**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

# THE INFLUENCE OF SOWING DATE ON PRODUCTIVITY ELEMENTS AND PRODUCTION IN CORN GROWN ON CHERNOZEM

**Iulia Oana Ştefan [1], Ramona Aida Păunescu [2*], Liliana Ciulu [3], Aurel Liviu Olaru [2]**

[1]University of Craiova, Doctoral School of Animal and Plant Resources Engineering (IRAV), 13 A.I. Cuza Street, Craiova, Romania
[2]University of Craiova, Faculty of Agronomy, Department of Agricultural and Forestry Technologies, 19 Libertatii Street, Craiova, Romania
[3]Corteva Agriscience Romania, 42-44, Soseaua Bucureşti-Ploieşti Street, Bucharest, Romania

Current Trends in Natural Sciences

***Abstract***
*The most important stage in the life cycle of any plant is emergence. Only after that can it be said that it has a chance to reach maturity and produce. A bifactorial experience: factor A – hybrid with 6 graduations: P 8834, P9398, P9889, P9944, P0450, P0710) and factor B – sowing time – with 2 graduations: 27.03.2024 and 16.04.2024, was placed on the chernozem of Caracal, in 2024. The hybrids were grouped in pairs and are part of three FAO groups (300-350, 350-450, and 450-500). The aim of the paper was to establish the influence of the sowing date on the elements of productivity and production.*
*In 2024, yields were extremely low (maximum 2600 kg/ha) but above the average yields obtained in Oltenia (500-800 kg/ha). While the hybrids of the FAO 300-350 group obtained higher yields by approximately 500 kg/ha in the first period, the hybrids in the following groups obtained lower yields by 500-550 kg/ha, and 230 kg/ha respectively, compared to the second period. Regardless of the hybrid, yields are almost identical at the two sowing dates.*

*Keywords: chernozem, corn, Corteva hybrids, production, sowing season.*

## 1. INTRODUCTION

Maize (*Zea mays* L.) is the most extensively cultivated cereal crop in Romania and one of the major staples worldwide, occupying approximately 244 million ha globally (Dhakal et al., 2022; Erenstein et al., 2022). As a species with wide adaptability and high nutritional value, maize plays an essential role in ensuring global food security (Rădoi et al., 2022; Zhai et al., 2022). In Romania, its agronomic and economic importance is constantly emphasized by the increasing variability of climatic conditions that directly affect crop productivity (Dragomir et al., 2022).
Among the numerous factors influencing maize yield, the sowing date represents one of the most decisive agronomic parameters. It determines the synchronization between the plant's phenological stages and environmental conditions, thereby influencing emergence, vegetative growth, and reproductive success (Bassetti & Westgate, 1993; Al-Darby & Lowery, 1987; Amgain, 2015). Germination and seedling emergence depend heavily on soil temperature and moisture; kernels typically absorb about 35% of their weight in water to initiate germination (Vâtcă et al., 2021;


*Corresponding author, E-mail address: aida.paunescu@yahoo.com

**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line) Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-953X ISSN: 2284-9521
ISSN-L: 2284-9521 ISSN-L: 2284-9521

Domokos et al., 2024). Consequently, correct water management and optimal thermal conditions are essential for establishing uniform stands.
Delays in sowing shorten the crop growth period and expose plants to high-temperature stress during the reproductive phase. Early sowing, conversely, may result in reduced plant density and uneven emergence when temperatures remain below optimal thresholds. Several studies have shown that delayed sowing reduces grain weight, kernel number per ear, and ear length (Beiragi et al., 2011; Zhai et al., 2022), although it can mitigate risks associated with early-season frosts or excessive soil moisture.
Agronomic practice recommends initiating sowing once soil temperature at 10 cm depth reaches 10 °C and shows a stable upward trend. Optimal emergence is achieved when temperatures remain above 15 °C. Early sowing is often used to avoid heat and drought stress during anthesis and silking, which can severely affect yield formation (Dragomir et al., 2022). Conversely, Li et al. (2018) observed that grain dehydration is faster in early-maturing hybrids than in later ones, particularly under delayed sowing.
Climate change further accentuates the need to adjust crop calendars and technologies. According to Babel and Turyatunga (2015), maize yield may increase by nearly 18% when sowing is advanced by about two weeks compared to the traditional calendar. Similarly, Bonciu (2019, 2023) highlighted that modern biotechnology and genomics approaches are critical to developing maize hybrids resilient to abiotic and biotic stress factors. Genetic improvement and optimized sowing schedules represent complementary strategies for maintaining productivity and quality under variable conditions (De Souza & Bonciu, 2022a, 2022b; Roșculete et al., 2018).
The present study aimed to quantify the influence of sowing date on maize yield and its main components under the specific soil and climatic conditions of Caracal, Romania. Understanding how different hybrids respond to early versus late sowing provides valuable insights for farmers and researchers seeking to enhance maize performance on chernozem soils.

## 2. MATERIALS AND METHODS

A bifactorial experiment: factor A – hybrid with 6 graduations: P 8834, P9398, P9889, P9944, P0450, P0710 and factor B – sowing time – with 2 graduations: 27.03.2024 and 16.04.2024, was placed on the chernozem of Caracal in 2024. The hybrids were grouped in pairs and are part of three FAO groups (300-350 – first and second hybrid, 350-450 – third and fourth hybrid, 450-500 – fifth and sixth hybrid).
The following were determined: production, yield, 1000-grain weight and cob length. The influence of sowing time and the hybrid x sowing time interaction on the previously mentioned productivity elements and on production was established.
The interpretation of the results was also done by reporting to the three FAO groups. The limit differences were calculated according to Săulescu and Săulescu (1965) through the PS2 program for bifactorial experiments.
The climatic conditions at Caracal for the testing year were not favorable for the corn crop.

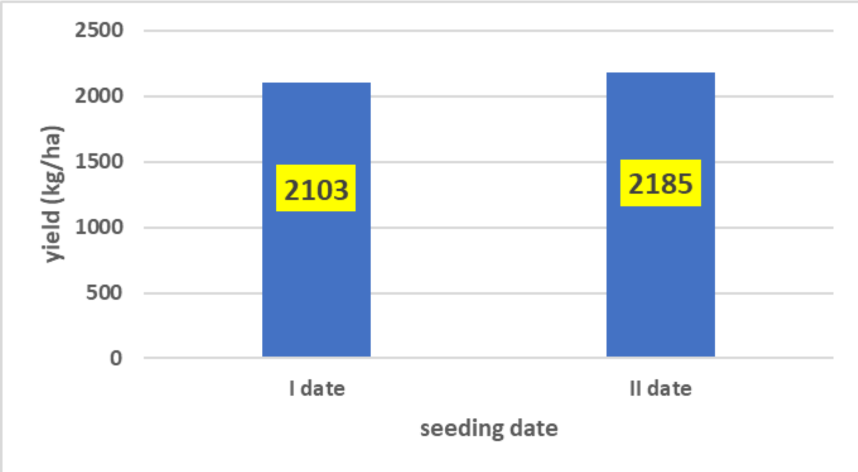
## 3. RESULTS AND DISCUSSIONS

In 2024, production was extremely low (maximum 2600 kg/ha) but above the average production levels obtained in Oltenia (500-800 kg/ha). Regardless of the hybrid, although production seems close


*Corresponding author, E-mail address: aida.paunescu@yahoo.com

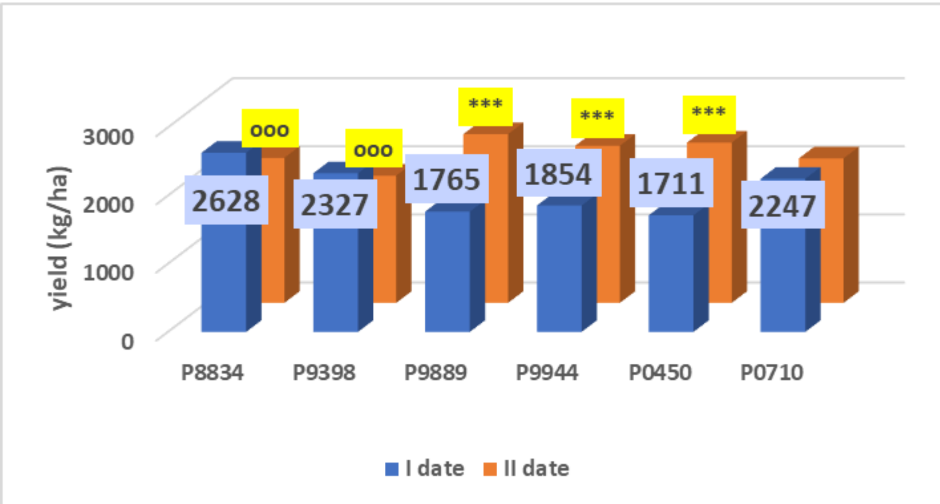
**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

at the two sowing dates, the later period showed a significant increase in production of 82 kg/ha (Figure 1).



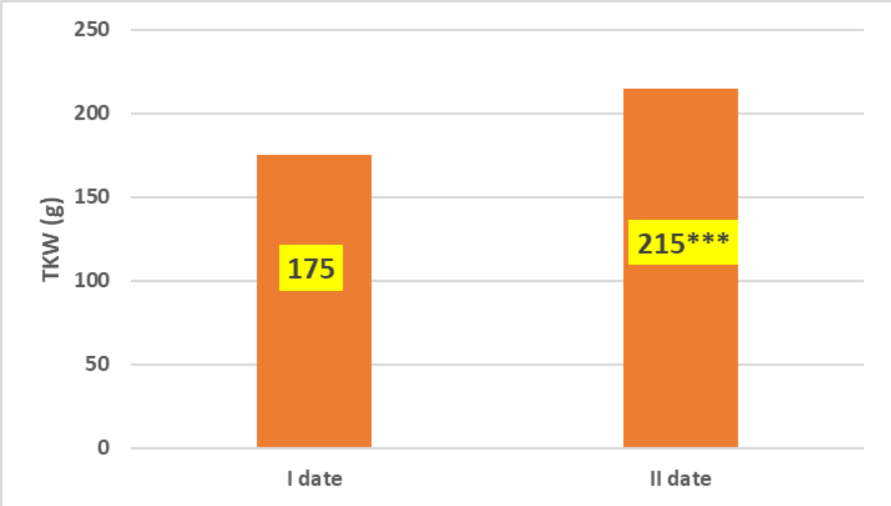

LD 5% = 68 kg/ha; LD 1% = 95 kg/ha; LD 0.1% = 135 kg/ha
***Figure 1. The influence of sowing date on production***

In corn hybrids from the FAO 300-350 group, delayed sowing resulted in very significantly lower yields of about 500 kg/ha. The hybrids in the 350-450 group achieved very significantly higher yields at the second sowing date. The hybrids in the 500 group had a differentiated but favorable behavior also due to delayed sowing (Figure 2). Both sowing date and the hybrid x sowing date interaction influenced 1000-grain mass. Sowing in mid-April led to a very significant increase in this trait (Figure 3).




LD 5% = 167 kg/ha; LD 1% = 234 kg/ha; LD 0.1% = 330 kg/ha
***Figure 2. Influence of hybrid x sowing date interaction on production***

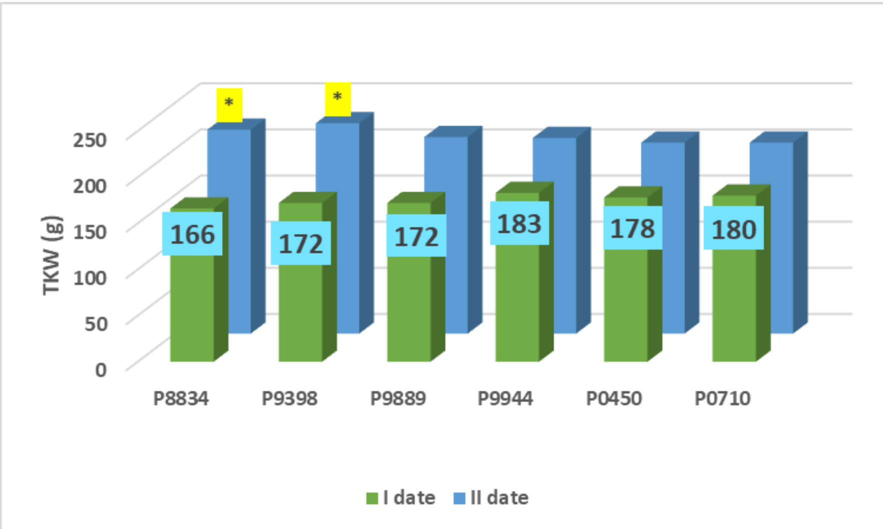

*Corresponding author, E-mail address: aida.paunescu@yahoo.com




LD 5% = 17 g; LD 1% = 24 g; LD 0.1% = 34 g

***Figure 3. Influence of sowing date on the mass of 1000 grains***

The hybrid x sowing date interaction revealed that hybrids in the FAO 300-350 group showed a significant increase in 1000-grain mass when sowing was done on the second date (Figure 4). The yield, which shows us how much of the weight of an ear is represented by grains, was very significantly lower when sowing was carried out in mid-April, regardless of the hybrids tested (Figure 5). In turn, the analyzed interaction showed the influence it had on the P 9889 and 0450 hybrids on yield, when they were sown later (Figure 6).

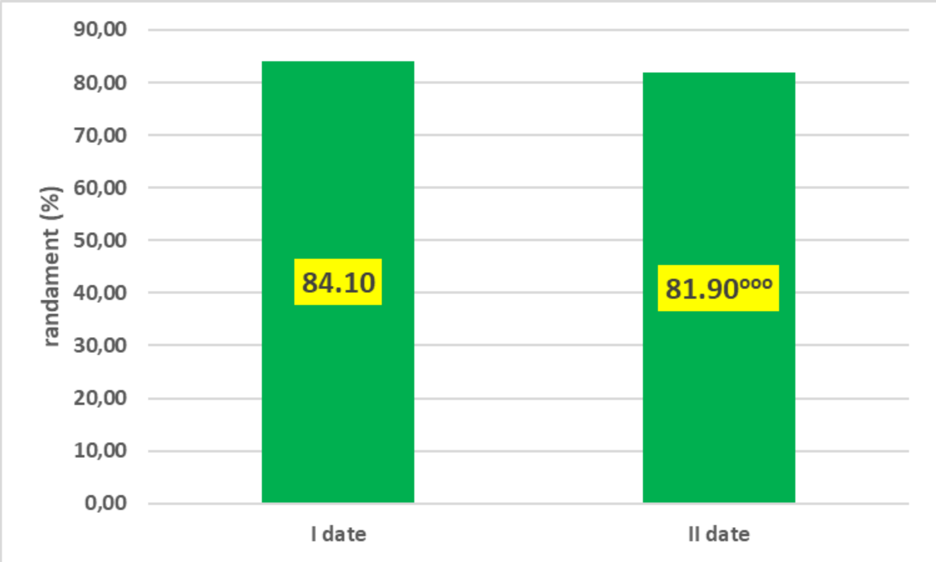



LD 5% = 43 g ; LD 1% = 59 g; LD 0.1% = 84 g

***Figure 4. Influence of hybrid x sowing date interaction on 1000 grain mass***

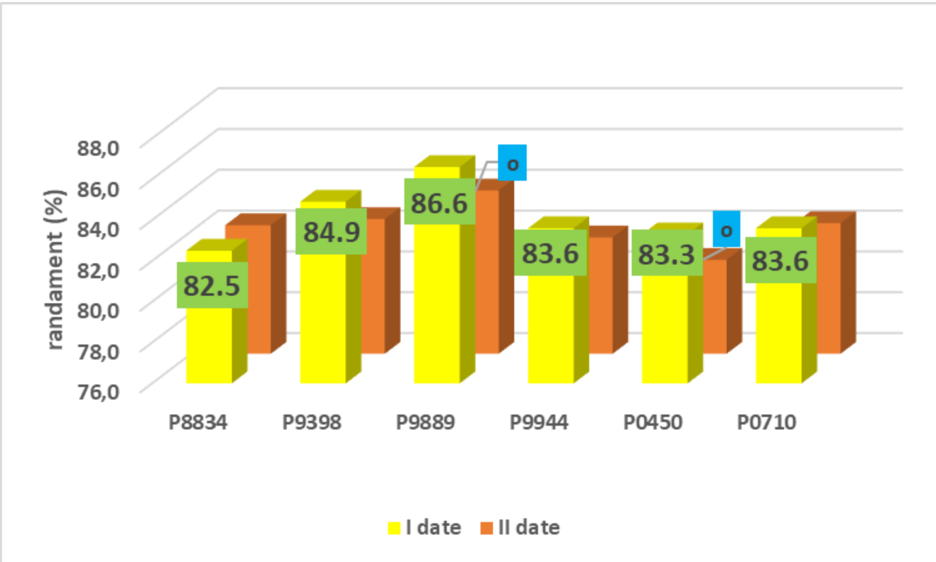

*Corresponding author, E-mail address: aida.paunescu@yahoo.com

**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line) ISSN: 2284-953X ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom) ISSN: 2284-9521 ISSN-L: 2284-9521




LD 5% = 1.1% ; LD 1% = 1,5%; LD 0.1% = 2.1 %

***Figure 5. The influence of sowing date on corn yield***



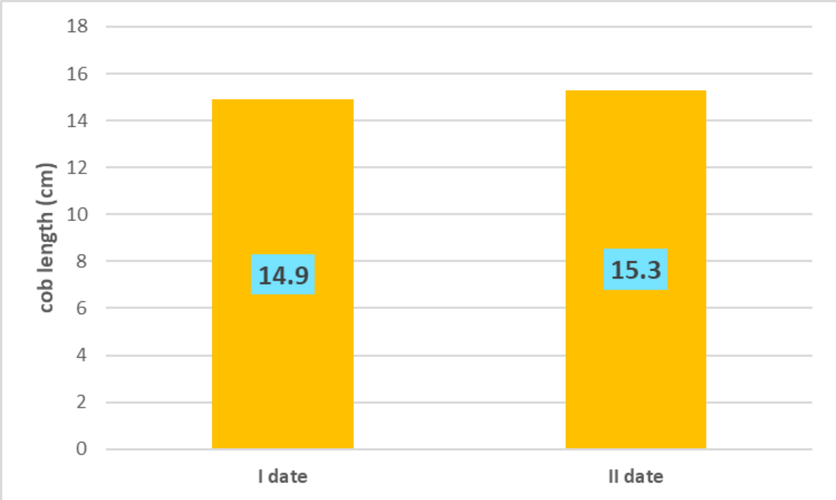

LD 5% = 2.6% ; LD 1% = 3.6%; LD 0.1% = 5.1%

***Figure 6. Influence of hybrid x sowing date interaction on corn yield***

The cob length was not influenced by the sowing date, but the values measured for this character were quite close: 14.8 cm for hybrids in the FAO 300-350 group; 15.1 cm for hybrids in the FAO 350-450 group; 15.4 cm for hybrids in the FAO 450-500 group (Figure 7). In turn, the hybrid x sowing date interaction did not influence ear length (Figure 8).

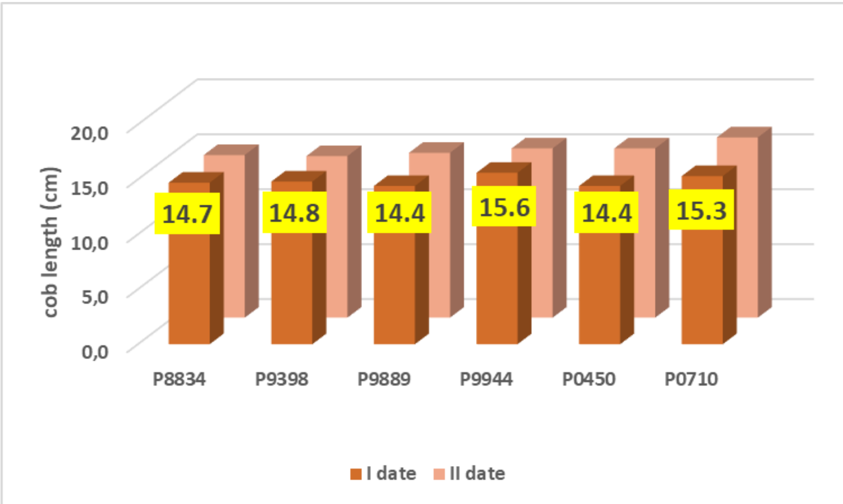

*Corresponding author, E-mail address: aida.paunescu@yahoo.com

**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521




LD 5% = 0.5% ; LD 1% = 0.8%; LD 0.1% = 1.1%

***Figure 7. Influence of sowing date on cob length***




LD 5% = 1.3 cm; LD 1% = 1.8 cm; LD 0.1% = 2.6 cm

***Figure 8. Influence of hybrid x sowing date interaction on ear length***

## 4. CONCLUSIONS

Sowing date positively influenced 1000-grain mass but negatively the yield.

Production was not influenced by sowing date but the hybrid x sowing date interaction showed that hybrids in the FAO 300-350 group obtained very significantly lower yields by approximately 500 kg/ha when sown later. Hybrids located in the 350-450 group obtained very significantly higher yields at the second sowing date.

The hybrid x sowing date interaction, under Caracal conditions, influenced both 1000-grain mass and yield.

The highest production on the Caracal chernozem in the unfavorable conditions manifested in 2024 was obtained by the P8834 hybrid (FAO 300-350 group) sown on March 27 – 2628 kg/ha. In the area of influence of SCDA Caracal, production did not exceed 800 kg/ha.


*Corresponding author, E-mail address: aida.paunescu@yahoo.com

**Current Trends in Natural Sciences**
Vol. 14, Issue 27, pp. 307-313, 2025
https://doi.org/10.47068/ctns.2025.v14i27.035
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

## 5. REFERENCES

Al-Darby, A.M., Lowery, B. (1987). Seed zone temperature and early corn growth with three conservation tillage systems. *Soil Science Society of America, Proceedings*, *28*, 272–275.

Amgain, L.P. (2015). Application of csm- ceres-maize model for seasonal and multidecadal predictions of maize yield in under subtropical condition of Chitwan, Nepal. *Journal of Maize Research and Development*, *1*(1), 86-97.

Babel, M.S., Turyatunga, E. (2015). Evaluation of Climate Change Impacts and Adaptation Measures for Maize Cultivation in the Western Uganda Agro-Ecological Zone. *Theor. Appl. Clim*. *119*, 239–254.

Bassetti, P., Westgate, M.E. (1993). Emergence, elongation and senescence of maize silks. *Crop Science*, *33*, 271-275.

Beiragi, M.A., Khorasani, S.K., Shojaei, S.H., Dadresan, M., Mostafavi, K., Golbashy, M. (2011). A Study on Effects of Planting Dates on Growth and Yield of 18 Corn Hybrids (*Zea mays* L.). *J. Exp. Agric. Int*., *1*, 110–120.

Bonciu, E. (2023). Genetic transformation in agriculture: the real chance for ensuring worldwide sustainable food security. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, *23*(1), 73-80.

Bonciu, E. (2019). The climate change mitigation through agricultural biotechnologies. *Annals of the University of Craiova-Agriculture, Montanology, Cadastre Series*, *49*(1), 36-43.

De Souza, C.P., Bonciu, E. (2022)a. Progress in genomics and biotechnology, the key to ensuring food security. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, *22*(1), 149-157.

De Souza, C.P., Bonciu, E. (2022)b. Use of molecular markers in plant bioengineering. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, *22*(1), 159-166.

Dhakal, S., Sah, S.K., Amgain, L.P., Dhakal, K.H. (2022). Maize Cultivation: Present Status, Major Constraints and Farmer's Perception at Madichaur, Rolpa. *J. Agric. For. Univ*., *5*, 125–131.

Domokos, Z., Șimon, A., Chețan, F., Ceclan, O.A., Filip, E., Călugăr, R.E., Vâtcă, S. D., Duda, M.M. (2024). The Influence of Sowing Date on the Primary Yield Components of Maize. *Agronomy*, *14*(9), 2120.

Dragomir, V., Brumă, I.S., Butu, A., Petcu, V., Tanasă, L., Horhocea, D. (2022). An Overview of Global Maize Market Compared to Romanian Production. *Rom. Agric. Res*., *39*, 535–544.

Erenstein, O., Jaleta, M., Sonder, K., Mottaleb, K., Prasanna, B.M. (2022). Global Maize Production, Consumption and Trade: Trends and R&D Implications. *Food Secur*., *14*, 1295–1319.

Li, S., Wang, K., Xie, R., Ming, B. (2018). Grain Mechanical Harvesting Technology Promotes the Transformation of Maize Production Mode. *Sci. Agric. Sin*., 51, 1842–1844.

Rădoi, D.M., Bonciu, E., Păunescu, G., Roșculete, C.A., Roșculete, E. (2022). A brief review on the influence of flag leaf on cereals production. *Annals of the University of Craiova-Agriculture, Montanology, Cadastre Series*, *52*(1), 320-327.

Rosculete, E., Bonciu, E., Rosculete, C.A., Teleanu, E. (2018). Detection and Quantification of Genetically Modified Soybean in Some Food and Feed Products. A Case Study on Products Available on Romanian Market. *Sustainability*, *10*(5), 1325.

Vâtcă, S.D., Stoian, V.A., Man, T.C., Horvath, C., Vidican, R., Gâdea, S., Vâtcă, A., Rotaru, A., Vârban, R., Moldovan, C. et al. (2021). Agrometeorological Requirements of Maize Crop Phenology for Sustainable Cropping—A Historical Review for Romania. *Sustainability*, *13*, 7719.

Zhai, L., Zhang, L., Yao, H., Zheng, M., Ming, B., Xie, R., Zhang, J., Jia, X., Ji, J. (2022). The Optimal Cultivar × Sowing Date × Plant Density for Grain Yield and Resource Use Efficiency of Summer Maize in the Northern Huang–Huai–Hai Plain of China. *Agriculture*, *12*, 7.


*Corresponding author, E-mail address: aida.paunescu@yahoo.com