

CORN PRODUCTION IN R. MACEDONIA AND POSSIBILITIES FOR IT'S CULTIVATION WITHOUT INTERVENTIONAL IRRIGATION

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ABSTRACT

Corn is an annual plant from the sub-group of millet grains. In Macedonia, there are relatively good soil and climate conditions for its production. It is the third cereal crop in terms of representation on arable land, after wheat and barley. In 2021, 130 769 tons of corn were produced. The total annual production of wheat, barley and corn grain in 2021 was 526 045 tons. Of the other cereal plants, rye, rice and oats are produced in much smaller quantities. These quantities of domestically produced corn do not meet domestic demand.

Taking into account the agrotechnical measures applied in the production of corn and the soil-climatic conditions that prevail in Macedonia, this article gives a special review of the problems faced by this production, as well as the possibilities and measures for its production without interventional irrigation.

Key words: *Zea mays*, yield, measures, irrigation, grain

1. Introduction

Cereal crops are a very significant group of field crops (Vasilevski, 2004). Corn has many uses for human nutrition, domestic animals and the processing industry. The realization of high and stable production of corn is largely influenced by the soil and climate conditions of the region, as well as the degree of agricultural technology used. The quantities of corn produced do not meet the needs in R. Macedonia, although it is the third cereal crop in terms of representation per area on which it is produced.

In relation to the average yield of other cereal crops grown in R. Macedonia, corn and rice have a significantly higher yield that approaches the regional and European averages. These situations are the result of improved agrotechnical measures in corn production, such as: using certified seed material of a hybrid nature, fertilization with satisfactory amounts of fertilizers, timely feeding of the crops at an appropriate stage of the organogenetic development of the plant, use of more modern machinery in the production process, etc.

2. Natural conditions for corn production in R. Macedonia

The natural conditions in the Republic of Macedonia provide the opportunity for the cultivation of all cereal plants. Millet grains are very sensitive to low temperatures. Corn in the phenophase of sprouting tolerates negative temperatures from -2 to -3°C. Corn, despite being a millet grain plant, due to the large habitus it forms, still has a relatively high need for water and its lack is hard to bear, especially in the phenophase of fertilization, pouring and ripening of the grain. One of the main problems in the production of cereal plants, including corn, is precisely this factor.

Cereals are mostly grown on all soil types. According to the reaction of the soil solution, cereal plants are divided into two groups: cereal plants that normally grow and vegetate at a neutral or slightly acidic reaction (pH 6-7), like wheat, barley and corn, and cereal plants that tolerate a wider pH interval value, like rye, oats, millet and buckwheat (<http://makstat.stat.gov.mk/>). Regarding the soil, it should be emphasized the great heterogeneity of the soil types found in the territory of Macedonia and the diversity in terms of fertility and other characteristics of such soils. In this regard, we need consistency in soil fertility tests, all with the aim of proper nutrition of this crop.

3. Corn production in R. Macedonia

Table 1 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 1. Corn production (<http://makstat.stat.gov.mk/>)

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



From the data it can be seen that the areas under corn have a tendency to decrease from year to year, but the data for the average yield per unit area at the republic level are constant and amount to over 4000 kg/ha. The average corn grain production for the three-year period is 140,910 tons. This amount is not enough for the needs of R. Macedonia, so about 20-25% is imported from the world market. In these three production years, corn was produced on an average area of 32,187 ha, with an average three-year yield of 4.4 t/ha.

4. Recommendations and measures for the improvement of production with corn in R. Macedonia

Corn production in the last three-year period does not satisfy domestic demand, although it is the third cereal crop in terms of representation in crop production in our country. Domestic production meets about 75 to 80% of needs. The remaining quantity is still provided by imports.

In order to overcome these conditions and become market independent for corn grain, it is necessary to take certain bolder steps in the organization of production. One of the possibilities is to increase the areas with this cereal plant. But in such market conditions, realistically, that is also more difficult to do.

Another possibility is to increase the average yield per unit area. The realization of the second possibility requires a series of steps that must be followed and implemented.

Those steps are as follows:

1. Alleviation of dry periods in the critical phenophases of the growth and development of corn with intervening irrigation, especially in the phenophases fertilization, filling and ripening of the grain;
2. State investments in the improvement of outdated and non-functional irrigation systems and the construction of new agro-ameliorative systems, use of the drip irrigation system;
3. Increased and improved application of means for plant protection;
4. 4. Increased support in the area of subsidies for the production of this crop;
5. Development of measures for corn production in conditions without interventional irrigation, etc.

Agrotechnical measures, with the application of which higher yields can be achieved, among others, are the correct selection of the pre-crop, cultivation in crop rotation and avoidance of cultivation in monoculture, correct selection of hybrids with appropriate length of vegetation, quality tillage, use of optimal seed quantities, matching additional plant nutrition with natural soil fertility, breeding pest, disease and weed resistant genotypes and more (Glemoćlija, 2004).

Conclusions

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

- Corn production in the Republic of Macedonia (2019/21) amounts to 140,910 tons of grain.
- The differences in average yields achieved between agricultural enterprises and cooperatives and family farms are small.
- Domestic production meets about 75 to 80% of needs. The remaining quantity is still provided by imports.
- In order 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 the import of corn grain, all efforts and measures should be aimed at increasing the average yield per unit area.
- Corn production without intervening irrigation carries a certain degree of risk in cultivation.
- The proposed measures are an option and opportunity for areas that do not have real possibilities for intervention irrigation in critical phenophases of the growth and development of corn.

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