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DECLINE IN SUNFLOWER SEED YIELD IN ROMANIA DURING THE 2020–2025 PERIOD

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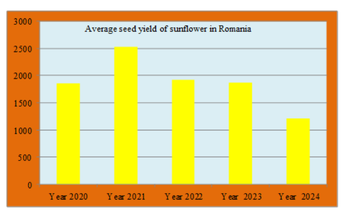
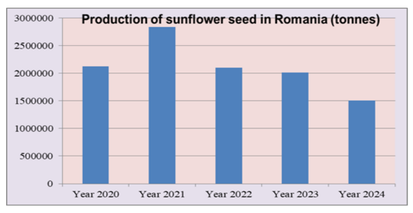
Abstract: *Between 2020 and 2025, the sunflower cultivated area in Romania consistently exceeded 1 million hectares, representing a significant share of the total area at the European Union level. Despite maintaining its leading position in both cultivated area and overall production, output levels were notably constrained by recurrent drought conditions. In recent years, sunflower production in Romania has been characterized by substantial variability in seed yield, mainly driven by increasing climate instability, particularly the frequency and intensity of droughts and extreme heat during critical phenophases such as flowering and seed filling. In 2024, and 2025, seed yields consistently fell below the six-year average, highlighting the strong impact of repeated drought and heat stress. In contrast, more favorable climatic conditions in 2021 revealed the crop's high productive potential, underlining the key role of precipitation in shaping yield performance. Overall, yield variability is closely linked to rainfall distribution, with essential phenological stages, especially flowering and seed development, being highly sensitive to water deficit. In 2024, the sunflower hybrid FD15E27, developed by NARDI Fundulea, recorded its lowest yield of the 2020–2025 period (2295 kg/ha), followed by 2025 with 2637 kg/ha. Across all study years and counties, the lowest seed yield was recorded in 2025, in Romania, in Dolj County, where the sunflower hybrid FD 15E27 produced only 707 kg/ha, while the highest seed yield was achieved in 2021 in Galați County, reaching 4638 kg/ha.*

• Introduction

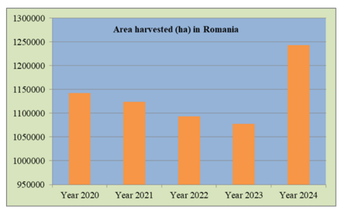
Romania is a major producer of sunflower seeds worldwide and in certain years has ranked first in the European Union in terms of the area cultivated with sunflowers, over one million hectares. Romania plays a significant role in the European Union in terms of sunflower cultivation, accounting for approximately one quarter of the total cultivated sunflower area. In Romania, production of sunflower, decrease in last years due to severe drought, especialy in year 2024 .



Average seed yield of sunflower (kg/ha), in Romania, in period 2020-2024



Total production of sunflower seed (tones), in Romania, in period 2020-2024



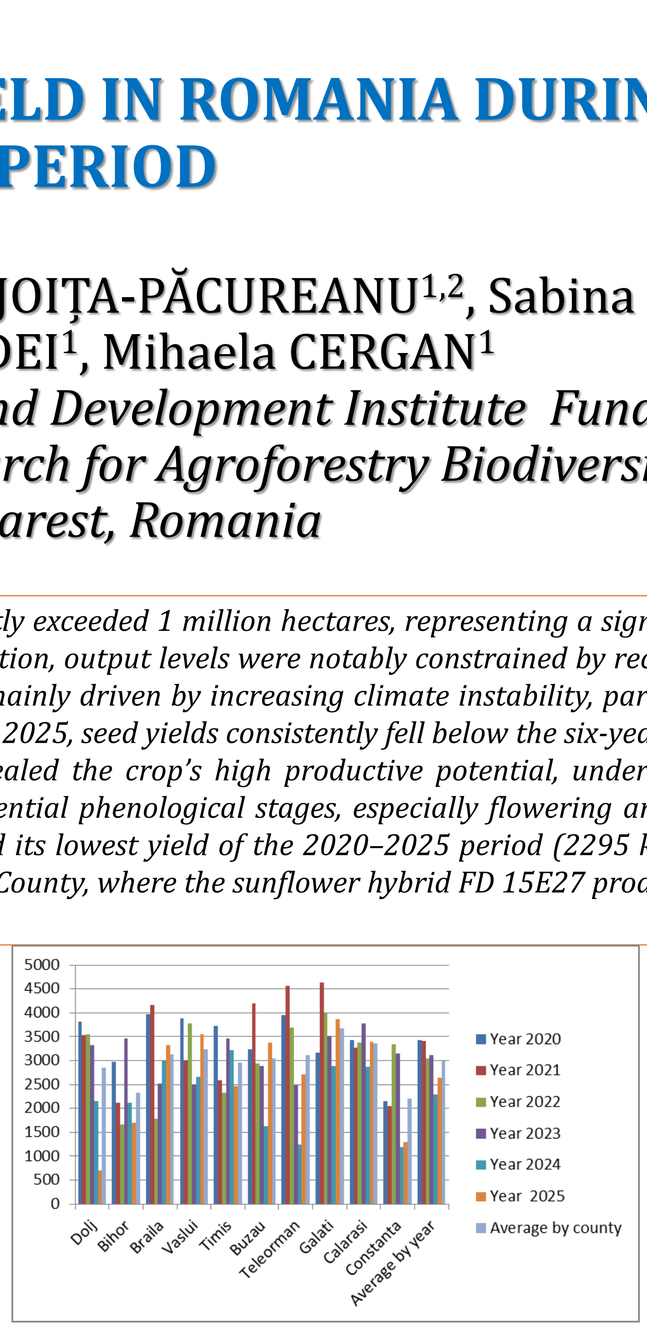
Area harvested (ha) with sunflower, in Romania, in period 2020-2024

• Material and method

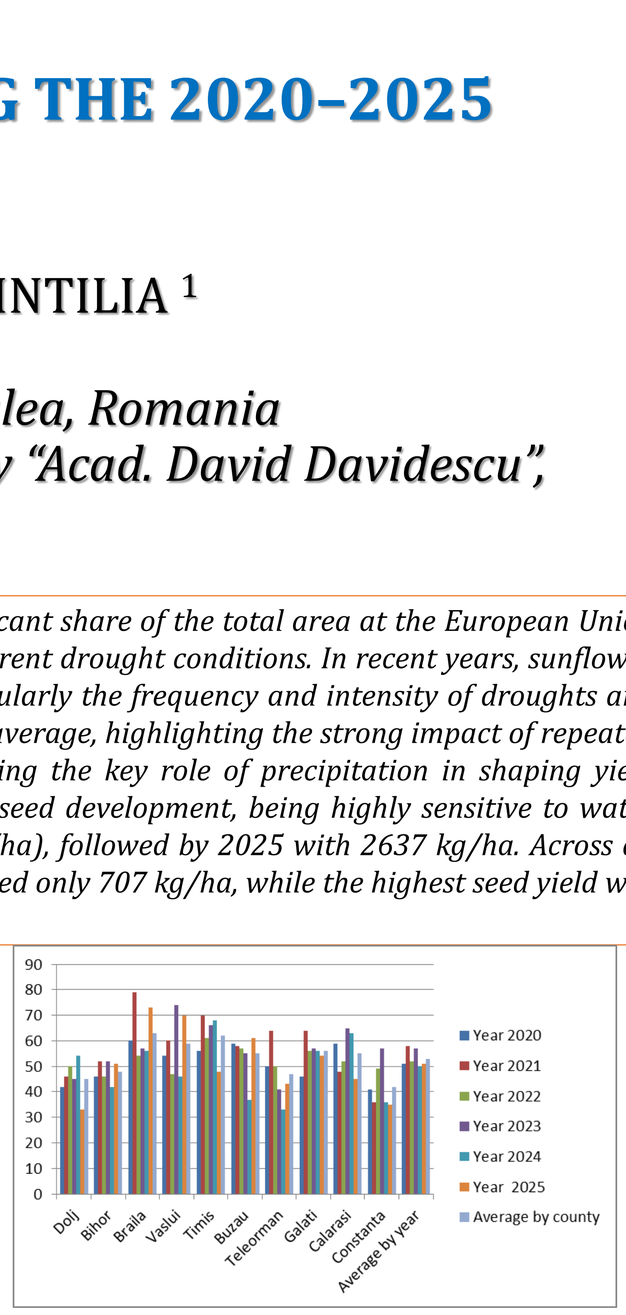
Sunflower hybrid FD15E27, developed by the National Agricultural Research and Development Institute Fundulea, was cultivated in 10 counties in Romania: Dolj, Bihor, Brăila, Vaslui, Timiș, Buzău, Teleorman, Galați, Călărași, and Constanța, in six years, during the period 2020-2025. The objective was to evaluate its performance under multi-annual and multi-location environmental variation, with particular emphasis on its behavior during drought years. Sunflower hybrid FD15E27 was registered in year 2019 in The official catalog of crop plant varieties in Romania, and is suitable for ExpressSun technology due to resistance at sulfonylurea herbicides with active substance tribenuron-methyl. In the flowering phenophase, measurements were made on plant height (cm) and analyzed after harvest, seed yield (kg/ha), 1000 seed weight (TSW, g) and hectoliter weight(HW, kg/hl) to observe differences between years and locations of the sunflower hybrid FD15E27.

• Results and discussions

During the period 2020–2025, the sunflower hybrid FD 15E27 showed notable variation in seed yield depending on both year and location.
The lowest annual average yield was recorded in 2024, with 2295 kg/ha, followed by 2025 with 2637 kg/ha, indicating less favorable growing conditions in these years compared to the rest of the study period.
When analyzed by county, the lowest average yield over the six-year interval was observed in Constanța County, with 2200 kg/ha, while the highest average yield was recorded in Galați County, reaching 3676 kg/ha. This highlights the strong influence of local environmental conditions on hybrid performance.
The lowest seed yield recorded across all years and counties occurred in 2025, in Dolj County, where sunflower hybrid FD 15E27 produced only 707 kg/ha and the highest seed yield were recorded in 2021, in Galați County with 4638 kg/ha.
The one thousand seed weight (TSW, g) of the sunflower hybrid FD 15E27, showed considerable variation across locations and years (table 3). Annual average one thousand seed weight (TSW, g) of FD15E27, was between 50 g, in 2024, and 58 g in 2021. Average one thousand seed weight (TSW, g) of FD15E27 by county, during period 2020-2025 was between 42 g in Constanța County and 63 g in in Brăila County.
The lowest one thousand seed weight (TSW, g) recorded across all years and counties occurred in 2024, in Teleorman County, and in 2025, in Dolj County, where sunflower hybrid FD 15E27 has 33g TSW, and the highest TSW were recorded in 2021, in Brăila County with 79 g.



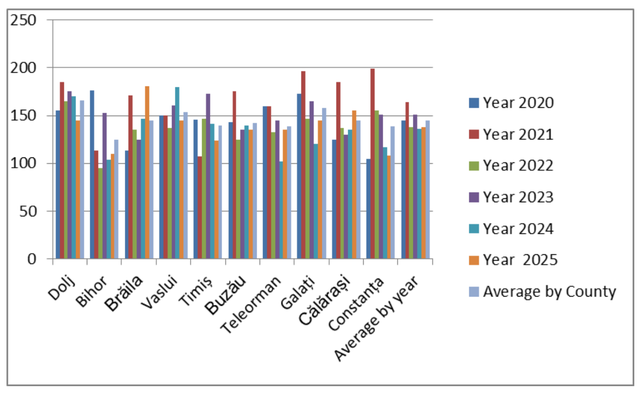
Average seed yield (kg/ha) of sunflower hybrid FD 15E27 recorded in period 2020-2025, in 10 Counties from Romania



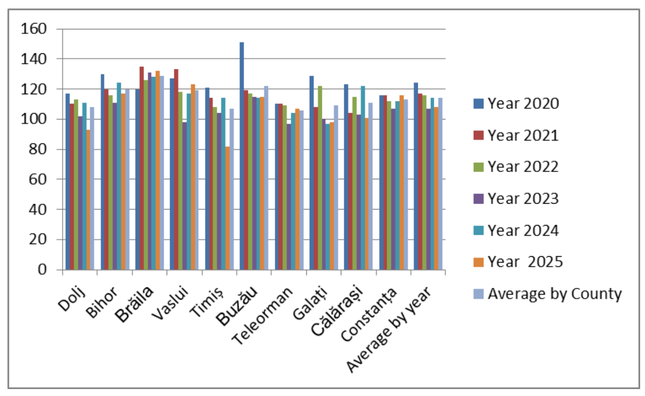
One thousand seed weight (TSW, g) of sunflower hybrid FD 15E27, recorded in period 2020-2025, in 10 counties from Romania

• Results and discussions

Average of plant height (cm) by year has the lowest value in 2024 with 136 cm and the higher value was in 2021 with 164 cm . Average of plant height (cm) by County has the lowest value in Bihor County with 125 cm and the higher value was in Dolj County with 166 cm. The lowest value of plant height (cm) recorded across all years and counties occurred in 2022, in Bihor County with 95 cm, and the highest values of plant height (cm) were recorded in 2021, in Constanța County with 199 cm. Average of period of vegetation (days) by year of sunflower hybrid FD15E27, were between 107 days in 2023 and 124 days in 2020. Average of period of vegetation (days) by County of sunflower hybrid FD15E27, were between 106 days in Teleorman County and 129 days in Brăila County.
The lowest value of plant height (cm) recorded across all years and counties occurred in 2022, in Bihor County with 95 cm, and the highest values of plant height (cm) were recorded in 2021, in Constanța County with 199 cm.



Average plant height (cm) of sunflower hybrid FD 15E27, recorded in period 2020-2025, in 10 Counties from Romania



Period of vegetation (days) of sunflower hybrid FD 15E27, recorded in period 2020-2025, in 10 Counties from Romania

• Results and discussions

There no was semnificative diferences regarding annual average hectolitre weight (HW, kg\hl) of sunflower hybrid FD15E27. Average hectolitre weight (HW, kg\hl) by county of FD15E27, during period 2020-2025 was between 37 g in Buzău County and 43 g in Dolj County and in Teleorman County. Hectolitre weight is ifluenced by agricultural year throught climatic conditions.

• Conclusions

The average 1000-seed weight (TSW) of the sunflower hybrid FD15E27, recorded between 2020 and 2025 across 10 counties in Romania, showed relatively low values, likely due to unfavorable climatic conditions. Specifically, TSW was 50 g in 2024, 51 g in 2020 and 2025, and reached a slightly higher value of 52 g in 2022. The lowest average 1000-seed weight (TSW) was observed in Constanța (42 g), in Dolj (45 g), in Teleorman (47 g), and in Bihor (48 g), reflecting the negative impact of climatic conditions on sunflower seed development.
Counties Constanța with an average seed yield of 2200 kg/ha, recorded in all six years, Bihor with 2335 kg/ha, Dolj with 2864 kg/ha, and Timis with 2964 kg/ha, were under average of all years and all counties of sunflower hybrid FD15E27 (2988 kg/ha).
Agricultural years 2024 (annual average recorded by FD15E27 in 10 counties-2295 kg/ha) and 2025 (annual average recorded by FD15E27 in 10 counties 2637 kg/ha) were under average of period 2020-2025 (2988 kg/ha).
Years 2024 and 2025 were characterized as very difficult for sunflower cultivation in Romania due to excessive heat and prolonged drought during flowering and seed filling.