



CONDITIONS AND CHALLENGES IN WHEAT, BARLEY AND CORN PRODUCTION IN REPUBLIC OF NORTH MACEDONIA IN THE PERIOD DURING THE NEW WORLD ECONOMIC CRISIS

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Abstract

Wheat, barley and corn are the most common cereals in crop production in Republic of North Macedonia. In 2021, 243,676 tons of wheat, 151,600 tons of barley and 130,769 tons of corn were produced. The other cereal species, like rye, rice and oats are produced in much smaller quantities. The total production of wheat, barley and corn grain in 2021 was 526,045 tons. The average production for the three-year period (2019/21) of grain from these crops was 529 956 tons.

The production obtained from these grains does not satisfy the domestic need and demand. Wheat is dominant and strategic cereal crop, followed by barley and corn. The domestic production meets about 55 to 60% of needs. The remaining amount is still provided by imports. In order to overcome these conditions and become import-independent for wheat, barley and corn grain, it is necessary to take certain bolder steps in the organizational part of production.

Key words: *production, cereals, yield, crops, grain, measures*

INTRODUCTION

Cereal crops are very important group of agricultural crops (Vasilevski, 2004). Cereal plants have many uses for human nutrition, domestic animals and the processing industry (Ilievski, 2014). The production of wheat, barley and corn grain does not meet the need in Republic of North Macedonia, although they have a strategic importance in production and are the most common crops grown in our country. These conditions are the result of a number of inconsistencies in production, such as:

- using uncertified seed material,
- inappropriate fertilization according to the requirements of cereal crops,
- fertilization with insufficient amounts of fertilizers;
- impossibility of interventional irrigation in critical phenophases of the growth and development of cereal plants as a result of outdated or non-functional irrigation

systems;

- use of old and inappropriate machinery in production;
- poor application of plant protection products during production, etc.

The soil and climate conditions of the region, as well as the degree of the agricultural technology used, greatly affect the achievement of high and stable production.

Of the total agricultural area in Republic of North Macedonia (1,263,000 ha), 40.46% is arable land (511,579 ha). Almost 81% of the arable land is used for agricultural production, of which 38.98% or 160,988 ha are with cereal crops. There are small differences in the achieved average yields of wheat, barley and maize between agricultural enterprises and family farms (State statistics office of the Republic of Macedonia (2012/07)). Wheat is in first place by area of all cereal crops.

Natural conditions for cereal plant production

The natural conditions in Republic of North Macedonia provide the opportunity for the cultivation of all cereal crops. At the same time, winter forms of grain withstand much lower temperatures compared to spring ones (Ilievski, 2014). In the case of winter forms, the optimum for spending the first vegetation period is from 0 to 15°C. In the later period of development, and especially in the phase of formation of the generative organs and flowering, they need higher temperatures, with an optimum of 16 to 22°C (Jevtić, 1992). The most resistant cereal crops to low temperatures are rye and wheat. They tolerate from -20 to -25°C without a snow cover, and maybe more (Ilievski, 2014). The most resistant to low temperatures are the winter forms of grain in the tillering phenophase. Millet, sorghum, rice and buckwheat can hardly tolerate temperatures below 0°C, while corn in the phenophase of germination tolerates negative temperatures from -2 to -3°C. Cereal

crops have a great need for water and can hardly bear the lack of it (Ilievski, 2014). One of the main problems in the production of cereal crops is precisely this factor. The most sensitive to lack of water are oats and rye, followed by wheat and barley, in the phenophases of grain filling and milk maturity.

Cereals are mostly grown on all soil types. According to the reaction of the soil solution, the cereals are divided into two groups: cereals that normally grow and vegetate at a neutral or slightly acidic reaction (pH 6-7): wheat, barley and corn; and cereals that tolerate a wider pH interval value: rye, oats, millet and buckwheat (Jevtić, 1992).

Wheat production in Republic of North Macedonia

Table 1 provides data on the representation, yield and realized production of wheat in the 2019, 2020 and 2021 production years and the average for the three-year period.

Table 1. Wheat production on agricultural arable land in Republic of North Macedonia 2019-2021.

Year	Area (ha)	Yield (kg/ha)	Production (t)
2019	68 959	3 485	239 916
2020	69 902	3 527	246 031
2021	70 515	3 463	243 676
Average 2019/21	69 702	3 492	243 208

Data in Table 1 show that the areas with wheat are constant, with small oscillations from year to year, but the data on the average yield per unit area show a tendency to increase.

Representation of high-yielding varieties and sowing quality seed material is one of the main factors for achieving high wheat yields (Georgievski et al., 2004/2005).

The average production of wheat grain for the three-year period is 243 208 tons. This

amount meets about 55 to 60% of needs. The remaining quantity is still provided by imports.

Barley production in Republic of North Macedonia

Table 2 provides data on the representation, yield and realized production of barley in the production years 2019, 2020 and 2021 and the average for the three-year period.

Table 2. Barley production on agricultural arable land in Republic of North Macedonia 2019-2021.

Year	Area (ha)	Yield (kg/ha)	Production (t)
2019	44 098	3 151	138 453
2020	45 011	3 283	147 711
2021	47 890	3 179	151 600
Average 2019/21	45 667	3 204	145 835

Data in Table 2 show that the areas with barley and the total production tend to increase slightly from year to year. The average

production of barley is 145 835 tons for the three-year period (2019/21).

Corn production in Republic of North Macedonia

Table 3 provides data on the representation,

yield and realized production of corn in the production years 2019, 2020 and 2021 and the average for the three-year period.

Table 3. Corn production on agricultural arable land in Republic of North Macedonia 2019-2021.

Year	Area (ha)	Yield (kg/ha)	Production (t)
2019	34 123	4 277	145 528
2020	32 013	4 589	146 434
2021	30 425	4 327	130 769
Average 2019/21	32 187	4 398	140 910

The data show that the areas under corn are decreasing from year to year, but the data for the average yield per unit area is constantly above 4000 kg/ha. The average corn grain production for the three-year period is 140,910 tons. Maize is produced on an area of 32 187 hectares with an average yield of about 4 398 kg/ha.

Total grain production of wheat, barley and corn

Table 4 provides data on the total production in tons of wheat, barley and corn for the years 2019, 2020 and 2021 and the three-year average.

Table 4. Total production of wheat, barley and corn in Republic of North Macedonia 2019-2021.

Year	Wheat (t)	Barley (t)	Corn (t)	Total (t)
2019	239 916	138 453	145 278	523 647
2020	246 031	147 711	146 434	540 176
2021	243 676	151 600	130 769	526 045
Average 2019/21	243 207	145 835	140 910	529 956

From the data in Table 4, it can be stated that Republic of North Macedonia produced an average of 243,208 tons of wheat, 145,835 tons of barley and 140,910 tons of corn for the period 2019/2021. The largest total grain production of these three cereal crops in the year 2020, amounts to 540,176 tons. In 2021, there is a slight decrease in the amount of production achieved, compared to the previous year.

Recommendations and measures for the improvement of cereal crops production Republic of Macedonia

Cereal crops production in the period of the new world economic crisis does not satisfy the domestic demand, although they have a strategic importance and are the most represented crops in plant production in our country. Domestic production meets about 55 to 60% of needs. The remaining quantity is still provided by imports.

In order to overcome these conditions and become market independent for cereal grains, it is necessary to take certain bolder steps in the organization of production. One

of the possibilities is to increase the areas with cereal crops. But in such market conditions, realistically, it is more difficult to do. Another possibility is to increase the average yield per unit area of all cereal crops. The realization of the second possibility requires a series of steps that must be followed and implemented.

Those steps are as follows:

1. Use of certified seed material by all producers;
2. Timely and sufficient amount of fertilizers for plant nutrition according to the needs of the crops and the soil conditions of the agricultural plots;
3. Precise nutrition of the crops in appropriate organogenetic stages to increase the generative organs in the grain, and thus the yield;
4. Alleviation of dry periods in the critical phenophases of the growth and development of cereal plants with interevent irrigation, especially in the phenophases of filling and ripening of the grain;

5. State investments in the improvement of obsolete and ineffective irrigation systems and the construction of new agroameliorative systems;
 6. Support and investment in small and medium-sized farms and family producers for the purchase of new and appropriate machinery;
 7. Increased and improved use of plant protection products;
 8. Increased support in the area of subsidies for strategic cereal crops;
- Agrotechnical measures, with which application higher yields can be achieved, among others, are: correct selection of the

pre-crop; growing in crop rotation; avoiding cultivation in monoculture and pre-crops that are harvested late and make it impossible to adhere to the optimal sowing dates; correct selection of varieties; quality tillage; use of optimal amounts of seed per sowing unit; harmonizing additional plant nutrition with natural soil fertility; breeding genotypes resistant to pests, diseases and weeds etc (Glemočlija, 2004).

These moments are not fully observed in the production of cereal crops in Republic of North Macedonia, which leads to a direct decrease in average yields per unit area.

CONCLUDING REMARKS

Based on the above, the following conclusions and findings can be drawn:

- The cereal crops production in Republic of North Macedonia (2019/21) is realized with the production of wheat grain (243 207t), barley (145 835 t) and corn (140 910 t).
- Rye, rice and oats are produced in much smaller quantities.
- Of the total agricultural area in Republic of North Macedonia (1,263,000 ha), 40.46% is arable land (511,579 ha). Almost 81% of the arable land is used for agricultural production, of which 38.98% or 160,988 ha are with cereal crops.
- The differences in average yields achieved between agricultural enterprises and cooperatives and family farms are small.
- The cereal crops production in the period of economic crisis does not satisfy the domestic demand, although they have a strategic importance and are the most represented crops in plant production in our country.
- Domestic production meets about 55 to 60% of needs. The remaining quantity is still provided by imports.
- To achieve a higher and stable production to a large extent in addition to the soil and climate conditions of the region, it is necessary to improve the degree of applied agricultural technology.
- In order to overcome the dependence on wheat, barley and corn grain imports, all efforts and measures should be aimed at increasing the average yield per unit area.

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СОСТОЈБИ И ПРЕДИЗВИЦИ ВО ПРОИЗВОДСТВОТО НА ПЧЕНИЦА, ЈАЧМЕН И ПЧЕНКА ВО РЕПУБЛИКА МАКЕДОНИЈА ВО ПЕРИОДОТ НА НОВАТА СВЕТСКА ЕКОНОМСКА КРИЗА

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Резиме

Пченицата, јачменот и пченката се најзастапени житни култури во растителното производство во Република Македонија. Во 2021 година се произведени 243 676 тони пченица, 151 600 тони јачмен и 130 769 тони пченка. Од останатите видови житарки, како на пример 'ржта, оризот и овесот, се произведуваат во многу помали количини. Вкупното производство на зрно од пченица, јачмен и пченка во 2021 година изнесува 526 045 тони. Просечното производство за тригодишниот период (2019-2021 година) на зрно од овие култури е 529 956 тони.

Добиеното производство од овие жита не ја задоволува домашната потреба и побарувачка. Пченицата е доминантна и стратешка житна култура, потоа следат јачменот и пченката. Домашното производство задоволува околу 55 до 60% од потребите. Останатата количина сè уште се обезбедува со увоз. За да се надминат овие состојби и да станеме увозно независни за зрно од пченица, јачмен и пченка, потребно е да се направат одредени посмели чекори во организацискиот дел на производството.

Клучни зборови: производство, жита, принос, површина, култури, зрно, мерки