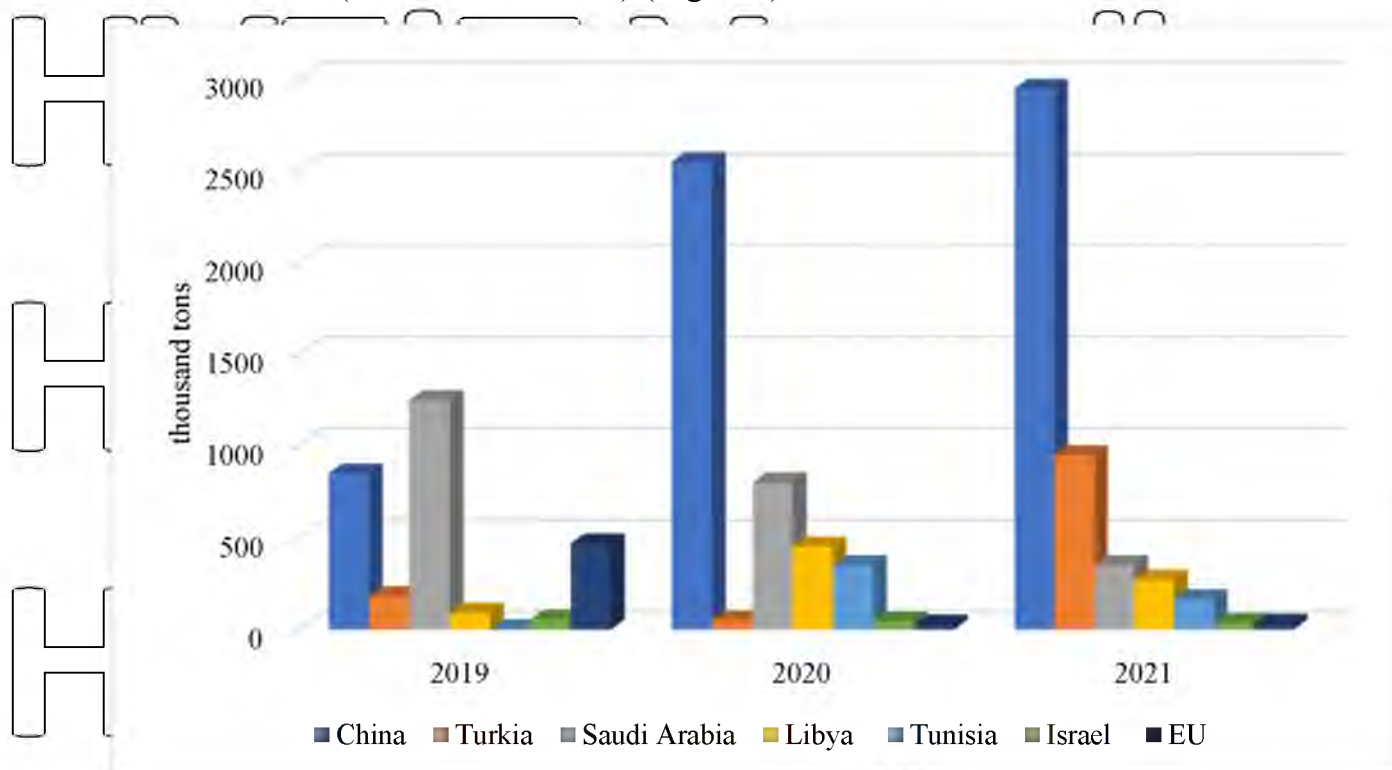


**Fig. 2.2. TOP-5 global barley exporters in the 2021–2022 marketing year**

Source: FAO; State Statistics Service of Ukraine

According to forecasts, in 2022 Ukraine planned to collect about 8,2 million tons of barley. However, the war started by Russia led to the loss of part of the harvest due to the occupation of the southern regions, which accounted for the largest share of barley production. As a result, by the end of 2022, the barley harvest amounted to 5,5 million tons. This had a significant impact on the state of the world barley market. In connection with this situation, the largest importers of Ukrainian barley will have to

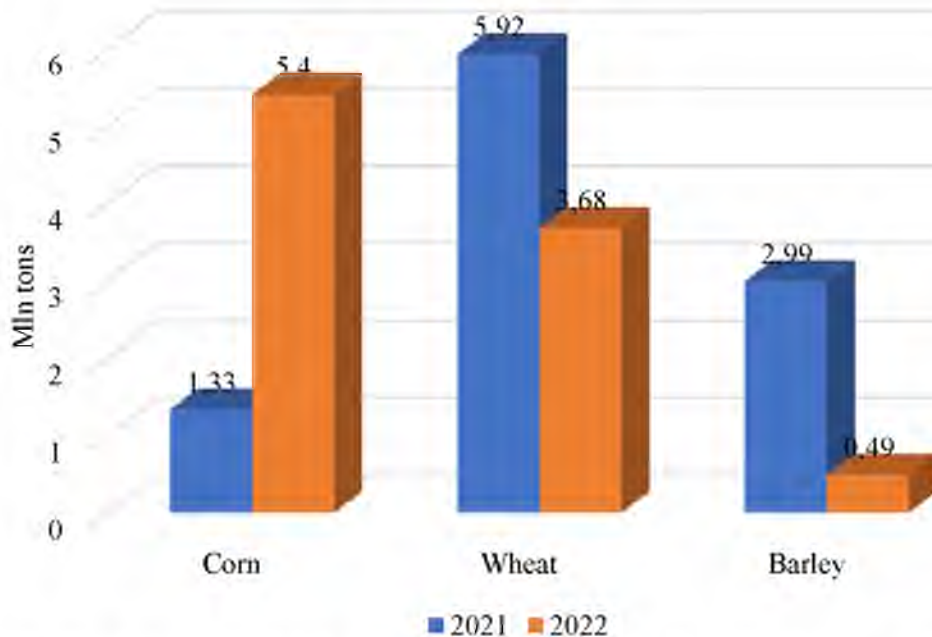
raise the purchase price in 2022 in order to activate the supply of barley by producers. The main consumer countries of Ukrainian barley in 2021 were China (2,93 million tons), Turkey (928 thousand tons), Saudi Arabia (373 thousand tons), Libya (347 thousand tons), Tunisia (235 thousand tons), Israel (119 thousand tons) and EU member states (116 thousand tons) (Fig. 2.3).



**Fig. 2.3. Geography of Ukrainian barley exports for 2019–2021**

Source: State Statistics Service of Ukraine

Before the war, the export potential of barley was 6–6.5 million tons, Ukrainian ports successfully handled it. Currently, export rates depend on the operation of the «grain corridor», which sends grain from three Black Sea ports: Odesa, Chornomorsk, and Piydennyi. With the beginning of the Russian invasion, Ukrainian agricultural exports stopped until August 2022, while under-export - they left 19 million tons of the main export crops - almost 12 million tons of corn and 7 million tons of wheat. The dynamics of the commodity structure of grain exports over the past two years indicates a significant reduction in the volume of exports of major grain crops. Thus, as of December 1, 2022, the export of corn decreased by almost 4 times, wheat - by 1.6 times, and barley - by 6 times compared to 2021 (Fig. 2.4).



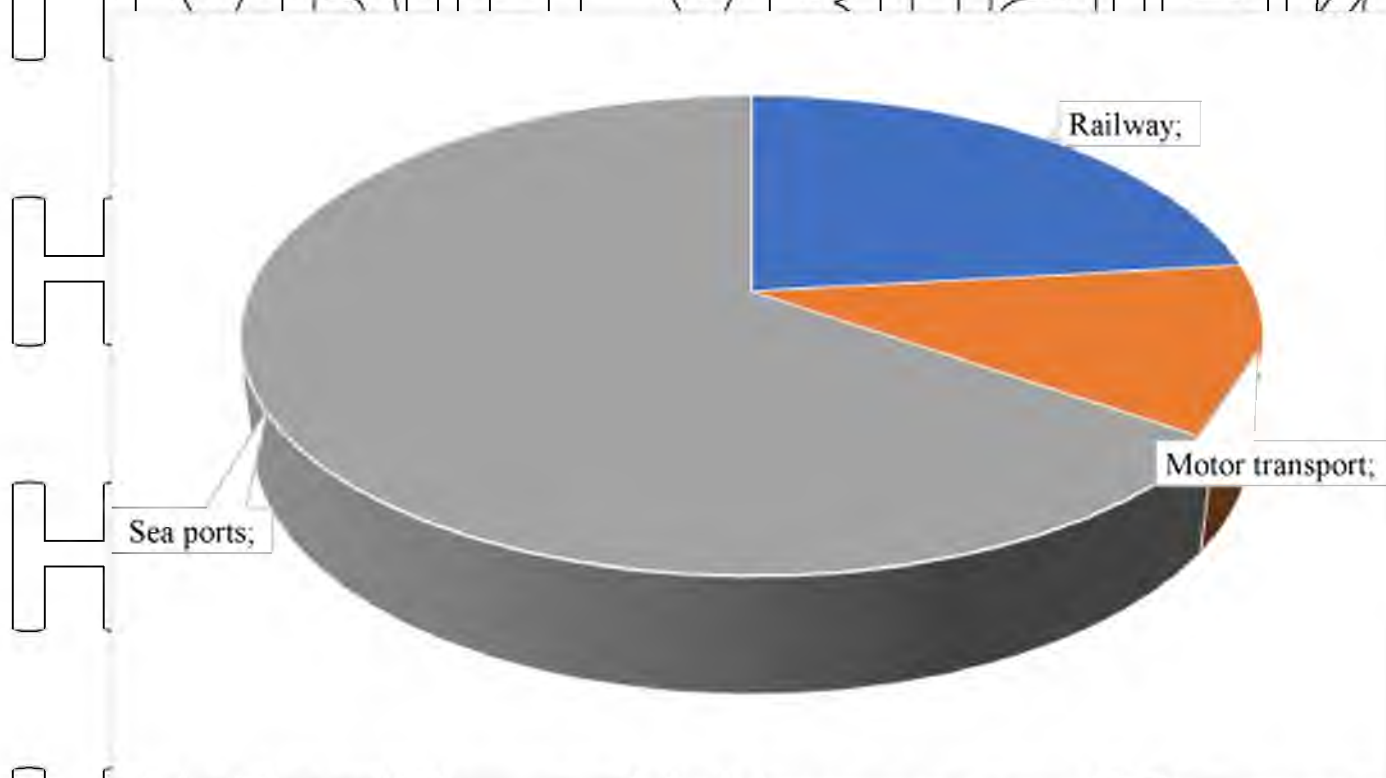
**Fig. 2.4. Commodity structure of Ukraine's exports in 2021–2022**  
(million tons)

Source: State Statistics Service of Ukraine

Note: in 2022, export volumes through the grain corridor are given as of December 1, 2022.

However, during the period of December From 2022 to May 2023, the volume of grain shipments may catch up to the pre-war level and provide importing countries with the necessary supplies of grain. This decrease in grain exports is due to Russia's partial blockade of the Black Sea ports. Before the war, 95% of domestic agricultural exports were sent through southern ports - almost 6 million tons of grain every month, while shipment by railway was 300,000 tons, which is almost 20 times less. After all, the main volumes of grain exports in Ukraine before Russia's attack on our country were sent to buyers through the ports of Mykolaiv, Odessa, and Chornomorsk. Mariupol and Berdyansk accounted for another 5%. For the most part, grain was transported to the ports by rail. As a result of such restrictive measures, there are still more than 8 million tons of 2021 grain harvest in our ports waiting to be shipped for export. Alternative road, rail and river routes cannot compensate for the loss of exports by sea.

transport and solve the problem of bottlenecks in new possible supply chains that have yet to be eliminated (Fig. 2.5).

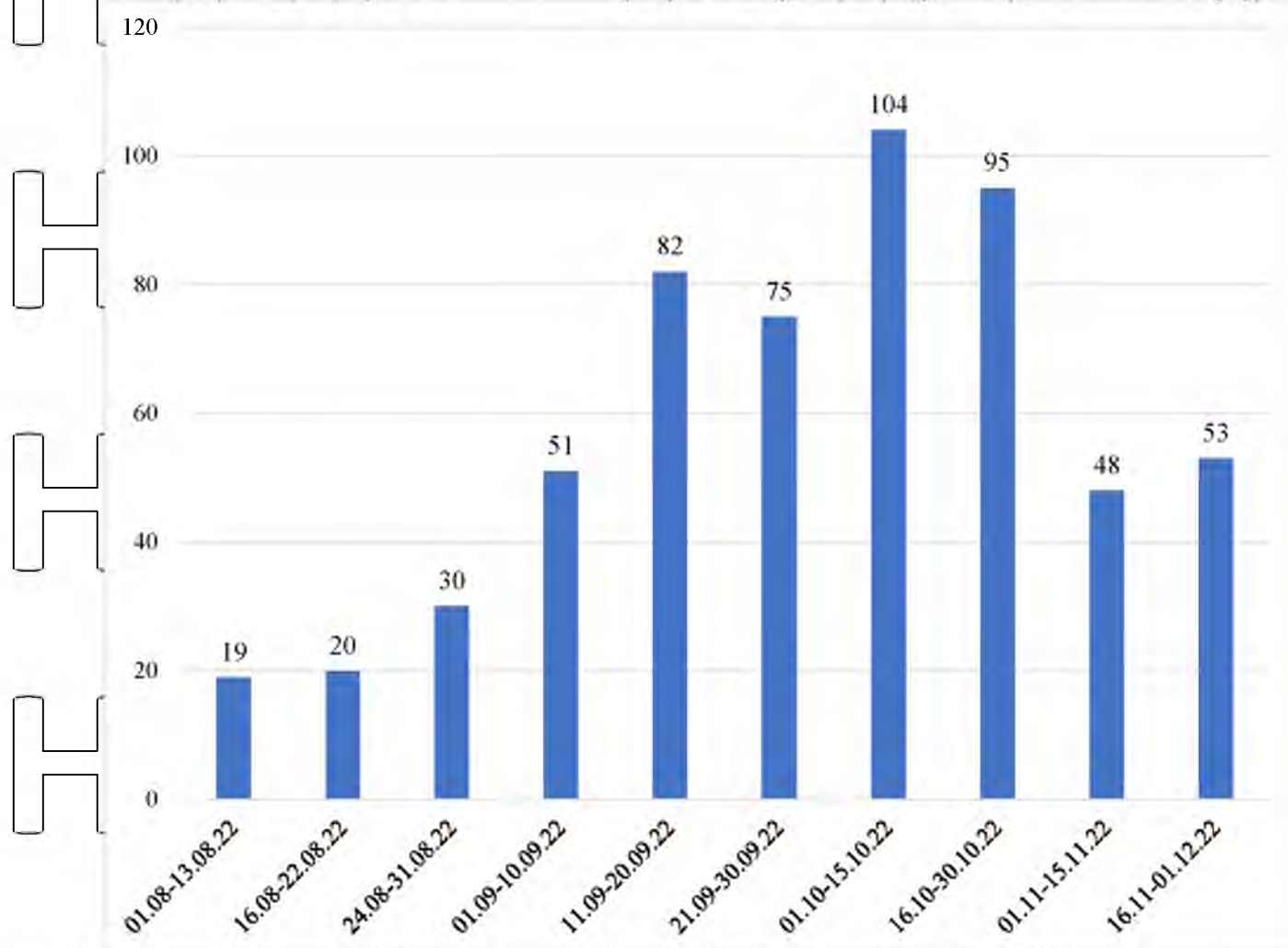


**Fig. 2.5. Grain export by type of transport for January-October 2022.**

Source: State Statistics Service of Ukraine

The export of grain to the EU countries, which takes place by rail and road transport, accounts for approximately 5% of all Ukrainian grain exports. In general, the use of railway transport for export deliveries from Ukraine is a good alternative and addition to the possibility of exporting by sea transport, however, it is worth noting that this mode of transport is more expensive and cannot ensure the transportation of such volumes of export transport as by sea transport. Therefore, grain export and its continuity are critically important for Ukraine both from the point of view of unloading the domestic market and as a source of foreign exchange earnings. The grain corridor was opened under the pressure of humanitarian organizations and missions, as the forced absence of Ukraine from the world grain market raised prices and caused famine in a number of vulnerable countries, primarily in Africa. According to grain corridor

statistics, as of December 12022, 577 ships left Black Sea ports and sent Ukrainian grain to more than 10 countries around the world (Fig. 2.6).

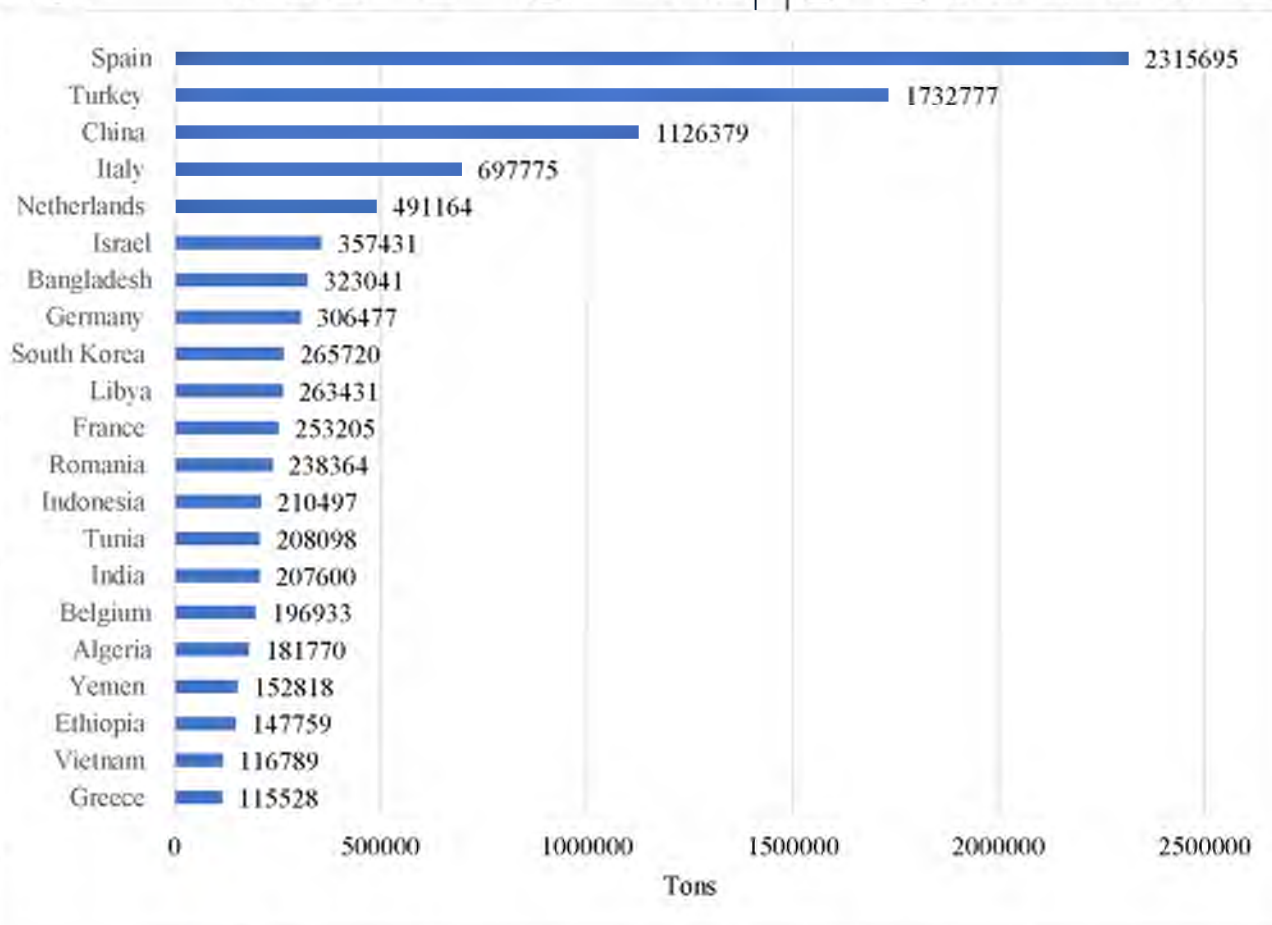


**Fig. 2.6. Dynamics of ships that left Ukrainian seaports through the grain corridor as of December 1, 2022**

Source: State Statistics Service of Ukraine

Russia tried to block and limit the exit of ships in various ways: there were periods when ships were idle for 10–14 days. The largest peak of the loading of ships that left Ukrainian ports fell in October–November fall of 2022 – a total of 356 ships, which is almost 62% of the entire number of ships during the period of operation of the grain corridor. Geographical structure of grain exports in 2022, has undergone changes. If in 2021 the first six in the export of Ukrainian grain belonged to China,

Egypt and Turkey, then as of 01.12.2022 the TOP-5 importing countries include Spain, Turkey, China, Italy and the Netherlands (Fig. 2.7).



**Fig. 2.7. Geography of grain exports from Ukraine as of December 1, 2022 (tons)**

Source: State Statistics Service of Ukraine

Domestic exporters partially managed to resume exports through the Danube-Black Sea canal, but this does not completely relieve the tension on the world food market. It is already clear that the war will have significant consequences for the world food market and the volatility of prices for agricultural products, a significant impact on food supply chains and the level of food security for food-importing countries and low-income countries and disadvantaged groups. The reduction of price risks becomes possible under the conditions of coordinated measures at the interstate level with the

aim of restoring the destroyed logistics chains in Ukraine, as well as supporting domestic producers in order to provide working capital by providing affordable loans.

The decrease in the volume of grain exports from Ukraine led to an increase in world grain prices and created inflationary pressure. In addition, the increase in grain prices may have negative consequences for the world food markets in the near term, primarily increasing the risks of global hunger, especially in some of the least economically developed countries of Africa and Asia. Price dynamics on the domestic and world market of grain crops, which had a fairly high degree of correlation over the past 10-15 years, differed significantly in 2022. The decrease in grain supply was accompanied by a price increase on the world market, while prices on the Ukrainian market remained at the level of the previous season. Before the grain corridor came into effect, domestic grain prices ranged from UAH 2,500 to UAH 4,900 per ton. Taking into account the high cost of logistics due to the impossibility of transporting grain by sea, many producers lost a significant share of export income, and in some of them the profitability decreased to 0. In addition, the price situation was affected by a significant excess of supply over demand, the unwillingness of farmers to significantly compromise the price and low rates of corn harvesting. During the grain corridor period, domestic grain prices rose to UAH 5,000-5,700 per ton.

Thus, after December 12, 2022, more than six processors increased the purchase prices for wheat of the 2nd and 3rd class by UAH 100-200 per ton and as of December 15, 2022, they stopped in the ranges of 6,000-7,500 and 5,900-7,300 hryvnias per ton respectively.

The gradual increase in domestic grain prices occurred due to a decrease in supply, which was a consequence of Russian missile attacks on the energy infrastructure of Ukraine on November 23, 2022. At the same time, 90% of its territory remained without electricity, which negatively affected logistics, transshipment and in general, the operation of the local export market. Due to the lack of electricity, a number of checkpoints at the border were temporarily out of business. At the same time, the faster growth of prices was restrained by the decrease in export rates of the mentioned crop due to some weakening of the demand of European importers and the

reduction of the volume of grain supply by sea due to problems with the energy supply of the port infrastructure. In addition, the increase in wheat processing costs due to frequent power outages and the need to use generators to support production limited the ability to raise the purchase prices for raw materials. Since Ukraine is the main player in the world market for the production of grains and their processing products, which affects the formation of global market stocks of grains, and is involved in global food supply chains, this leads to the emergence of risks of strengthening inflationary processes not only at the national, but also at the international level. One of the price risks for the world food market during the war in Ukraine is the preservation or increase in the rate of inflationary processes that occurred during the COVID pandemic. World grain prices have risen sharply since the beginning of Russia's full-scale war against Ukraine. After the Grain Corridor Agreement came into effect, prices on world markets stabilized. However, after Russia announced the suspension of its participation in the grain agreement, world prices for grain rose sharply (Fig. 2.8).

As a result of the decrease in the efficiency of the functioning of firms producing and exporting grain in Ukraine during the war, new directions emerged in the field of grain production, storage and export. In particular, these are projects for the construction of new and branching of existing elevators near the western borders; use of alternative methods of grain storage and drying; involvement of small Danube ports in the transportation of grain. Blocking of Black Sea ports by Russia led to the emergence of the following risks for the grain industry in Ukraine: seeds, fuel and plant protection products. During the period of hostilities, the prices of resources used for the production of agricultural products increased significantly, in particular, the prices of seeds, plant protection products, fertilizers and fuel increased by an average of 40-45%. Due to the blockade of the sea ports, from March to August, the rate of export of agricultural products was very low. Only 322,000 tons were exported in March, 970,000 tons in April, 1,2 million tons in May, and more than 1 million tons in June. After the unblocking of Odessa ports in August 2022, this figure was 4 million tons, but it is 1,5 times less than before the war in 2021.

Low prices for grain products, which have fallen catastrophically in Ukraine due to a decrease in export rates. In June, 1 ton of wheat was offered for an average of 5,700 UAH, and at the end of August the price was 4,050 UAH, for 1 ton of corn - 5,600 UAH and 4,250 UAH, respectively [2]. Lack of elevators for grain storage - at the beginning of 2022, the total capacity grain storage amounted to 75 million tons.

Since the largest capacities for grain storage are concentrated in the south of the country, in the areas of hostilities, elevators for storage of only 60 million tons can be considered available today. Reduction of crops for the future harvest of 2023 - as a result of hostilities, occupation and mining territories, Ukraine lost almost 20% of

cultivated areas. The decrease in the area sown under winter grains in 2022 by 40% compared to 2021 is also caused by lower incomes or the lack of income for producers. Negative consequences for the development of the grain industry in Ukraine will have an impact on the world grain market. In particular, such challenges for the world

community and international organizations on security and food are: The emergence of food shortages and, as a result, hunger in poor countries, in particular in Africa and Asia. Thus, in 2021, the dependence of 36 out of 55 countries on exports from Ukraine and Russia amounted to more than 10% of their total volume of wheat imports, and some countries imported wheat exclusively from Ukraine and Russia. Ukraine is the

world's fourth largest producer and exporter of agricultural products -ditch. A significant decrease in the supply of grains on world markets will lead to an increase in world prices for them, as well as provoke an increase in inflationary pressure in general. The increase in grain prices will have an extremely negative impact on food markets in general, first of all, in less developed countries, where there is a low purchasing power of the population, which also suffers from a shortage of food products.

The World Food and Agricultural Organizations joined their efforts to help with the restoration and adjustment of the production and export of grain crops from Ukraine to international markets in order to cope with the consequences of Russian aggression in our country. The main measures to reduce risks for the Ukrainian and global grain market should be carried out in the following directions: Restoration of grain storage

capacities and functioning of supply chains from harvest to export. Thus, as of May 2022, 14% of the elevators were destroyed, and another 10% ended up in the occupied territories. The most valuable for grain storage, given the current situation on the fronts, will be the elevators of the western regions. Their approximate capacity is 9 million tons. Now, despite the war, elevators are being built in these regions, but this will not significantly change the situation [9]. As part of a new project funded by Japan, FAO will address the problem of storage shortages by providing small landowners with polyethylene sleeves for grain storage, grain loading and unloading equipment, and the supply of long-term modular storage facilities. grain focused on small and medium-sized farms in 15 regions. Preservation of the production potential of Ukrainian farmers to ensure the continuity of production in the future. Ukrainian farmers feed themselves, their communities and millions of people around the world. Ensuring the possibility for them to continue production, safe storage and access to alternative markets for selling their products is extremely important for food security, preservation of sources of livelihood, strengthening of food security in Ukraine and provision of other countries that depend on imports, stable and sufficient supplies of grain, at an acceptable price. In addition, the project will provide technical support to the government for the creation of alternative grain export routes and will contribute to the rapid development of the technical potential of the laboratory in Izmail, which will allow farmers to comply with international standards, including in the field of checking the quality of grain products on security and certification. The launch of the state program for the purchase of new grain products from producers at economically reasonable prices. State support for farmers by providing seeds, fuel, providing preferential credit, etc., is important.

Funding of programs for demining the territory. According to the estimates of the Ukrainian Association of Sappers, about 83,000 km<sup>2</sup> of the territory is currently contaminated by various types of explosive objects. For example, according to the Food and Agricultural Organization of the United Nations (FAO), the cost of demining in Croatia was about 1,25 euros per 1 km<sup>2</sup>, the cost of destroying one anti-personnel mine was 0,56 euros. Given these costs, the cost of demining measures in Ukraine for

the specified area alone exceeds \$10 billion [1]. Transition of Ukraine from a raw material exporter to an exporter of value-added products. This will make it possible to turn from a simple agrarian state into a high-tech agrarian state and solve the issue of ensuring food security in the world.

## 2.2. Analysis of the global grain market situation in the face of global challenges

Cereal crops represent one of the largest commodity positions on the global agri-food market. Trade in this type of products is carried out in many countries of the world. Unlike other markets, the global grain market has certain features:

- is the most perfect from the point of view of competition and predictable;
- grain market products are vital and widely used almost all over the world;
- grain market products have a long storage and transportation period.

Dynamic population growth around the world is one of the trends that contributes to the fact that food consumption is constantly increasing. According to the preliminary forecast of the United Nations, the population of the Earth may increase to 9.7 billion people in 30 years. This will undoubtedly cause a rapid growth in demand for food products, including products on the grain market. However, with the increase in population growth, the land that is suitable for growing agricultural products will remain at the same level (currently - about 1.5 billion hectares), and the amount of land per person will decrease by 2 times.

It is also unlikely to increase the productivity of the land, currently both in Europe and in the USA the productivity of the land is already quite high, and it can be increased only thanks to genetically modified products. According to this, in the coming years there will most likely be a shortage of food on the world market, which in turn will lead to an increase in prices.

The current state of the world grain market is characterized by changes in the ratio of world supply and demand, price fluctuations, as well as the rapid growth of

food trade, due to the increase in the needs of the population and its income in various countries of the world.

According to the results of 2012-2022, the indicators of the development of the world grain market reflected a steady growing trend. The dynamics of changes in the main market indicators - demand and supply of cereals over the last 7 years in the world shows that the average annual rate of change in supply is higher than the rate of change in demand: +2.5% versus +1.9%. However, the trend of demand growth over supply has been observed in recent years.

It should be noted that there is a certain imbalance between world demand and supply. However, this does not mean that every year more grains are produced than consumed. This difference is caused by the annual supply of grain in different countries. Only a positive effect can be seen in this, since the grain industry depends on natural and climatic conditions, therefore, in the event of a crop failure, the world stock should be approximately 700 million tons of grain. The increase in the global supply of grain crops is due to the increase in production, and as a result, the increase in grain stocks.

During the last decade, we can observe an increasing trend in the global consumption and trade of grain crops. Which, in turn, is caused by the annual population growth of almost 81 million people.

The global pandemic has not had a significant impact on the global grain market, but there is some uncertainty due to lost revenues caused by the restrictive measures that countries have taken to contain the spread of the disease, the disruption of logistics chains, and the global economic downturn. However, after analyzing the indicators of consumption, production, trade and stocks, in general, the global grain market demonstrates resistance to the crisis caused by the pandemic [21].

Analysis of the structure of world grain production shows that the largest share falls on fodder grain – 35,3%, corn - 28,6%, wheat – 18,3%, rice – 12,1%, barley – 3,4%, oats – 0,5%, rye – 0,3% (Fig. 2.2). Analysis of the structure of world grain production shows that the largest share falls on fodder grain – 35,3%, corn – 28,6%,

wheat – 18,3%, rice – 12,1%, barley – 3,4%, oats – 0,5%, rye – 0,3% (Table 2.3 and Fig. 2.9).

# НУБІН УКРАЇНИ

Table 2.3

## Dynamics of sown areas and production of grain crops in Ukraine

Sown areas, million ha	2018/19	2019/20	2020/21	2021/22	2022/23 August	2022/23 September
Wheat	215.48	215.53	220.51	222.17	221.63	221.44
Fodder grain	327.37	334.52	344.76	345.51	340.61	339.95
Corn	191.72	193.56	199.07	207.08	203.64	203.16
Barley	48.06	52.55	52.47	48.63	47.59	47.30
Oat	9.72	9.56	10.08	9.61	9.49	9.42
Rye	3.74	4.04	4.17	4.06	3.79	3.78
Sorghum	40.03	39.78	42.96	41.46	41.04	41.22
Rice	162.57	161.7	165.21	166.65	165.56	164.75
Production (million tons)	2018/19	2019/20	2020/21	2021/22	2022/23 August	2022/23 September
Wheat	731.46	762.17	774.53	779.9	779.60	783.92
Fodder grain	1,396.37	1,417.08	1,441,10	1506,03	1,469.49	1,463.62
Corn	1,123.65	1,119.59	1129,29	1219,76	1,179.61	1,172.58
Barley	138.76	158.76	160,86	145,4	146.36	147.72
Oat	21.92	23.22	25,72	22,54	24.30	24.21
Rye	10.00	12,25	14,3	12,54	12,09	12,04
Sorghum	59.53	57,93	62,44	62,1	60,38	60,32
Rice	499.07	498.87	509,26	515,08	512.44	507.99

Source: created by the author based on the source [31].

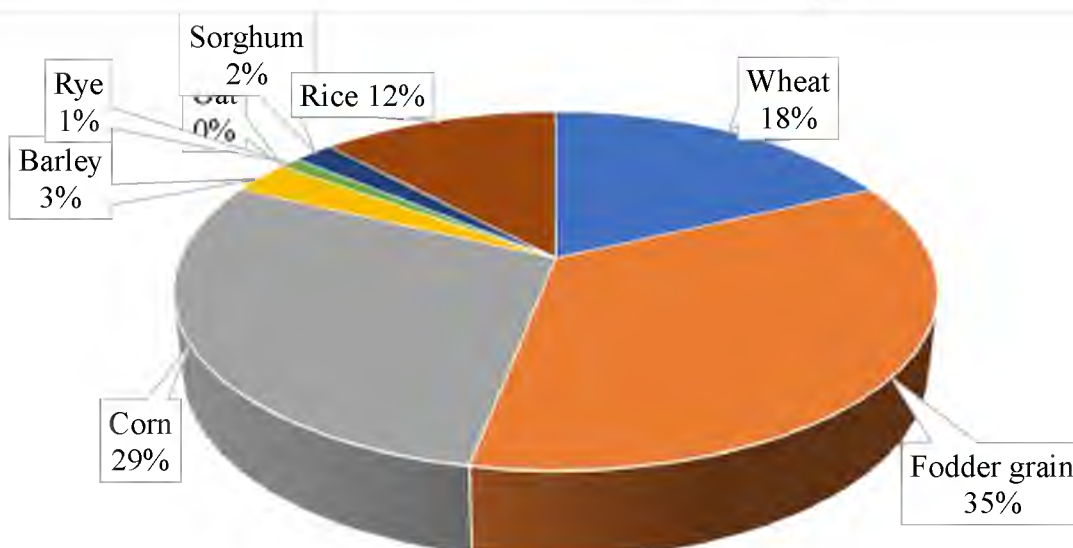
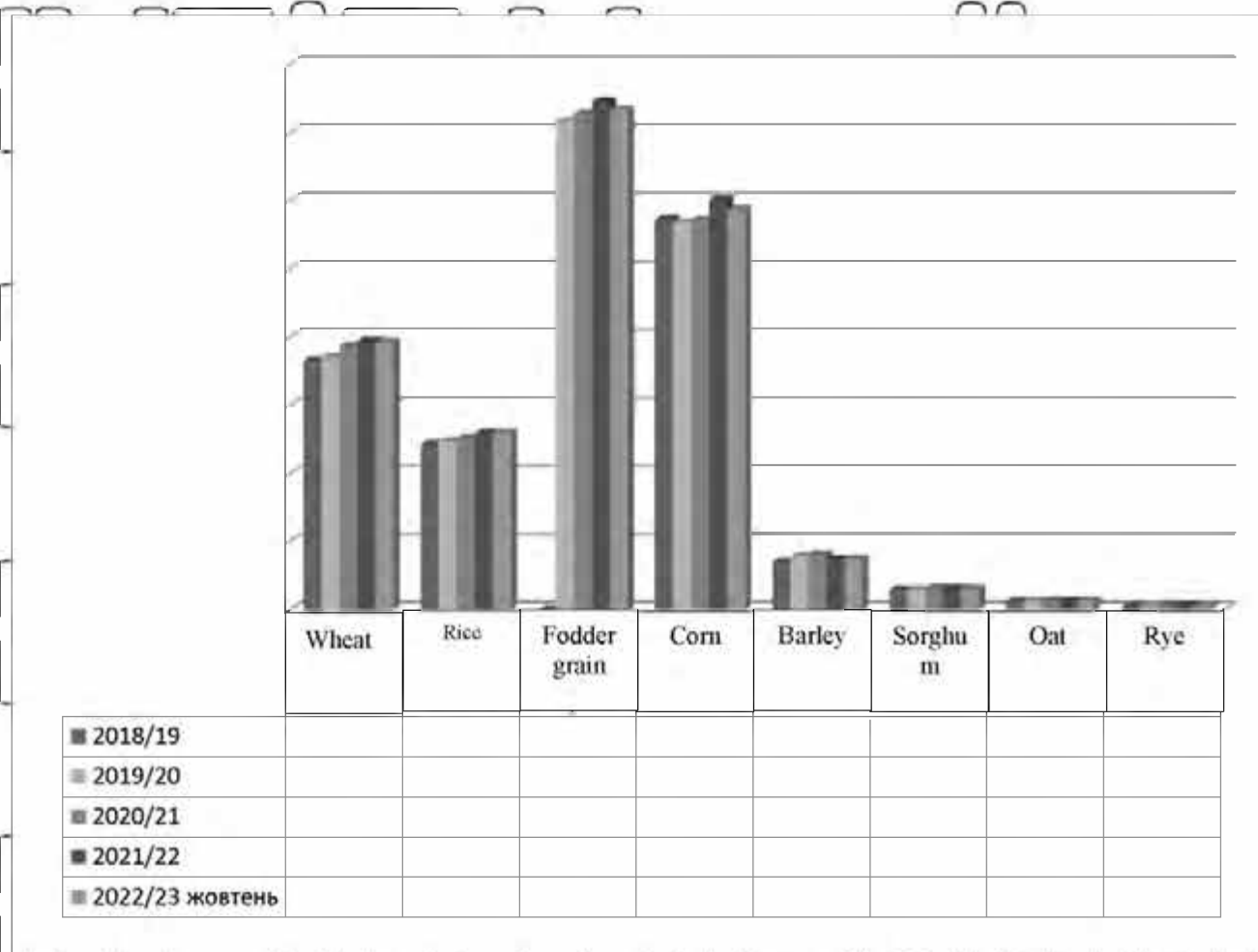


Fig. 2.9. The structure of cereal production in 2020/2021 MR

Source: calculated by the author based on data [31].

# НУБІН УКРАЇНИ

As for grain consumption, the largest share is fodder grain – 1492,4 thousand metric tons, followed by corn – 1203,1 thousand metric tons, wheat – 789,3 thousand metric tons, rice – 519,2 thousand metric tons, followed by barley – 148,1 thousand metric tons, sorghum – 61,6 thousand metric tons, oats – 23,3 thousand metric tons, rye – 12,6 thousand metric tons.



**Fig. 2.10. World consumption of grain crops**

Source: calculated by the author based on data [31]

World market statistics usually analyze two groups - wheat and fodder grain. For most countries, wheat remains the main food crop. In 2021/22, about 222,17 million hectares of cultivated land are under wheat. Almost 80% of the total world production is concentrated in such countries as China, India, Ukraine, the EU, Turkey, Argentina, Australia/Canada, the USA and Russia. The largest world producers of wheat are China (136,95 million tons), the EU (138,29 million tons), India (109,59 million tons).

and Russia (52,19 million tons). Ukraine's share in world wheat production is about 4% (11,8 million tons) [32].

According to FAO forecasts, in 2022 wheat production will decrease by 0.8% in annual volume at the level of 770.9 million tons. for the first time in four years. After months of dry weather in North America, 70 percent of all winter wheat acreage in the US was in drought conditions in early May. Consequently, abandonment rates are expected to increase and crop yields to decline, leading to a decline in winter crop production of approximately 8 percent in 2022. However, total domestic wheat production is expected to increase by 5 percent to 47.1 million tons this year, which is supported by the expectation of a high spring harvest, which would more than compensate for the decline in the winter harvest [32].

In Canada, the total acreage of major spring wheat crops is forecast to increase. Taking into account the likely return of yields after drought levels ease in 2021, total wheat production is pegged at 31,2 million tonnes, up 44 percent from last year.

The prospects for wheat production in Europe were significantly affected by the war in Ukraine. Reflecting the disruption in agricultural operations caused by the war, there was a sharp reduction in acreage and yields. There was a decrease in wheat production by 38 percent compared to the previous year. In contrast, favorable weather conditions in the Russian Federation support expectations for improved yields and an increase in total production nearly 10 percent above last year's level, tying the harvest at 83 million tons, despite expected declines in plantings.

In the European Union (EU), the forecast for wheat production is almost 138.7 million tons and is unchanged from year to year. An increase in the area planted to wheat is expected to counter the likely decline in yields due to continued drought in the southern regions.

In Asia, specifically in India, wheat production is forecast at 105,5 million tons, which is almost 4 percent less than the record harvest of 2021. Despite the increase in planted area motivated by higher purchase prices and favorable weather at the start of the season, a decline is forecast due to unseasonably high temperatures in March and April. This resulted in lower than expected yields and localized crop losses. In Pakistan,

wheat production is forecast at the level of 26,5 million tons. In China (mainland), despite adverse weather in some areas, wheat production is expected to remain at last year's level, averaging 137 million tonnes in 2022 [31].

In Middle East Asia, weather conditions were generally favorable, except for some eastern areas that were affected by drought. The leading producer, Turkey, despite a reduction in plantings partly due to rising fertilizer costs, is still expected to increase production to 19 million tonnes in 2022, about 1 million tonnes more than in 2021.

In North Africa, the outlook for wheat production is hampered by prolonged rainfall deficits in several countries. Below-average rainfall was particularly noticeable in Morocco, where a reduction in total plantings and an expected sharp fall in yields underpins a forecast of almost 67 percent drop in production compared to last year. There were also dry but less severe conditions in Algeria, where harvests are expected to remain below average.

In the Southern Hemisphere, wheat sowing in 2022 is underway. In Australia, the preliminary forecast for the 2022 harvest is 28 million tonnes, down 23 percent from last year's record, due to increased acreage and likely lower yields.

In the South, rising commodity prices in the Americas are seen as a counter to high wheat prices and prompted a slight decline in planted area in Argentina, leading to an expected 5 percent drop in wheat production in 2022 from a record high in 2021. Early planting plans in South Africa indicate a moderate rise in plantings, encouraged by strong prices, with production forecast to remain at last year's level.

From the analysis of feed grain production, it can be seen that the main producers are South and North America, the European Union and East Asia. The fastest development of production occurs in East Asia (by 130% for the analyzed period), South America (by 115%), and the countries of the Black Sea region (by 93%). At that time, the harvest of these crops is decreasing in the countries of Oceania. The reason for this was the complexity of weather conditions during the drought.

Feed grain production will fall below last year's record. FAO's first forecast for world coarse grain production in 2022 points to a 0,6% year-on-year decline, with

output targeted at 1494 million tonnes. The decrease is due to expectations of a reduction in global corn production, forecast at 1188 million tons in 2022, which is 1,6 percent less than the previous year's result [33].

Much of the projected decline is concentrated in North America, where U.S. planting rates were reduced due to unfavorable spring weather, pointing to a likely decline in corn plantings in 2022. Yields are assumed to remain unchanged, with production currently projected at 367,3 million tons, 4 percent less than last year.

Corn production in Canada, on the other hand, may increase slightly in 2022, as early prospects point to increased plantings that more than offset the expected decline in yields from historic highs in 2021.

In Europe, corn production in Ukraine is predicted to drop by 50 percent to 21 million tons in 2022. The war in the country severely limits access to both agricultural resources and land for planting, contributing to low prospects for harvested area and yields [33].

In the Russian Federation, corn production is expected to decline, but remain above the five-year average. In the European Union (EU), maize production is set at 73,7 million tonnes in 2022 and will grow by 1,6 percent year-on-year, with a 2 percent increase in acreage forecast due to high corn prices and stable profits.

In South America, in Brazil, production will reach a record level of 114,6 million tons. A significant increase in plantings underpins this forecast, and robust price are estimated to have fueled a 20 percent increase in corn acreage compared to the five-year average.

Although yields are also expected to increase in 2022, the further strengthening of the production outlook, the lack of rainfall in April-May resulted in a slight decline in yields.

Argentina's corn production is expected to fall on an annual basis, but at 57 million tonnes it will still exceed the five-year average by 6 percent, thanks to an increase in planted area, which is expected to partially offset lower yields.

In South Africa, the main corn-producing continent, this year's production is forecast to fall to 15,4 million tonnes, although this is still above average.

Despite a decline in corn acreage, partly driven by high costs, profitable grain prices at planting have kept plantings at above-average levels, partially offsetting the effects of modest yield declines. Significant reductions in production are forecast for southern Africa in 2022, where persistent rainfall deficits have reduced expected yields and reduced maize acreage.

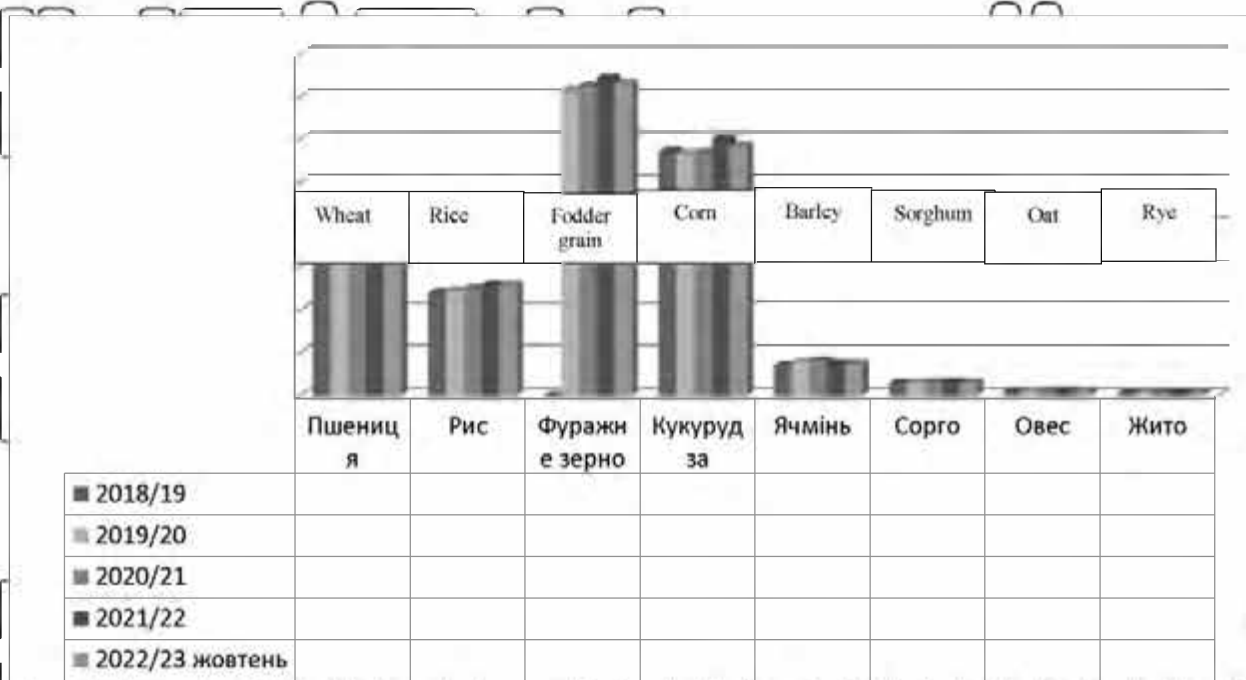


Fig. 2.11. World use of cereals

Source: created by the author based on the source [34].

Wheat consumption will decrease in 2022/23. Early forecasts for global wheat use in 2022/23 point to a slight decline of 0,4 percent to 769 million tonnes, the record level estimated for 2021/22, with a projected increase in food consumption outweighed by a likely reduction in wheat use for animal feed and, to a lesser extent, in industrial use. At the current forecast level, total wheat use in 2022/23 will be 1,1 percent below the ten-year trend [31].

Global total coarse grain use is expected to fall marginally by 0,1 percent (1,2 million tonnes) in 2022/23 from an all-time high estimated for 2021/22 to 1498 million tonnes, the first decline in eleven years.

While the industrial use of coarse grain is forecast to remain stable compared to last year, feed consumption is expected to decrease. At approximately 870 million

tonnes, coarse feed grain use, accounting for almost 60 percent of total coarse grain use, is forecast to decline by 4,2 million tonnes (0,5 percent) in 2022/23 to 2021/22 levels.

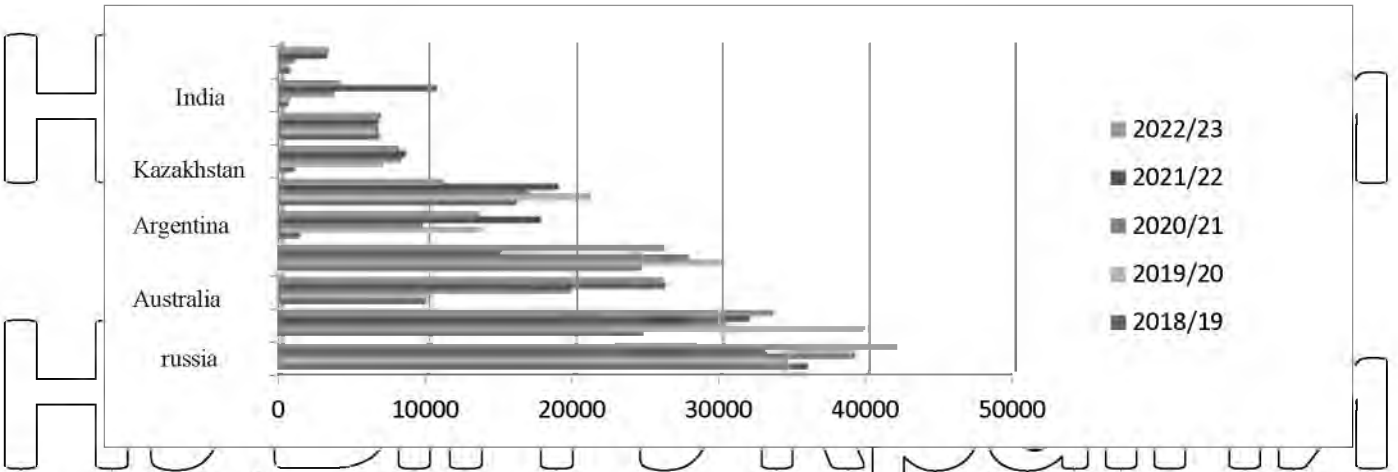
There is a slight increase in wheat stocks in 2022/23. Based on preliminary forecasts for 2022 production and 2022/23 use, global wheat stocks are forecast to reach 298 million tonnes by the end of the 2022 season, up 1,2 million tonnes (0,4 percent) from initial levels and setting a new record.

The expected increase in reserves will be mainly concentrated in China (up by 6,8 million tons based on an expected decrease in use against a background of sustainable production), the Russian Federation (up to 5,1 million tons, from an expected increase in production) and Ukraine (up by 2,0 million tons due to export disruptions due to the war). These increases exceed expected declines in several countries, including India and Morocco, due to production declines.

At current forecast levels, the ratio of world wheat stocks to use in 2022/23 will be 37,9 percent, down from the 38,6 percent expected for the current season, but well above the historic low of 23,3 percent recorded in 2007/08. Excluding China, the ratio would have been much lower at 24,4 percent, but still well above the corresponding all-time low of 19,2 percent recorded in 2007/08.

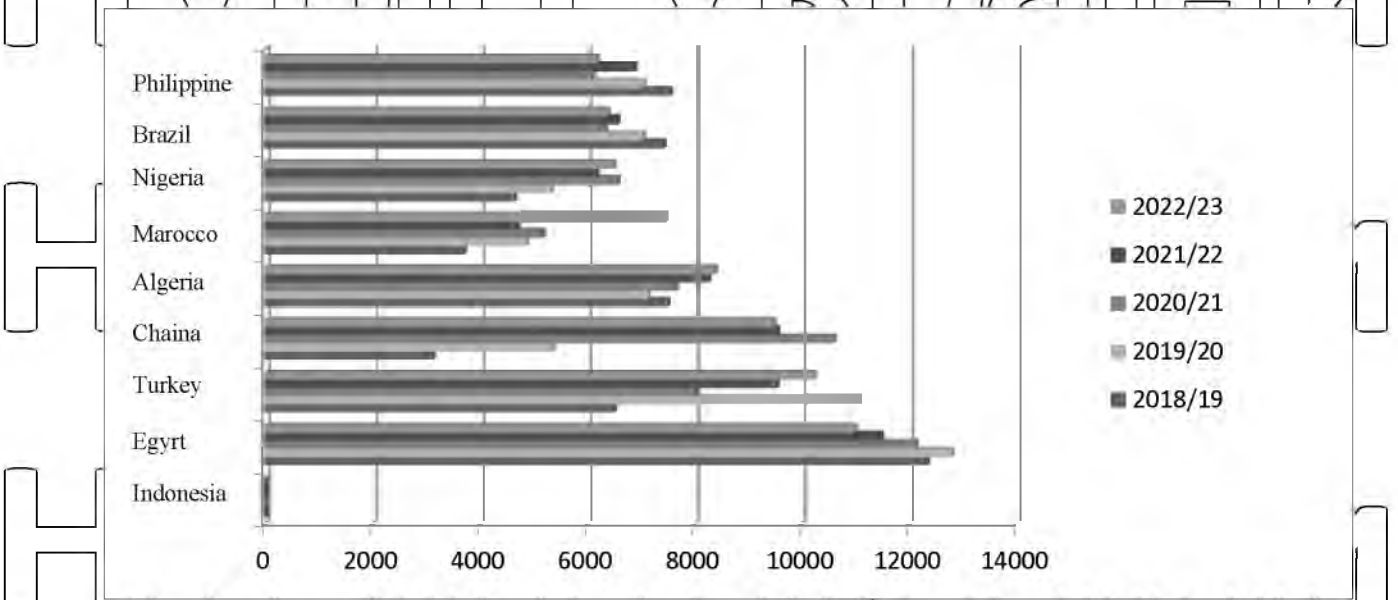
The ratio of major exporters' ending stocks to total depletion (defined as domestic use plus exports) is forecast to increase from 17,6 percent in 2021/22 to 19,0 percent in 2022/23. However, it should be noted that this cost includes the build-up of stocks in Ukraine, where they are forecast to reach, in 2022/23, about three times their five-year average, and remain largely unavailable for export due to the blockade of Ukrainian ports by the Russian Federation.

The grain market in the world is currently characterized by the concentration of production and export of a small group of countries. At the beginning of the 21st century new players entered the world market, managing to become one of the main producers and exporters of grain in a short period of time. These players are two countries of the Black Sea basin, namely Ukraine and Russia.



**Fig. 2.12. Key exporters of wheat in the world Fig. 2.5 Key exporters of wheat in the world Fig. 2.5 Key exporters of wheat in the world**

Source: generated by the author based on data [35].



**Fig. 2.13 Key importers of wheat in the world**

Source: generated by the author based on data [35].

On the other hand, there is a wide geographical diversification in the consumption and import of grain (countries of Asia, Africa and to some extent Latin America). According to FAO forecasts, the main trend until 2026 will be unchanged - the consumption of cereals will grow, due to the increase in demand in developing countries.

Wheat trade will decline in 2022/23 compared to the record in 2021/22. The first FAO forecast on world trade in wheat (incl wheat flour in wheat equivalent) in 2022/23 (July/June) is 188,9 million tons, which is 3,2 million tons (1,7 percent) less than the previously estimated level. The main reason for the projected reduction in world trade in 2022/23 was exports from Ukraine, as the main exporter of wheat. It is predicted that exports from Ukraine will decrease by almost 50% (a decrease of 9 million tons) compared to the previous season, based on the assumption of prolonged disruptions in exports due to the war.

Major Ukrainian ports were blockaded by the Russian Federation at the end of February 2022, and internal infrastructure was significantly damaged. Ukraine will most likely continue to export small volumes of wheat by rail across European borders, but it is not known when it will be able to resume exports from its ports [31].

For other major exporting countries, lower export volumes due to annual production declines also reduce exports from Australia, India and, to a lesser extent, Argentina. In India, the ban on wheat exports (introduced in May 2022) and significantly limiting supplies in 2022/23 increased its market share in 2021/22 against the backdrop of lower exports from Ukraine, and by setting competitive prices that helped open trade with new markets, including Egypt and Vietnam. Sales and food security targets are expected to support an export forecast of 7 million tonnes in 2022/23, remaining well above India's average exports over the past five years.

Exports from the United States are forecast to fall slightly below last year's already depressed levels as domestic supplies remain tight.

Larger shipments from Canada and the Russian Federation are forecast in 2022/23, linked to expected production growth. Given its large supply and geographical proximity to several Ukrainian markets, the European Union is also expected to increase exports in 2022/23 to 38 million tonnes, which, if realized, would make it the largest wheat exporter in the world.

On the import side, a reduction in imports to Asia is expected. Regionally, Asia's total wheat imports are around 99,3 million tonnes, down nearly 6 percent from 2021/22.

Iran is forecast to drop 57 percent (4.5 million tonnes) in 2022/23 from its record high in 2021/22 as production recovers from last season's levels, but still remains well above the five-year average.

An uncompetitive wheat price relative to other grain prices in China is expected to lead to a reduction in China (mainland) wheat imports in 2022/23, forecast to be down 15 percent (1.7 million tonnes) from their record high in 2021/22.

An increase in imports is forecast for Iraq in 2022/23 to offset a second consecutive year of declining domestic production and stockpiling. Imports by Indonesia and Turkey, the largest and third largest importers in Asia, are likely to remain stable at 10.8 million tonnes and 9 million tonnes respectively.

In contrast, in Africa, stronger import demand from several countries is expected to lift wheat purchases in 2022/23 to 54.0 million tonnes, up 5.0 percent (2.6 million tonnes) from the 2021 estimate / 22 years old. The increase was largely due to a forecast 32 percent (1.5 million tonnes) increase in Moroccan imports to a record 6.2 million tonnes to offset an expected sharp drop in domestic production.

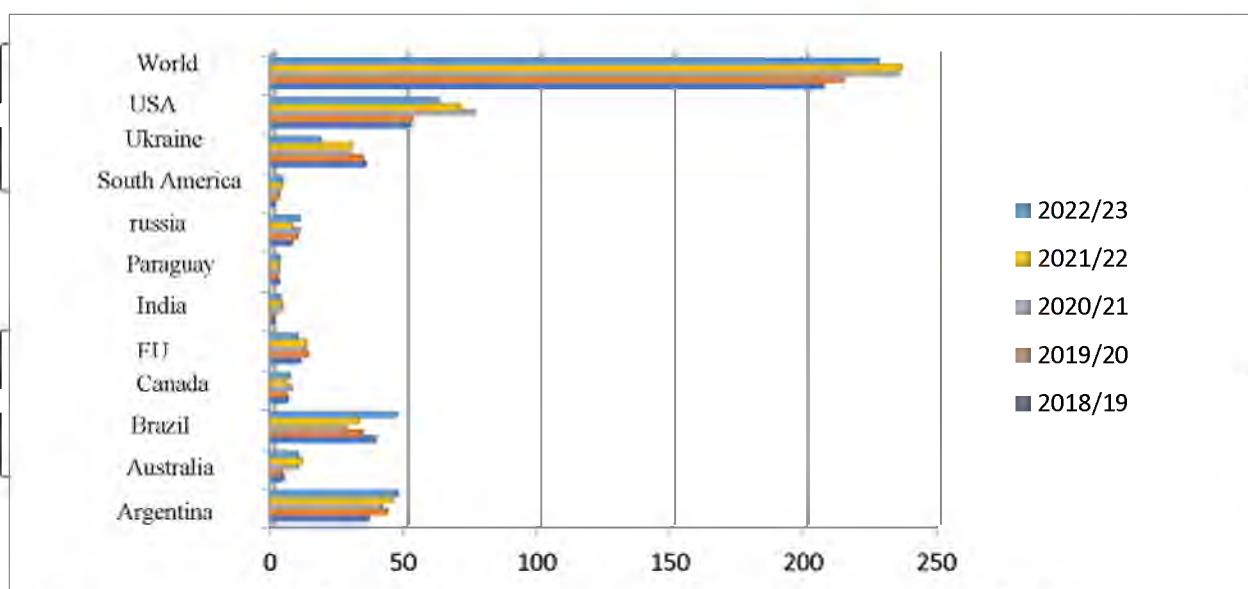
Purchases by Egypt, one of the world's largest wheat importers, are forecast at 13 million tonnes, up slightly from 2021/22. The Egyptian government has taken steps in recent months to open import routes to new markets, including Argentina and India.

Small increases are also forecast for Algeria, Africa's second largest wheat importer and the world's fifth largest, as well as Ethiopia, Mauritania, Sudan and Tunisia, all of which depend on imports to meet domestic wheat needs.

Nigeria, Africa's most populous country and third-largest wheat importer, is forecast to import 6.2 million tonnes, down slightly from 2021/22. In Latin America and the Caribbean, total wheat imports are forecast to remain at last year's level of 23.8 million tons.

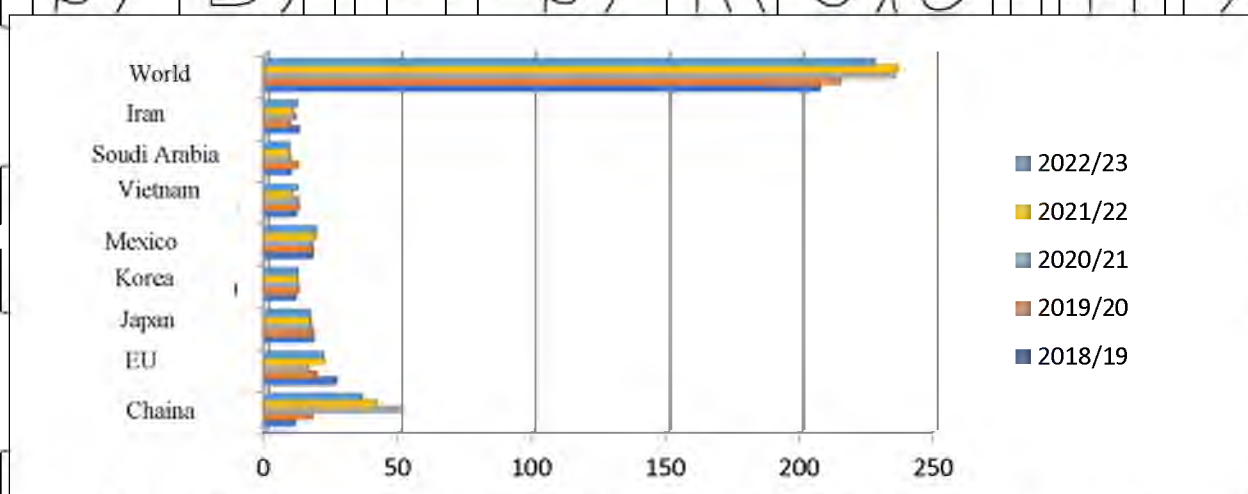
World feed grain trade will decline in 2022/23 for the second season in a row.

FAO's first forecast for world feed grain trade in 2022/23 (July/June) is 220 million tonnes, down 4.4 percent from the estimated level for 2021/22 and representing the second consecutive annual decline.



**Fig. 2.14 Key exporters of fodder grains**

Source: generated by the author based on data [35].



**Fig. 2.15 Key exporters of fodder grains**

Source: generated by the author based on data [35].

Global trade in maize, barley and sorghum is forecast to decline in 2022/23 compared to the corresponding level in 2021/22. World maize trade at 174 million tonnes 2022/23 (July/June) is forecast to fall by 3.7 percent (6.6 million tonnes) from 2021/22 levels, largely due to an expected sharp drop in exports from Ukraine due to the war.

As a result, corn from Ukraine is forecast to fall by 7 million tonnes (32 percent) in 2022/23 reaching 15 million tonnes, the lowest level since 2012/13. Elsewhere,

domestic production has fallen, so supplies from Argentina and the United States are expected to fall by 5,5 million tonnes and 6 million tonnes respectively from 2021/22 levels.

However, an expected increase in exports from Brazil to around 12,5 million tonnes from 2021/22, supported by a record harvest, should partially offset these declines. On the import side, the largest decrease in imports is expected in Europe. Projected decline in use, mostly for fodder, against the background of the expected increase in production, a reduction of 6 million tons (40 percent) of purchases in the EU is forecast compared to the volume of 2021/22.

In Asia, maize imports by China (mainland) are expected to decline slightly to 3,5 million, but will still register a third consecutive year of large imports, around 20 million tonnes relative to historical averages, and maintain the country's position as the largest in world importer of corn. Apart from China (mainland), maize imports by almost all other Asian countries are forecast to remain stable or expand compared to 2021/22, with significant growth in Vietnam, driven by growing feed demand.

With imports increasing in most countries in the region, this will offset declines in Chinese imports, and Asia's total corn imports will reach last season's level of 96 million tons.

Demand for imports from Latin America and the Caribbean will be lower in 2022/23, with maize imports forecast to fall by 5,6 percent. After rising in 2021/22, maize imports by net exporter Brazil are likely to return to closer to average levels in 2022/23.

Purchases by Mexico, the world's second largest corn importer, are forecast to remain at around 17 million tonnes in 2021/22.

Morocco is forecast to increase purchases in 2022/23 mainly to replenish stocks. North American corn imports are expected to decline, with Canadian corn purchases in particular expected to fall by 3 million tonnes after surging to a record high last year to meet increased feed demand amid low domestic barley supply.

World trade in barley (excluding malt) is also forecast to fall in 2022/23, by 8,6 percent (2,9 million tonnes) from 2021/22 to 30,3 million tonnes. The expected

reduction in production reflects the likely reduction in purchases, which are almost entirely concentrated in Asia, especially China (mainland), the Islamic Republic of Iran and Turkey. Falling barley use in China (mainland), the world's leading importer of barley, will cut the country's purchases by 1,5 times in 2022/23 but, pegged at 9 million tonnes, is expected to remain above the average for the past few months seven years, the third year in a row [36].

Islamic barley imports from Iran and Turkey are also forecast to decline, by 1 million and 2.3 million tonnes, respectively, due to expected growth in domestic production. As for exports, a smaller export of barley is forecast, mainly from Ukraine and, to a lesser extent, Australia.

Like maize and barley, global sorghum trade is forecast to fall in 2022/23 to 11.4 million tonnes, down 6,6 percent (0,8 million tonnes) from the record 2021/22 level.

The projected decline is almost entirely attributed to expected lower purchases by China (mainland), mainly due to the substitution of corn for feed.

Table 2.4

### The main reasons for the rise in grain prices in the world

1. Climate change	the La Niña effect in the countries of South America, which developed in the fall of 2020 in Argentina and Brazil, had a negative impact on grain yields. As a result, grain prices rose sharply in September. By the middle of this century, rising average temperatures, changes in precipitation patterns, rising sea levels, increasing frequency and intensity of extreme weather events, and possible increases in pest and disease damage are expected to affect crop production
2. The Chinese factor	according to analysts' forecasts, China will take second place among the main grain importers, having increased its purchases. According to estimates by the US Department of Agriculture, the import of wheat to China in the 2020-2021 marketing year will amount to 10 million tons compared to 5.4 million tons a year earlier, corn - 24 million tons compared to 7.6 million tons. The country is increasing its own production and plans to increase purchases as well. However, in the conditions of the current worsening of the epidemiological situation, the volume of wheat imports may turn out to be even greater, because China

<p>НУБІ</p>	<p>traditionally increases stocks in conditions of instability. In 2020, after losing 50% of the pig population a few years earlier, China began its active recovery, so more corn, soybeans and their processing products were needed. This forced the country to significantly increase imports</p>
<p>НУБІ</p>	<p>the introduction of export restrictions by a number of countries for reasons of food security provoked a surge in demand on world markets. In December 2020, Russia decided to play it, which in recent months has changed the rules of the game on the grain and oil markets several times. First, the country's authorities announced the introduction of export quotas, then introduced customs duties, then increased the amount of the</p>
<p>НУБІ</p>	<p>export tax, and finally announced a floating customs rate for grain exports from April 1, 2021. This behavior of one of the leading players in the world market and the leader in the export of wheat confused the players and further destabilized the grain</p>
<p>НУБІ</p>	<p>markets. Such actions are designed to ensure sufficient grain stocks for the exporting country in an emergency period. They disrupted the usual supply chains and provoked a significant increase in quotations even before the restrictions began - immediately after the news was released. As a result, unlike other commodity markets, prices on the wheat market increased by an average of 15% in the second half of March 2021 alone.</p>
<p>НУБІ</p>	<p>However, the export restrictions of some countries became a kind of "window of opportunity" for other wheat exporters, including Ukraine. The activity of such countries restrained further price growth</p>
<p>НУБІ</p>	<p>the spread of COVID-19 had a significant impact on the global wheat market. The aggravation of the epidemiological situation in some countries caused the postponement of the start of agricultural work. This affected not only the cultivated area, but also the yield, especially in the EU and the USA. The reduction in demand for meat products due to the introduction of quarantine measures by countries and the deterioration of the financial condition of households led to a decrease in the demand for fodder wheat from the livestock industry</p>
<p>НУБІ</p>	<p>Uncertainty with the future harvest of winter crops in the main producing countries of the Northern Hemisphere</p>
<p>НУБІ</p>	<p>5</p>

Source: generated by the author based on data [35].

International wheat prices have almost reached a record high. After the start of the 2021/22 season, with prices up 33 percent over the previous year, international wheat prices rose further in 2021/22 to levels not seen since 2008.

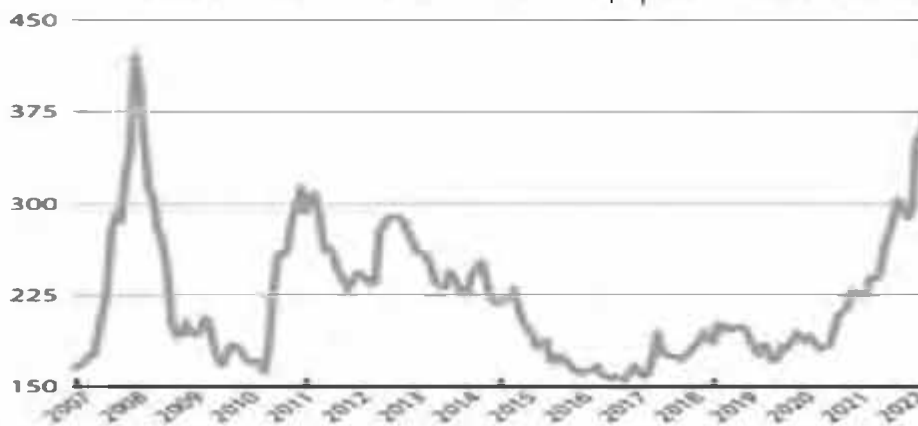


Fig. 2.16 World wheat price indices

Source: ISG

In the first half of 2021/22, world wheat prices rose by 23 percent, mainly due to a reduction in global supplies of high-quality wheat, following harvests in several major exporting countries in 2021.

The abrupt halt to exports from Ukraine – a major wheat exporter – following the invasion of the Russian Federation further exacerbated the global grain supply problem, leading to a sharp rise in prices in March 2022.

Prices rose further in May when India, which has significantly increased supplies in 2021/22 to help offset lost exports from Ukraine, announced a ban on wheat exports.

By May 2022, world wheat prices were 55 percent higher than in May 2021, and only 12 percent below the record high reached in February 2008. US Wheat, No.2 Hard Red Winter, f.o.b. The Gulf, which sets the benchmark price for global wheat markets, averaged \$521 per tonne in May 2022, up 76 percent from its May 2021 value.

Reflecting these trends, in addition to this, production is expected to decline in 2022 in some major exporting countries, including Ukraine (due to war-related disruptions), Australia, India and the United States of America. Chicago wheat futures Council of Trade (CBOT) for near-term deliveries surpassed the 2008 record in March.

and then again in May, setting a new all-time high. An average of 449,5 dollars. USA per ton in May. CBOT winter futures are also up nearly 74 percent year-over-year.

Crude prices remain at record levels. After steady growth in the first half of the 2021/22 season, international prices for major feed grains jumped 13 percent above the record high of 2012, reached in March 2022 in response to a sharp collapse in exports from Ukraine, a major exporter of corn and barley.

The prices of the main feed grains (corn, barley and sorghum) registered the highest levels in history (since 1990). Although they subsided slightly, world prices remained above the previous record levels of 2012 in April and May. The sudden loss of exports from Ukraine put strong pressure on markets given the high concentration of corn exports among four countries (Argentina, Brazil, the United States of America and Ukraine), and already limited levels of barley supply.

With supplies from Ukraine largely unavailable to global markets as its ports remain blocked by war, the prospect of reduced export availability of maize in Argentina and the United States in the 2022/23 season has added further pressure. Energy and resource prices are high, and fertilizer availability is limited. With these trends in mind, U.S. corn base prices (yellow, No. 2, f.o.b.) averaged \$348 per ton in May, up 14 percent year-over-year. International prices for barley and sorghum also remain elevated, respectively 59 and 10 percent above their year-ago levels in May.

An expected decline in global production in 2022, concentrated in major exporting countries, coupled with uncertainty over export prospects from Ukraine and implications for global availability during the 2022/23 season, also put pressure on futures prices. Chicago Board of Trade (CBOT) corn futures for December 2022 delivery, for the new crop in the United States, averaged \$451 tonne in May, up nearly 74% from a year earlier [37].

### **2.3. Evaluation of the export potential of the grain industry of Ukraine**

Ukraine has a powerful agricultural potential, which is the basis of the development of a strategic branch of the national economy. The rational use of this

potential will make it possible not only to fully ensure the food security of our country, but also to turn Ukraine into one of the most important players in the world agricultural market.

The main natural and biological resource of the agrarian sphere is land. A significant part of the world's most fertile chernozems is concentrated on the territory of our country. Natural and climatic conditions, significant labor resources, favorable geographical position are favorable for the cultivation of many agricultural crops, and all this is the basis for forming and increasing competitiveness in the world market.

Agriculture is historically one of the most important complex branches of the domestic economy. Of the 60,4 million hectares of the country's territory, agricultural land occupies 41.8 million hectares, of which the arable land is 32,6 million hectares. Fertile soils are the most famous and indisputable brand of Ukraine. Every year, our state gradually increases the gross production of grain and industrial crops.

The activation of the cultivation of these crops and the increase in the area sown under them contributed to the fact that in 2018, according to the Ministry of Economic Development, Trade and Agriculture of Ukraine, our country topped the ranking of exporters of sunflower oil, took first place in the world in terms of the production of sunflower and sunflower oil it, became the third in terms of the level of sales on the foreign market of rapeseed, 4th - of corn and barley, and 7th - of wheat. In 2020/2021 MR, these trends were maintained and, accordingly, the places of Ukraine in the world export of agricultural products were: 1 – sunflower oil and meal, 3 – corn and rapeseed, 4 – barley.

The development of the cereal market is one of the strategically important for the economy of Ukraine. A high level of grain yield not only guarantees the food security of the state, but also of the importing countries of Ukrainian grain products. In the modern conditions of the armed aggression of the Russian Federation and the conduct of active hostilities in a significant territory of Ukraine, a whole series of problematic situations have arisen, entailing a decrease in the number of sown areas, a drop in the level of grain crop yields, a decrease in the level of export of grain products, and many others. That is why a detailed study of the problems of the grain crop market

in Ukraine and the outline of promising directions for its development become extremely important.

The current state of Ukraine's economy in 2022 is characterized by significant destruction and damage caused by the military aggression of the Russian Federation: the seizure of territory, destroyed enterprises, exported machinery and equipment.

Military aggression did not bypass the agricultural market either. Due to the fact that about 20% of the territory of Ukraine is under occupation, as well as active hostilities in some regions, the sowing campaign of 2022 could not be carried out in full.

According to the Ministry of Agrarian Policy and Food of Ukraine, only 75% of Ukraine's acreage was sown this year. Thus, it is expected that the yield level of grain crops will decrease compared to 2021 [38].

The question of the amount of grain harvest in 2022 worries not only the citizens of Ukraine, the situation is also actively monitored by the international community.

After all, by 2022, the Ukrainian agricultural market would provide crops not only for 40 million people in Ukraine, but also for 190 other countries in the world, while the trend of increasing production volumes remained. Ukraine was distinguished by its powerful potential for increasing the production of grain crops, which was facilitated by the dynamically growing demand for Ukrainian grain on world markets. Over the

past five years, Ukraine confidently exported more than 40 million tons of grain crops, and in 2020 it will already be more than 55 million tons [39].

Regarding the sown areas, the largest areas under wheat were concentrated in Zaporizhia, Odesa, Kharkiv and Dnipropetrovsk regions, under corn - in Poltava, Vinnytsia, Chernihiv, Cherkasy, Sumy, Kirovohrad and Dnipropetrovsk regions, under barley - in Odesa, Mykolaiv, Dnipropetrovsk, Zaporizhia regions and Kherson regions. During 2015–2020, Sumy, Kharkiv, Ternopil, Chernihiv, Khmelnytskyi, Lviv, Poltava, Ivano-Frankivsk, Rivne, Volyn, Cherkasy, and Vinnytsia regions became the leaders in terms of wheat productivity [39].

At the same time, the northern part of Ukraine (Polissia) and mountainous regions are zones with low soil fertility, which are not suitable for growing grain crops. The only effective source of income in this region for the absolute majority of

agricultural producers is the production of winter cereals. In recent years, grain production has been increasing in all regions of the country, regardless of natural and climatic conditions and soil quality [40].

Kozak O.A. and Hryshchenko O.Y. [41] believe that grain farming is largely connected with the natural environment and land resources, as well as the main material and technical means of the agricultural sector, the level of use of which depends on the organization of production, technology and other factors, including climatic conditions. Kravchuk N., Menchynskyi O., Tomchuk O. [42] point out that the improvement of the grain market requires the renewal of the grain collection park, the expansion of the infrastructure for grain storage, the improvement of the structure and the implementation of breeding and seed breeding achievements, the use of biotechnology in grain production, the improvement of material technical base of agricultural enterprises, providing farmers with high-quality seed material and fuel.

The situation on the cereal market changed dramatically in February 2022. The military aggression of the Russian Federation against Ukraine is purposefully aimed at destroying the Ukrainian economy, and above all the agricultural sector, with the aim of causing a world panic around Ukrainian grain. According to the Ministry of Agrarian Policy and Food of Ukraine, as of April 1, 2022, the projected area of sowing of the main spring crops for the 2022 harvest in the territory controlled by Ukraine is 13438,4 thousand hectares, which is 3477,9 thousand hectares less than last year [43]. This is due to the occupation and introduction of active hostilities in the territory of Kherson, Zaporizhzhia, Donetsk, and Luhansk regions; robbery of Ukrainian farmers (theft and export to the Russian Federation of agricultural machinery and grain crops); mining of cultivated areas and destruction of infrastructure.

In order to identify prospects for the development of the grain crop market in Ukraine, it is necessary to study their productivity over the past years. To do this, the sown areas in Ukraine, the gross harvest of grain crops and the yield per 1 hectare of sown areas were analyzed, which are shown in Table 1. So, as you can see from Table 1, the sown area of agricultural land in Ukraine grew annually. In 2015, the sown area was 14738,4 thousand ha, in 2016 the sown area was 14337,1 thousand ha, in 2017 the

sown area was 14623,6 thousand ha, in 2018 the sown area was already 14839,4 thousand hectares.

During 2019-2021, the sown area in Ukraine only grew, in particular, in 2019, 15318,1 thousand hectares of agricultural land were used for sowing, in 2020, 15392,2 thousand hectares of land were sown, and in 2021 there was a record amount of agricultural land under sowing - 15943,9 thousand ha. As for the gross collection of grain crops by Ukrainian farmers, this volume changed during the years 2015-2021. In 2015, Ukrainian farmers collected 60125,82 thousand tons of grain, in 2016 they collected 66088,000 tons of grain, in 2017 they collected 61916,66 thousand tons of grain crops. In 2018, the gross collection increased significantly to 70056,53 thousand tons of grain, which was 8139,87 thousand tons more than in 2017, or by 13,15%.

In 2019, the gross collection of grain crops continued to grow - up to 75143,2 thousand tons, which was 5086,67 thousand tons more, or 7,26%, than in 2018. In 2020, Ukrainian farmers harvested only 64933,39 thousand tons of grain crops. In 2021, a record was set for gross collection - 85680,1 thousand tons, which was 20746,71 thousand tons more than in 2020, or by 31,95%. The record harvest of grain crops reduces the probability of famine for the population of Ukraine in 2022-2023.

Table 2.5

**Sown areas, gross harvest and yield of grain crops in Ukraine  
during 2015-2021**

Year	Sown area, thousand ha	Gross harvest, thousand tons	Yield, tons/ha
2015	14738,4	60125,82	41,1
2016	14337,1	66088,0	46,1
2017	14623,6	61916,66	42,5
2018	14839,4	70056,53	47,4
2019	15318,1	75143,2	49,1
2020	15392,2	64933,39	42,5
2021	15943,9	85680,1	53,8

Source: summarized by the author based on [44].

As for the productivity of cultivated areas, it changed every year. In 2015, the yield was 41,1 centners of grain crops from 1 hectare, in 2016 it increased to 46,1 centners of grain crops from 1 hectare, in 2017 it decreased to 42,5 centners of grain crops from 1 hectare. In 2018-2019, an increase in productivity was observed: if in 2018, 47,4 centners of grain crops were collected from 1 hectare, then in 2019 – 49,1 centners of grain crops from 1 hectare. In 2020, there is a decline in productivity - only 42,5 centners of grain crops from 1 hectare. In 2021, a record was set for the yield of grain crops – 53,8 centners of grain crops from 1 hectare. This was achieved due to favorable climatic conditions and the use of progressive forms of agriculture.

Researchers M.M. Hchuk, I.A. Konoval, O.D. Baranovska, V.D. Yevtushenko. [45] note that the yield of grain crops is the main factor in stabilizing the supply on the grain market. Both weather conditions and the level of resource provision of grain producers greatly affect the level of grain yield. For producers with limited access to financial resources and modern technologies, the yield level of grain crops is characterized by a large variation from year to year depending on weather conditions. At the same time, in enterprises that produce grain in an intensive way, the level of yield of grain crops has a smaller variation. Intensive technologies for growing grain crops, in addition to increasing yield, usually ensure higher efficiency of grain production.

The high productivity of cultivated areas in Ukraine leads to a surplus of grain crops that are exported. The main grain importing countries from Ukraine in 2021 are listed in Table 2.5. So, as can be seen from Table 2.5, a number of world countries were the largest importers of grain crops from Ukraine in 2020–2021. In particular, the largest importer is China, which purchased grain crops in 2020 in the amount of 1,854,823.8 thousand dollars USA, or 19,46% of the total volume.

In 2021, China increased the purchase of grain crops to 2552513,9 thousand dollars. US, or 20,68% of the total volume, which was 697690,1 thousand US dollars more.

In second place is Egypt, which imported grain crops in the amount of 1119389,4 thousand dollars, or 11,23% of the total volume in 2020. In 2021, Egypt

increased the volume of purchases of grain crops to 1386442,4 thousand dollars. USA, or 11,23% of the total volume, which was USD 267053,0 thousand more. Rounding out the top three is Turkey, which imported 473418,3 thousand US dollars in 2020, or 4,97% of the total volume. In 2021, Turkey increased the volume of purchases of grain crops in Ukraine - up to 918339,7 thousand dollars. USA, or 11,23% of the total volume, which was 267053000 USD.

As for other importing countries, in 2021, Indonesia purchased grain crops from Ukraine in the amount of 749759,7 thousand dollars. USA, or 6,07% of the total volume; Spain purchased in the amount of 644882,9 thousand dollars. USA, or 5,22% of the total volume.

Table 2.6  
The largest importers of grain crops from Ukraine in 2020–2021

Country of destination	2020 y.		2021 y.		Deviation, (+,-)	
	Cost, thousands of dollars USA	Specific weight, %	Cost, thousands of dollars USA	Specific weight, %	Absolute, thousands of dollars USA	Relative, %
China	1854823,8	19,46	2552513,9	20,68	+697690,1	+37,61
Egypt	1119389,4	11,75	1386442,4	11,23	+267053,0	+23,86
Turkey	473418,3	4,97	918339,7	7,44	+444921,4	+93,98
Indonesia	546711,2	5,74	749759,7	6,07	+203048,5	+37,14
Spain	543182,4	5,70	644882,9	5,22	+101700,5	+18,72
Netherlands	513148,9	5,38	552213,6	4,47	+39064,7	+7,61
Iran	227890,3	2,39	533326,3	4,32	+305436,0	+134,03
Pakistan	258379,7	2,71	354830,4	2,87	+96450,7	+37,33
Libya	264662,3	2,78	341608,1	2,77	+76945,8	+29,07
Tunisia	346986,8	3,64	306102,8	2,48	-40884,0	-11,78
Israel	229795,5	2,41	277257,4	2,25	+47461,9	+20,65
Saudi Arabia	155360,2	1,63	266431,4	2,16	+111071,2	+71,49
Morocco	256490,9	2,69	266068,8	2,16	+9577,9	+3,73
Italy	159815,4	1,68	237563,4	1,92	+77748,0	+48,65
Lebanon	184217,7	1,93	230350,2	1,87	+46132,5	+25,04
Bangladesh	316730,7	3,32	217293,4	1,76	-99437,3	-31,39
Yemen	144410,2	1,52	206407,6	1,67	+61997,4	+42,93
Republic of Korea	281766,4	2,96	204104,9	1,65	-77661,5	-27,56
Other countries	1652489	17,34	1629470	17,00	-23019,0	-1,39
<b>Together</b>	<b>9529669,1</b>	<b>100,00</b>	<b>12343875,2</b>	<b>100,00</b>	<b>+2814206,1</b>	<b>+29,53</b>

Source: summarized by the author based on [31].

The Netherlands was purchased for USD 552213,6 thousand. USA, or 4,47% of the total volume; Iran purchased in the amount of 533326,3 thousand dollars. USA, or

4,32% of the total volume. As for other importing countries, their share in the total volume of purchases of grain crops was less than 3,0%. In particular, in 2021, Pakistan purchased grain crops in the amount of 354830,4 thousand dollars. USA, or 2,87% of the total volume; Libya purchased grain crops in the amount of 341608,1 thousand dollars. USA, or 2,77% of the total volume; Tunisia – 306102,8 thousand dollars. USA, or 2,48% of the total volume; Israel – 277257,4 thousand dollars. USA, or 2,25% of the total volume; Saudi Arabia – 266431,4 thousand dollars. USA, or 2,16% of the total volume;

Morocco – 266068,8 thousand dollars. USA, or 2,16% of the total volume; Italy – 237563,4 thousand dollars. USA, or 1,92% of the total volume; Lebanon – 237563,4 thousand dollars. USA, or 1,87% of the total volume; Bangladesh – 217293,4 thousand dollars. USA, or 1,76% of the total volume; Yemen – 206407,6 thousand dollars. USA, or 1,67% of the total volume; Republic of Korea – 204104,9 thousand dollars. USA, or 1,65% of the total volume.

In 2020, 17,37% of the total amount of grain crops, or 1652489,0 thousand dollars, was accounted for by other countries, whose share in the purchase of grain crops in the end was less than 1,0%. USA. In 2021, other countries purchased grain crops in the amount of USD 1629470,0 thousand. USA, or 17,0% of the total volume.

It was for USD 23019,0 thousand. less than in 2020, or by 1,39%.

In total, importers bought grain crops from Ukrainian farmers in the amount of 9529669,1 thousand dollars. USA in 2020, and in 2021 this amount increased to 12343875,2 thousand dollars. USA, which was 2814206,1 thousand dollars. USA, or by 29,53%.

Before the beginning of the military aggression of the Russian Federation, the main volume of export of grain crops in Ukraine was directed to buyers through the ports of Mykolaiv and through the ports of Southern Odesa and Chornomorsk. In total, this is 95% of grain cargoes exported by sea. Mariupol and Berdyansk accounted for another 5%. For the most part, grain crops were transported to the ports by rail. Since the beginning of hostilities on the territory of Ukraine, the export of grain through port terminals has been stopped [46].

Most of the export of grain crops today is provided by railway transportation. Exports go to the ports on the Danube and directly to the Romanian seaport of Constanta, as well as to the ports of the Baltic countries. On average, transportation by rail and road transport adds from 20% to 40% to the value of grain crops [47].

The Ukrainian grain market is export-oriented. About 2/3 of the gross harvest of wheat is exported, and even more so - about 3/4 of corn. The main obstacles in the path of Ukrainian exporters of agricultural products are their low quality, which does not meet European and international quality standards, low rates of technical and technological renewal of production, and the existing problem in ensuring the storage of production products during the marketing year.

On the one hand, experts point out that in Ukraine there is no problem with a lack of places to store products and the situation is somewhat better with grain warehouses than with vegetable warehouses, but the problem lies in something else, namely the lack of modern equipment in warehouses, which causes a decrease in the quality of processing and storage and increased costs for this technological process. According to the Ukrainian Grain Association, currently, it is possible to ensure the preservation of 60-65 million tons of grain, and in addition, about 4 million tons can be stored in sea ports.

But this is not the only influencing factor. It also takes into account the purchase price and cost of production, which is lower in Ukraine than in Europe, which allows it to reduce prices more actively. When forming the final sale price, the issue of transport and logistics is taken into account. And in this regard, Ukraine, compared to Western Europe, has a geographical advantage in organizing supplies to the Middle East, East Africa, and Southeast Asia.

In view of the above, it is worth intensifying the innovative activity of agricultural enterprises of Ukraine in order to increase their competitive positions on the basis of high product quality and the ability to painlessly adjust the sales price both on the domestic and foreign markets. Because the vast majority of domestic producers of agricultural products are losing their competitive positions. This is due to the fact that the majority of agricultural enterprises operate on an extensive basis, and there is

a lag behind the implementation of the opportunities of the external environment in terms of using the achievements of scientific and technical progress.

The implementation of innovative technologies mostly takes place in agricultural holdings, but even they have certain difficulties related to the extensive management system and a large number of structural divisions. That is why the priority direction in the agricultural sector is the introduction of agricultural technologies that will improve the quality of products. The main difference between Ukrainian high-tech solutions and global ones is their focus. In Ukraine, technologies are aimed at strengthening control and combating theft, while foreign ones aim to increase yield and overall production efficiency.

A significant problem that restrained the development of the agricultural market of Ukraine in the pre-war period was the underdevelopment of the infrastructure of its logistical support, which led to the strengthening of price speculation on the market, the exacerbation of manifestations of unfair competition, the creation of non-transparent mechanisms for the sale of food, the complication of the formation of effective control mechanisms for compliance with the established standards of business development processes in the agrarian sphere, increasing the risks of food quality deterioration during its storage. Thus, according to the estimates of the Ministry of Agrarian Policy and Food of Ukraine, in the pre-war period, there were about 1200 elevators in the country, 70% of which were worn out and obsolete.

In turn, the annual deficit of elevator capacities was in the range of 40-45 million tons [43]. With the beginning of large-scale actions, the situation with infrastructural support of the logistics capacities of the agrarian market only worsened. Thus, according to the American non-governmental organization Conflict Observatory, every sixth granary in Ukraine was destroyed or damaged as a result of the full-scale invasion of the Russian Federation.

In turn, about 15,7% of elevators, grain bunkers and warehouses for storing grain and seeds, such as wheat, barley and sunflower seeds, were destroyed or came under the control of the occupation authorities. Of the 344 objects photographed by satellites for evaluation, 75 of them have visible damage. The Conflict Observatory noted that

due to the war, Ukraine lost 8,4 million tons of certified capacity for grain storage only according to the lowest estimates [46].

It is obvious that such a situation only deepens the structural problems of infrastructural and logistical support for the functioning of the agricultural market in Ukraine and limits the possibilities of the domestic agricultural industry to ensure the storage of agricultural products in conditioned and ergonomic conditions.

So, the main problem for the grain market in Ukraine was the military aggression of the Russian Federation, which aims to prevent Ukrainian grain from entering the world market and cause famine. The blockade of Ukrainian ports in the Black and Azov Seas prevents importers from exporting grain crops from Ukraine in the required volumes. Minor transportation is carried out by rail and road transport. However, a large part of the harvested grain crop remains in warehouses, which is very risky in modern conditions. On more than one occasion, missile strikes by the Russian military were aimed specifically at the destruction of agricultural infrastructure, including elevators and grain warehouses.

In addition, the presence of a high level of supply of grain crops in the middle of the country caused a drop in product prices. So, farmers faced another problem - achieving the break-even level of their own production. Reducing the level of negative influence of factors on the development of the grain market of Ukraine in modern conditions is possible thanks to the active state support of the agricultural sector, the influence of international partners on the situation surrounding Ukrainian grain.

After the full-scale invasion of the Russian Federation into Ukraine, grain and oil prices rose to record highs, surpassing their 15-year highs. This will lead to an increase in the number of countries that will not be able to provide themselves with food. It was the war in Ukraine that intensified the crisis situation in poor countries and not only. But despite shelling, destruction of grain elevators and fires in wheat fields, Ukrainian farmers were able to sow and harvest crops.

The current harvest of 2022 should be about 70 million tons of grain and oil crops. We need about 20 million tons for domestic consumption, and 50 million tons must be exported from this year's harvest. Now Ukraine is exporting corn last year

because today farmers have harvested 6-7% of the potential area. Wheat is exported from the remains and 60% of the new harvest.

Export of grain is necessary for Ukraine to obtain foreign exchange earnings, and for importing countries to ensure food supplies and prevent famine. Statistics from the Global Hunger Index show that in 2021 11 million people around the world went to bed hungry every night, 47 countries had a high level of hunger in 2021, and in 2022 the estimate is already at the level of 60 countries; 3,1 million children die of malnutrition every year. Therefore, if the country is not provided with food, hunger riots and migration of refugees from Africa and Asia are inevitable.

Before the war, Ukraine exported 60-65 million tons of grain crops per year, that is, approximately 5-7 million tons of grain per month, of which the bulk of the cargo (4 million tons, or 65%) was exported by rail. The rest of the grain was delivered to the ports either by river or road transport.

To date, the same three types of transport remain, but in a much reduced form. We can ship grain from four ports located at the mouth of the Danube (Kilia, Ust-Daunayskiy, Reni and Izmail). However, these small ports can provide only a tenth of all pre-war volumes of port transshipment. In the future, these terminals will be able to provide up to 1-2 million tons of grain transshipment for grain growers. About 300000-500000 tons more can be transported abroad by motor vehicles every month, while the railway exports about 900000 tons of grain per month [46].

In total, we can export only 2,2-2,5 million tons of grain per month using three modes of transport. Ideally, when all three types of transport will work at full capacity, we will be able to export up to 2,5-3,5 million tons.

Taking into account such volumes of grain export per month, the indicator of our annual export will stop at 25-35 million tons due to limited logistical possibilities. This is the limit. This categorically does not suit the agrarian market, because in the pre-war period Ukrainian farmers grew 106 million tons of grain and the lion's share was exported. As a result, already in 2022/23 MR production indicators fell to 60-70 million tons, of which 40-50 million tons or more could be exported.

According to operational data of the State Customs Service, as of November 9, since the beginning of the 2022/23 fiscal year, thanks to the work of the grain corridor, Ukraine exported 14,628 million tons of grain and leguminous crops, including in November – 1,426 million tons. This was reported by the press service of the Ministry of Agrarian Policy of Ukraine. At the same time, it is noted that for the same period of the previous season, the specified indicator was 20,983 million tons, of which 1,538 million tons were shipped in November.

In terms of crops, since the beginning of the current season, the following were exported:

- wheat – 5,56 million tons (in 2021/22 MR – 12,976 million tons);
- barley – 1,176 tons (4,589 million tons);
- rye – 6,3 thousand tons (70,7 thousand tons);
- corn – 7,834 million tons (3,145 million tons).

The total export of Ukrainian flour on November 9 amounted to 42,6 thousand tons (the previous season – 44,8 thousand tons), including wheat – 39,7 thousand tons (44,3 thousand tons).

Ways to solve problems on the grain market are: stabilization of the military and political situation in the country, provision of Ukrainian farmers with seed, fuel and agricultural machinery, creation of safe working conditions (denmining of cultivated areas), maximum sowing of grain crops in safe regions, application of innovative technologies in the production and storage of grain crops.

This will allow Ukraine to survive the crisis year 2022 and prepare optimistically for challenges in 2023. Reducing the impact of the military aggression of the Russian Federation, unblocking sea ports and finding alternative ways to export grain crops will reduce the probability of world hunger, etc.

The results of the conducted research show that until 2022, a positive trend in the development of the cereal market in Ukraine was observed. This is evidenced by the increase in the number of sown areas, gross harvest and grain yield in recent years. However, the military aggression of the Russian Federation fundamentally changed this situation. This year, there is a decrease in the number of cultivated areas due to

active hostilities in the territory of Kherson, Kharkiv, Zaporizhzhia, Donetsk and Luhansk regions.

There are also problems with grain storage and transportation. In particular, the blockade of sea ports does not allow the export of significant stocks of grain to other countries of the world. So there is a problem of lack of grains and a food crisis of a

global scale. Thus, the existing situation on the grain market of Ukraine requires decisive steps to stabilize the military-political situation in the country, the involvement of not only the top leadership of Ukraine, but also other bright leaders of partner

countries in this process. State support for farmers by providing seeds, fuel, preferential lending, etc. is important.

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## SECTION III. PROSPECTS FOR RESTORING AND INCREASING THE EXPORT POTENTIAL OF THE GRAIN INDUSTRY OF UKRAINE

### 3.1. Strategic directions for restoring and developing the export potential of the grain industry of Ukraine

The agro-industrial sector is considered to be perhaps the largest engine of the national economy of Ukraine: this industry had a steadily growing trend before the full-scale invasion, with annual growth of 5-6%, and the share of agricultural production in the GDP structure was 10%, and including processing of agricultural products - 16%. Agriculture was one of the world's leading producers of certain types of food, thereby providing trade volumes equivalent to 6% of world consumption. Ukraine was a leader in international trade in sunflower oil, ranking first in the world, and in barley and rapeseed (fourth and third, respectively), as well as other products.

The Ukrainian budget annually received approximately USD 22,3 billion. The country's budget received approximately USD 22,3 billion annually from trade in agricultural products and foodstuffs, accounting for about 41% of total Ukrainian exports. The industrialized development of agricultural production in the country was able to offset the impact of the disparity between the level of state support and the cost of lending with the EU and North American countries, and to compete successfully in international markets.

The involvement of the maximum possible amount of agricultural land in agricultural turnover was the result of the end of extensive growth (by increasing the land bank) and a gradual transition to intensive growth through improved production technologies, production of goods with higher added value, renewal of the machinery fleet and construction of storage facilities, and development of processing.

The adoption of the land reform package has not only launched the land market, but also significantly improved land relations and reduced corruption and raiding. Land reform has made the agricultural sector much more attractive to investors. In addition, land reform has become the basis for long-term development, for example, for the

establishment of orchards and vineyards. The launched land reclamation reform has opened up a significant opportunity for agricultural producers to invest independently in order to expand the area of irrigated land and reduce water supply costs, which has led to an increase in gross agricultural production. The new Law on Cooperation has opened up new opportunities for the development of cooperatives that unite hundreds and thousands of both small and medium-sized agricultural enterprises, and has increased their competitiveness to the level of the largest agricultural holdings.

Due to the blocking of seaports, exports have significantly decreased from the previous 6-7,5 million tons per month to 1,5-2 million tons. This, in turn, caused a decline in prices for the sale of agricultural products within the country, below their cost level, which may threaten bankruptcy for domestic agricultural producers. If all seaports are not unblocked before the harvesting of new crops begins, the shortage of necessary storage capacities in the country will reach up to 15 million tons, and the lack of funds from the sale of agricultural products may threaten to disrupt the harvesting and sowing campaigns in 2022.

According to FAO's preliminary estimates, direct losses of assets in the industry could reach \$6,6 billion. The damage to the agricultural sector could reach used 6,6 billion. As of July, approximately 5% of agricultural land was damaged. Losses of available sowing areas amounted to more than 25%, irrigated land to more than 70%, berry fields to about 25%, and orchards to 20%. There has been a significant increase in the cost of production due to rising prices for seeds, fertilizers, and, of course, fuel. Large areas of land are dangerous and unusable due to damage and mines. Infrastructure facilities in the agricultural, energy, transportation, warehousing, and processing industries have also suffered significant damage.

In addition, there are challenges that could not be overcome even before the war began: difficulty connecting to utility networks, protective barriers to entry of agricultural products to foreign markets (including the existence of EU quotas), incomplete adaptation of legislation on safety, phytosanitary and veterinary control in accordance with EU standards, problems with blocking tax invoices, and the mismatch

between the transshipment and delivery capacities of agricultural products and the needs of agricultural producers.

*Key challenges, opportunities and constraints for the agricultural sector:*

- unblocking and developing seaports, creating alternative export routes;
- transformation and full provision of an environment for sustainable economic viability of all entities of the agro-industrial sector:

- rapid recovery, formation of new economic chains and support for the competitive functioning of the processing industry;

- Providing agribusinesses with high-quality end-to-end infrastructure: land, irrigation and infrastructure: land, irrigation and drainage systems, finance, transportation and logistics, and engineering networks;

- restoring safe physical and environmental conditions of land;

- overcoming corrupt practices and the shadow market for land and agricultural products, improving the investment climate;

- balancing the production of high and low-margin products;

- improving the energy efficiency of the industry through the development of bioenergy;

- achieving an optimal level of physical and economic food security;

- Ensuring sustainable growth in the context of the implementation of measures aimed at climate neutrality under the green deal;

- timely fulfilment of Ukraine's obligations to harmonize national legislation with EU legislation under the Association Agreement.

*Key opportunities:*

- high level of support from the international community interested in restoring Ukraine as one of the world's guarantors of food security;

- recovery of the sector will give impetus to the development of related sectors of the economy: machine building, services, trade, transportation, chemical industry, etc.;

- increase in crop yields by 2-3 times due to the use of hydrotechnical land reclamation;

➤ the package of land reform laws and other deregulation and anti-corruption initiatives adopted by the Verkhovna Rada of the IX convocation significantly improves the business climate in the agricultural sector;

➤ the level of productivity per 1 employed person can be increased by 6 times due to increased processing and more active use of digital technologies;

➤ the launch of the land market will help attract investment in capital-intensive production: orchards, berry gardens and give impetus to the development of land reclamation, infrastructure, and soil fertility.

*Key constraints:*

➤ a sharp drop in demand due to logistical constraints, a drop in the sector's profitability, and a lack of liquidity;

➤ deterioration of the quality of land resources;

➤ limited access to finance for all entities in the agricultural sector;

➤ decline in the technological potential of the sector;

➤ shortage of qualified personnel;

➤ lack of effective tools for improving competitiveness, structural reorganization and economic sustainability for the agricultural sector as a whole.

### **3.2. State support for grain production and exports under martial law**

Moscow's invasion of Ukraine and international economic sanctions against Russia have interrupted the supply of fertilizers, wheat and other goods, raising food and fuel prices, especially in developing countries.

Prior to the February invasion, Ukraine was considered the world's breadbasket, exporting 4,5 million tons of agricultural products per month through its ports - 12% of the world's wheat, 15% of corn, and half of its sunflower oil. The consequences of the hostilities have had the greatest impact on global food markets, in particular on international prices for wheat, corn, and vegetable oils. This could lead to the deepest food crisis in modern human history.

The war will have serious economic consequences for Europe, especially since it began when the pandemic crisis has not yet ended, as the IMF notes [49]. Global wheat prices are at record highs, exceeding previous highs during the 2008 global food crisis.

The rise in prices was caused by a shortage of grain supply, as the war against Ukraine effectively halted more than a quarter of global wheat exports. It was profitable and logistically convenient to buy from Ukraine. Since the ports of Odessa, Chornomorsk, etc. are now cut off from the world by Russian warships, supplies can only be made via congested land routes, which are much less efficient. There is a threat that world markets will not receive about 60 million tons of wheat, 38 million tons of corn, and 10.5 million tons of barley, which means that global grain exports will sharply decline. More than 400 million people in the world depend on grain supplies from Ukraine [50].

According to the Ministry of Agrarian Policy, due to the war, the area for sowing in 2022 in the area of active hostilities decreased by 3.5 million hectares. Given the current situation in Ukraine, about 13.9 million hectares of spring crops can be sown in 2022, which is 75% of the total area before the war. The 5% increase compared to the previous estimate is mainly due to the liberation of Kyiv, Chernihiv, Sumy regions and some areas of other regions of Ukraine from the temporary occupation.

In a time of war, production and export deficits are inevitable. Grain prices rose. Against this backdrop, wheat futures on the Chicago Board of Trade rose to \$13.63 per bushel (\$315.1 per ton), the highest in the history of trading (last year, in 2021, wheat was trading at half the price - \$6.74 per bushel). Subsequently, they adjusted to \$12.02 per bushel (\$277.9 per ton). World corn prices are also approaching their highest level since 2012, and prices for soybean and palm oil have already reached record highs [51].

Russia's war against Ukraine has led to a sharp rise in prices and disruption of supply chains. The so-called «energy inflation» caused by rising energy prices will inevitably hit the wallets of every European family. Restrictions on fuel and fertilizer supplies make it difficult to farm in relatively safe regions and lead to significant losses

in production and exports. Half of the grain purchased by the UN World Food Program for the 120 million people who are undernourished every day comes from Ukraine.

The ban on the export of certain agricultural products: oats, millet, buckwheat, sugar, salt, rye, and livestock was a necessary measure to meet the food needs of the state and the population of Ukraine. Exports of wheat, meslin (a mixture of rye), corn, sunflower oil, poultry and eggs are allowed only after prior notification to the government and obtaining a license.

Another important aspect of the military aggression against Ukraine is the aggravation of social issues. After the start of the full-scale war, more than 8 million Ukrainians registered as internally displaced persons. According to the International Organization for Migration, the share of IDPs has increased to 17,5% of the population of Ukraine [51]. According to the International Labor Organization (ILO), about 4,8 million jobs have been lost in Ukraine [52].

In the context of the humanitarian crisis caused by Russia's aggression against Ukraine, labor markets in neighboring countries are also experiencing serious shocks. According to experts, in the event of an escalation of hostilities, employment losses will increase to 7 million jobs. Neighboring countries have accepted more than 5,23 million Ukrainian refugees. Among them, 2,75 million refugees are citizens of working age, 1,2 million of them have lost or left their jobs [53].

Given the current situation in Ukraine, the need to provide the population with food and restore supplies to global markets to fill the state budget, creating suitable conditions for the functioning of the agricultural sector is of particular importance.

The functioning of seaports in Ukraine, which used to be used for about 90% of agricultural exports, is now impossible.

Today, up to 20 thousand tons of grain are transported by rail daily, while previously about 150 thousand tons went through seaports. In cooperation with the UN World Food Program, the Ministry of Agrarian Policy is working to create alternative logistics routes for agricultural exports.

While the government continues to work on solving the problem of agricultural export logistics, it is working to minimize bureaucratic procedures for agribusinesses,

with the aim of speeding up the process of obtaining the necessary licenses and certificates, which will be processed in a maximum of 24 hours. In order to provide Ukrainian farmers with fertilizers, the government lifted the ban on the export of nitrogen fertilizers and set an export quota of up to 210 thousand tons, but no more than 70 thousand tons per month.

The problem of shortage and high cost of fuel for the needs of farmers can be solved by introducing significant tax benefits; gasoline and diesel fuel of Euro-3 and Euro-4 environmental classes are allowed to be placed on the market for use by farmers; work with pesticides and agrochemicals has been simplified, and the validity of permits for transportation, storage, and use for martial law has been extended. Tractors, self-propelled chassis, etc. can be operated without registration. However, the problem of sharply rising prices for fuel and fertilizers remains relevant and needs to be addressed.

Today, Ukrainian farmers are responsible for the food security of the entire country. The government has introduced appropriate measures of financial state support for farmers during the sowing season.

In order to support the sowing campaign and provide farmers with the necessary materials, agricultural producers are provided with loans under the State Program «Affordable Loans 5-7.9%» for the period of martial law (Resolution of the Cabinet of Ministers of Ukraine No. 274 «On Amendments to the Resolutions of the Cabinet of Ministers of Ukraine No. 28 of 24.01.2020 and No. 723 of 14.07.2021» dated 12.03.2022) (Table 3.1).

Table 3.1

### Loans granted under the State Program Affordable Loans

1. the program was expanded to cover medium-sized enterprises with annual revenues of up to EUR 50 million (previously EUR 20 million) and large enterprises with annual revenues of more than EUR 50 million, regardless of the number of employees;

2. increased the maximum loan amount for all business entities from UAH 50 million to UAH 60 million, including a group of related companies;
3. set the interest rate at 0% per annum;
4. the following lending purposes were established: investment loan for the purchase of agricultural machinery, working capital loan for the purchase of seeds, fertilizers and fuel and lubricants;
5. the loan term is set at 6 months;
6. the deadline for submitting an application for participation in the program has been set at 31.05.2022;
7. the amount of the loan guarantee was set at 80% of the loan amount of micro, small and medium-sized enterprises (except for large enterprises);
8. provision was made for the reservation of agrarians liable for military service (Resolution of the Cabinet of Ministers of Ukraine No. 194 «Some issues of reservation of persons liable for military service under the legal regime of martial law» dated 03.03.2022). In order to carry out a set of spring and summer field works in a timely manner, agricultural enterprises and food producers must submit to the Ministry of Agrarian Policy of Ukraine lists of critical employees who will be granted a deferral of up to 6 months from being called up for military service during mobilization and wartime;
9. reservation of agrarians liable for military service is provided for (Resolution of the Cabinet of Ministers of Ukraine No. 194 «Some issues of reservation of persons liable for military service under the legal regime of martial law» dated 03.03.2022). In order to carry out a set of spring and summer field works in a timely manner, agricultural enterprises and food producers must submit to the Ministry of Agrarian Policy of Ukraine lists of critical employees who will be granted a deferral of up to 6 months from being called up for military service during mobilization and wartime.

Source: generalized by the author based on [54].

In order to provide domestic farmers with fertilizers, a ban on the export of phosphate, potash, and complex fertilizers has been imposed. For nitrogen fertilizers, a quota of up to 210 thousand tons by July 01, 2022, but no more than 70 thousand tons per month, was set. Meanwhile, the validity of pesticide and agrochemical permits has been extended by 90 days. This issue is regulated by the Resolution of the Cabinet of Ministers of Ukraine No. 259 «On Amendments to Annex 1 to the Resolution of the Cabinet of Ministers of Ukraine No. 1424 dated 12.03.2022», as well as by the Resolution of the Cabinet of Ministers of Ukraine No. 353 «On Amendments to Annex 1 to the Resolution of the Cabinet of Ministers of Ukraine No. 1424 dated 29.12.2021» dated 24.03.2022.)

The requirements for the production of certain types of products and their labeling have been liberalized; the tax burden on enterprises located in the combat zone or in the temporarily occupied territory has been reduced for the period of martial law; measures are being taken to support farming (Table 3.2).

### Measures to support farming

Table 3.2

- |    |  |
|----|--|
| 1. | temporary differences between the actual parametric values of a food product and the mandatory information on the labeling of such a product are allowed (Resolution of the Cabinet of Ministers of Ukraine No. 186 «Some Issues of Food Labeling under Martial Law» dated 03.03.2022). Thus, in the case of forced changes in the recipe due to the absence or insufficiency of the relevant raw materials, such differences are allowed for the period of martial law. However, the consumer must be informed in any possible way about the presence of substances in the food product that may cause allergic reactions or intolerance) |
| 2. | overly detailed and irrelevant requirements for small-scale milk production and circulation have been abolished (Order of the Ministry of Agrarian Policy of Ukraine No. 209 «On Approval of Hygienic Requirements for Small-scale Milk Production and Circulation» dated 07.04.2022). In particular, it provides  |

for a flexible approach to compliance with hygienic requirements during milk production in farms with up to five conventional heads of dairy animals and its procurement by milk collection points. This regulation will ensure harmonization of hygienic requirements for milk production on farms with the Requirements for Safety and Quality of Milk and Dairy Products approved by the Order of the Ministry of Agrarian Policy No. 118 dated 12.03.2019:

3. enterprises located in the combat zone or in the temporarily occupied territory are exempted from paying environmental and land taxes in 2022 (Law of Ukraine «On Amendments to the Tax Code of Ukraine and Other Legislative Acts of Ukraine Regarding the Validity of Norms for the Period of Martial Law» of 15.03.2022 No. 2120-IX),
4. The Order of the Ministry of Agrarian Policy of Ukraine No. 168 dated 11.03.2022 approved the application forms for providing financial support to farms.

Source: generalized by the author based on [53]

Table 3/3

**Measures to regulate export-import operations with agricultural products and the movement of agricultural products of plant and animal origin, as well as live animals through the territory of Ukraine**

1. a ban on the export of certain types of agricultural products was introduced and licensing of exports of a number of socially important products was established (Resolution of the Cabinet of Ministers of Ukraine No. 207 of 05.03.2022 «On Amendments to Annexes 1 and 5 to the Resolution of the Cabinet of Ministers of Ukraine No. 1424 of 29.12.2021»). Thus, it is forbidden to export oats, millet, buckwheat, sugar, salt, rye, cattle (live), meat and offal (frozen, brine, dried or smoked). Exports of a number of socially important goods are subject to licensing: wheat, corn, meat and eggs of domestic chickens, and sunflower oil. Later, the CMU Resolution No. 352 «On Amendments to Annex 5 to the CMU Resolution No. 1424 of 29.12.2021» of

	<p>24.03.2022 abolished the licensing of corn and sunflower oil exports. The CMU Resolution No. 549 dated 3.05.2022 lifted the ban on the export of millet and sugar;</p>
2.	<p>to ensure uninterrupted supply of imported food and feed under martial law, it is allowed to sell imported food and feed with information in a language other than the state language (Resolution of the Cabinet of Ministers of Ukraine No. 234 «On Measures to Ensure Uninterrupted Supply of Imported Food and Feed under Martial Law» dated 09.03.2022). At the same time, batches of these food and feed products must be accompanied by mandatory information in the state language (provided at the request of consumers);</p>
3.	<p>promptly update the list of critical imports with food products, which prevents shortages of such products, as well as the necessary equipment. Currently, critical imports (CMU Resolution No. 153 «On the List of Critical Imports» dated February 24, 2022) include, in particular, cattle, heifers, pigs, sheep and goats, poultry, mineral or chemical fertilizers, veterinary equipment, etc;</p>
4.	<p>the customs clearance of food products was simplified and the list of goods subject to deferred customs payments was determined (Resolution of the Cabinet of Ministers of Ukraine No. 236 of 09.03.2022 «Some issues of customs clearance of certain goods imported into the customs territory of Ukraine during martial law»). These are food products such as meat, fish, milk, vegetables, oil, coffee, tea, etc;</p>
5.	<p>certain requirements for the import and export of agricultural products during martial law have been changed. In particular: the requirement to obtain a quarantine certificate for imported seeds when transported through the territory of Ukraine has been abolished; the possibility of issuing a phytosanitary certificate in electronic form has been introduced; the import of food, feed, by-products of animal origin, as well as live animals into the customs territory of Ukraine has been simplified (Law of Ukraine «On Amendments to Certain Laws of Ukraine on Uninterrupted Production and</p>

Supply of Agricultural Products during Martial Law» of 12.05.2022 No. 2246 (IX).

Source: Author's compilation based on [53].

Table 3.4.

### Measures taken to maintain the stability of food supply to the population

1. control was established over the growth of prices for the following goods: wheat flour, pasta, loaf, bread, buckwheat, oatmeal, pork, beef, poultry (chicken carcasses), milk, butter, sour cream, chicken eggs, sunflower oil, crystal sugar, white cabbage, onions, beets, carrots, potatoes (Resolution of the Cabinet of Ministers of Ukraine dated 06. 03.2022 No. 2233 On Amendments to the Resolution of the Cabinet of Ministers of Ukraine No. 1548 dated 25.12.1996»);
2. free provision of long-term storage food and sanitary products to the population, in particular in regions where active hostilities are ongoing (Resolution of the Cabinet of Ministers of Ukraine No. 328 of 20.03.2022 «Some issues of providing the population with long-term storage food and sanitary products under martial law»). These products include: flour; cereals; pasta; sunflower oil; canned meat, fish, and legumes; sugar; milk or its substitute; bakery and confectionery products; tea and coffee. The Resolution sets the norm of each product per person per month;
3. carry out public procurement of socially important products during martial law, the list of which is constantly updated (Order of the Ministry of Agrarian Policy of Ukraine No. 147 «List of Food Products for Public Procurement to Meet the Urgent Needs of the State Functioning under Martial Law» dated 04.03.2022). Procurement is carried out exclusively from suppliers included in the list approved by the Order of the Ministry of Agrarian Policy of Ukraine No. 148 dated 05.03.2022;
4. The National Food Security Platform [1] was created on the basis of the State Service of Ukraine for Food Safety and Consumer Protection to unite the

efforts of military administrations, food producers, retailers, and international organizations to provide food and essential goods to residents of communities, members of the Armed Forces of Ukraine, and territorial defense. The online platform allows users to quickly access up-to-date information on the real needs and offers of certain goods, instantly contact the buyer or supplier, and order transportation services. The platform currently unites 50 military administrations and 410 city and territorial communities. In total, more than 4,1 thousand users have joined the platform.

Source: Source: generalized by the author based on [52].

To address the issues of agricultural logistics, the Coordination Council for Logistics in Agriculture was established (Resolution of the Cabinet of Ministers of Ukraine No. 427 of April 9, 2022 «On the Establishment of the Coordination Council for Logistics in Agriculture»). The main tasks of the Council are to facilitate coordination of actions of ministries, other central executive authorities, and local state administrations in the field of transit potential and logistics development.

Table 3.5

### Main tasks of the Coordination Council for Logistics in Agriculture

1.	formation and implementation of state policy in the field of transport, road infrastructure, transit potential and logistics;
2.	determining the mechanism for improving the quality of transport and information technologies of the logistics infrastructure;
3.	improvement of transportation logistics;
4.	improving the efficiency of state control procedures for the movement of goods and vehicles across the state border;
5.	reducing the cost of international and domestic transportation of goods;
6.	improving the monitoring of international transportation;
7.	reducing the time for transportation of goods to their destination;
8.	providing qualified personnel for the logistics infrastructure;

- |     |   |
|-----|---|
| 9.  | identifying ways and mechanisms to address problematic issues that arise in the implementation of state policy in the field of transport, road infrastructure, transit potential and logistics;                                 |
| 10. | improvement of the regulatory framework on transport, road economy, state customs and taxation, state control over the movement of goods and vehicles across the state border and other issues within the Council's competence. |
- Source: Source: Source: generalized by the author on the basis of [53].

These areas of state support will help to create conditions for the functioning of the agricultural sector of the Ukrainian economy in wartime. In order to establish relationships with agricultural producers, conduct a detailed analysis of the situation in the country and, if necessary, support from international partners, an agricultural platform was launched that records the current needs of farmers in real time <https://agrostatus.org/> and an online platform was created to improve the logistics routes of farmers during martial law.

However, it is worth paying attention to the need to address a number of other related issues caused by the military aggression against Ukraine, including disruption of supply chains, energy supply problems, forced evacuation of citizens, the introduction of martial law and the need to book agricultural workers, critical infrastructure, contamination of agricultural land with ammunition, demining, search and establishment of new channels for the sale of agricultural products.

### **3.2. Directions for ensuring grain export logistics from Ukraine in the context of limited logistics capabilities**

As a result of Russia's full-scale aggression, blocking of Ukraine's regions and ports, agricultural enterprises are facing problems with exporting products that threaten the world's food security. The forced logistics of agricultural exports to look for new ways to move outside the country. There was a need at the state level to seek help and

support from the international community and the capabilities of European logistics. In the pre-war period, there was a sharp dissonance between the productivity of crop production, grain logistics, and the need to fulfill export agreements for the supply of various types of products to foreign buyers.

The geography of Ukrainian agricultural supply is quite wide and involves cooperation with partners in more than 180 countries. This includes China and India. Egypt, Saudi Arabia, and Iran are the top exporters of grain. Turkey and the European Union account for a significant share of exports [55].

Ukraine is facing problems in supplying these countries, primarily with grain crops. Currently, the largest channels for exporting agricultural products from Ukraine are border crossings to the European Union. Agricultural products are shipped primarily through land railroad crossings on Ukraine's border with Poland, Romania, Slovakia, and the Baltic states.

Traditionally, the lion's share of Ukraine's gross grain harvest has been exported, and over the past 3 seasons the share of exports has fluctuated between 70-73%, while the share of the harvest required for domestic needs has not exceeded 30%. A significant advantage of exports over domestic demand is typical for major grains such as wheat and corn, while the opposite trend is observed for niche crops, and in the barley segment, the share of exports slightly exceeds its domestic consumption.

It should be noted that before Russia's military invasion, Ukraine realized 95% of its barley export potential (estimated at 6.0 million tons in February 2022), 81% of wheat (22,5 million tons), and 60% of corn (30,0 million tons).

At the outbreak of the war, the Ukrainian government imposed a ban on the export of certain grain crops, such as oats, millet, buckwheat and rye, to ensure the country's food security during martial law, and introduced mandatory licensing for wheat and corn exports. This procedure was subsequently canceled for corn at the request of market participants due to a significant excess of the grain harvest over domestic demand and expectations.

record high transitional crop residues at the end of 2021/2022 against the background of limited opportunities for further realization of its export potential [56].

Currently, three types of grain logistics are common in Ukraine: rail, water and road transport. Their choice depends on the distance and final point of transportation. Rail transport holds the leading position, but in recent years we have seen a shift to road transport. The river method has the smallest share in the overall structure of grain logistics.

In the railroad transportation of grain, there is a shortage of special grain cars, especially during the harvest of certain crops. "Ukrzaliznytsia claims to be able to transport up to 47 million tons. This applies to both its delivery to sea and river ports and transportation to neighboring countries. During martial law, the demand for rail transportation increased significantly. Nowadays, there is a large transportation load and a shortage of railcars, which is why many agricultural producers and grain traders have faced problems with grain export logistics to the European Union [57].

Thus, there are six rail border crossings for grain exports from Ukraine to the EU countries: Izov - Hrubeshiv, Mostiska - Medyka, and Yahodyn - Dorohusk on the border with Poland; Vadul Siret - Domesti on the border with Romania; Chop - Cierna nad Tisou on the border with Slovakia, and Chop - Záhony on the border with Hungary. Their total daily throughput is 534 grain cars. In the current environment, the load on railroad logistics from Ukraine has increased significantly, and the capacity of railroad border crossings is significantly inferior to that of port infrastructure. Therefore, the Ukrainian rail way system and the railways of neighboring countries need time to adapt to the sharp increase in the volume of Ukrainian cargo transportation [59].

There are a number of technical challenges to developing alternative routes. For example, the double change of bogies to wagons during delivery to Baltic ports, dimensional restrictions when moving through the European Union, which make it unacceptable to use Ukrainian wagons at certain transshipment areas of the EU rail infrastructure.

This applies to both its delivery to sea and river ports and transportation to neighboring countries. It is worth noting that, according to experts, only 55-60% of the available potential for transportation of goods across the western border is used by cross-border transportation, which is due to a number of factors, such as: uneven use

of border crossings by market participants, lack of foreign carriers rental, limited capacity of certain sections, the need to build new logistics chains in neighboring countries, bureaucratic delays in customs, phytosanitary, veterinary registrations, etc. [58].

However, according to railroad statistics, in March-April 2022, 921,6 thousand tons of corn and 7,0 thousand tons of wheat were shipped. Border crossings loaded 4,9 thsd tonnes of barley for export via land. A significant part of the fleet is made up of domestic grain cars, but they are outdated and require either major repairs or complete write-off.

Recently, more and more market participants have been trying to solve the problem radically by creating their own grain carrier fleet and ordering dozens of them. This approach is quite promising, but it also has a number of problems. First, buying bunkers is a rather complicated and expensive investment. At the same time, it should be borne in mind that the capacity of domestic grain carriers is not unlimited. Secondly, the issues of independence of transportation of private grain cars from elevators to railroads remain not fully agreed upon [60].

In recent years, the practice of loading grain onto railroad platforms using the container method has become increasingly widespread. That is, the logistics of grain in special, most often 20-ton containers. This approach also has a number of advantages and disadvantages. On the one hand, transportation of grain in containers to foreign buyers guarantees product quality, provides ease of handling, and makes it possible to clearly separate different batches of products.

The use of grain containers makes it possible to partially eliminate the shortage of hopper cars and the huge problem of transporting crops by road. On the other hand, not all elevators have the technical capacity to load grain into containers. According to official statistics, containers with agricultural products intended for export contain only 20% of grain [51].

In order to increase the efficiency of rail transport during martial law and ensure grain export logistics, the Prime Ministers of Ukraine and Poland signed a Memorandum on strengthening cooperation in the rail sector. It provides for the

establishment of a joint logistics enterprise between the two countries. An effective mechanism of cooperation between the PKP and Ukrzaliznytsia will increase the volume of railroad traffic transporting Ukrainian exports to the European Union and world markets through the Polish ports of Gdynia and Gdansk, but this requires identifying a list of infrastructure investments and seeking funding sources in the European Union (in the form of grants and financial assistance from the European Commission) for cross-border infrastructure projects [52].

*Risks and areas of support for export logistics of Ukrainian agricultural products.*

The suspension of foreign trade has an extremely negative impact on the country's economy due to the lack of foreign exchange earnings and directly affects Ukrainian farmers, who have significant stocks of raw materials and most of whom remained in a very difficult situation before sowing.

*Internal negative factors affecting the export logistics of grain and the activities of agricultural producers have been identified:*

- rising prices and fuel shortages;
- a significant increase in prices for transshipment of agricultural products;
- bureaucratic delays in customs, phytosanitary, and veterinary registration of products;
- difficulties in obtaining licenses for road carriers to carry out transportation within the EU;
- uneven use of border crossings by market participants, the burden on western border crossings when exporting products;
- long queues at railroad crossings.

Therefore, from the very beginning of the war, the search for and creation of new ways to export Ukrainian products, such as the modernization of existing logistics facilities to the country's western border, was important for both the Ukrainian side and the main importers. As Ukraine borders on the European Union, it is quite logical that the main flow of exports is now directed in this direction, but logistics remains a weak point in the almost well-established sales chain [52].

It is quite clear that it will not be possible to reach the pre-war export volume only through the western border, but it will be possible to unload the domestic infrastructure in a few months and free up warehouses before the new harvest, at least partially.

In addition, it is very important that the European Union and the United Kingdom have canceled all tariff quotas and import duties on Ukrainian products for one year. In the medium and long term, the European Commission will work to increase the infrastructure capacity of new export corridors and establish new infrastructure links as part of Ukraine's reconstruction.

The next stage of the application for funding from the Connecting Europe Facility (CEF). The fund will support projects that improve transport links with Ukraine, including for rail links and rail terminals. Therefore, on May 12, 2022, the European Commission made a decision to sign a high-level Memorandum of Understanding between the European Union and Ukraine on indicative maps of the Trans-European Transport Network (TEN-T) in Ukraine [53].

Under the high-level agreement signed with the European Commission, Ukraine's logistics corridors (railways, roads, waterways) were included in the TEN-T maps.

*Development of grain export logistics is possible in case of*

- unblocking and development of seaports, creation of alternative export routes;
- transformation and full provision of the environment for sustainable economic viability of all agro-industrial complex entities;
- rapid recovery, formation of new economic chains and support for the competitive functioning of the processing industry;
- restoration of safe physical and environmental conditions of land;
- achieving an optimal level of physical and economic food security;
- timely fulfillment of Ukraine's obligations to harmonize national legislation with EU legislation under the Association Agreement.

Thus, Ukraine is one of the key exporters of grain crops to the foreign market, with production far exceeding domestic consumption. However, Russia's full-scale

military invasion of Ukraine has not only disrupted the supply chain of agricultural products to the domestic market, but also to the foreign market, destroying export logistics. As a result, Ukrainian agricultural products cannot be delivered to their destinations on time, which threatens global food security.

The Ukrainian agricultural sector is looking for ways to optimize grain export logistics through alternative destinations [53].

*The main problems faced by producers include:* low capacity of railway stations on the border with European countries; bureaucratic government obstacles in European countries regarding grain imports and certification; restrictions on freight transportation by land; lack of sufficient European railcars for grain transportation; capacity constraints of European logistics centers; lack of drivers for international road transportation, etc.

The main obstacle during martial law is the lack of a stable material and technical base that can ensure the required volumes of grain exports. However, the Government of Ukraine and the international community are implementing various support programs to stabilize grain export logistics through cooperation in rail and road transportation, using the potential of small rivers, and delivering products to seaports in the European Union.

All these steps can save Ukraine's grain exports and, accordingly, preserve the financial stability of agricultural producers and the country, which is extremely important for defeating the aggressor and ensuring the world's food security.

## CONCLUSIONS

1. International trade as a factor of economic development has played and continues to play an important role in the formation and further development of the world economy, and is an integral part of international relations and global economic development, and its economic, social and political significance will only grow.

2. The export potential is inherent in economic entities of all levels - an enterprise, industry or type of activity, a region within a country, a national economy, a grouping of several states - that realize this potential through the development of foreign trade, primarily exports. In other words, the country's export potential consists of the export potentials of individual industries, primarily industry as the most important producer of finished goods, and the export potential of an industry consists of the export potentials of individual enterprises. Export potential is objectively related to the competitiveness of products intended for sale on the world market.

3. Over the past decade, Ukraine has been a leader in the rankings of the world's major grain producers and exporters (corn, wheat, barley). However, in 2022, the Russian invasion of our country led to negative consequences and risks for the grain industry. In particular, the sown areas for the upcoming harvest have decreased due to mining, occupation and hostilities in the south and east of the country; prices and, consequently, income of grain producers have decreased due to rising fuel costs and disruption of logistics chains; Ukraine's export opportunities have decreased due to Russia's blockade of the Black Sea ports. The situation in our country has a direct impact on the global grain market and may cause famine in many countries in Asia and Africa. Therefore, the current challenges to the development and stabilization of the grain market in Ukraine should be addressed by the joint efforts of the international community and include the following measures:

4. State support for grain producers: providing free assistance and soft loans to rebuild grain storage facilities, purchase seeds and fuel and lubricants, buying grain at economically reasonable prices.

5. Implementation of measures not only for grain production but also for grain processing, thereby providing the population with jobs and additional revenues to the country's budget. In addition, it will be possible to move from being a raw material exporter to an exporter of finished products.

6. Production of grain types that are efficient and environmentally friendly will reduce the burden on soils and increase the use of biological plants for the needs of grain producers and the population.

Mine clearance of the territory of Ukraine as soon as possible to allow for a safe start of the spring sowing campaign.

7. The development of grain export logistics is possible in the case of:

- unblocking and development of seaports, creation of alternative export routes;
- transformation and full provision of the environment for sustainable economic viability of all agro-industrial complex entities;

- rapid recovery, formation of new economic chains and support for the competitive functioning of the processing industry;

- restoration of safe physical and environmental conditions of land;

- achieving an optimal level of physical and economic food security;

- timely fulfillment of Ukraine's obligations to harmonize national legislation with EU legislation under the Association Agreement.

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