

CEREAL PRODUCTION OF DOLJ COUNTY IN THE REGIONAL AND NATIONAL CONTEXT (2017-2021), ROMANIA

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Abstract

The purpose of the paper was to analyze cereal production in Dolj County and in Romania in the period 2017-2021 in order to identify the main trends, based on the statistical data provided by National Institute of Statistics and processing them by comparison method and time and structural indices. Dolj County has a total area of 741,401 ha (7th place at national level – 3.11% of the total), an agricultural area of 585,135 ha (2nd place at national level – 32.57%) and an arable area of 488,560 ha (2nd place at national level – 39.03%). The county is characterized by favorable agro-productive conditions for cereal cultivation, taking into account climatic factors and soils specific to the county (for example, sandy soils for rye cultivation). The county cultivated (on average) 331,450.80 ha with cereals, predominantly wheat and grain maize (60.5, and 26.53% of the total), obtained a total production of 1,567,667 t (predominantly wheat and maize with 54.89 and 33.96% of the total), and the average yield per hectare reached 4,728 kg. It can be said that Dolj County can decisively influence, in certain situations, the cereals market in Romania and the South-West Oltenia Region, but it must be aimed at improving the performance of this side of vegetal activity, in order to capitalize on the existing potential.

Key words: cereals, production, yield, area under cultivation

INTRODUCTION

Dolj County is located in the South-Western part of Romania, being part of the South-West Oltenia Development Region. The county stands out through a total area of 741,401 ha (7th place nationally – 3.11% of the total), an agricultural area of 585,135 ha (2nd place nationally – 3.99%) and an arable area of 488,560 ha (2nd place nationally – 5.20%). Starting from these aspects and agro-pedoclimatic characteristics, it can be said that the county presents favorable conditions for grain cultivation, although here may occur the drought phenomenon that affects the production potential of some cereal species [1]. The county presents a wide range of solutions, for which the winter wheat crop is abundantly suitable, as some authors specify [2], but at the same time the crop is sensitive to extreme weather phenomena [12].

The idea of writing the paper appeared as a result of the fact that Romania is a large cereal grower [8] [13], so that cereal production is predominant in the agricultural sector [4], and

Dolj County has tradition for those crops. For Dolj County, the fluctuation of cereal production is directly related to variations in environmental factors [6], such as drought – for which sorghum shows increased resistance to other species due to its root system [11].

The group of cereals is important, in terms of the important characteristics they present, in relation to their multiple use at social level [3]. This group includes a number of crops, as follows: wheat, rye, barley, barley, oats, maize, sorghum, rice, etc. Cereals are used in human food with a significant role [5]. For example, corn is appreciated for its fiber and carbohydrate content, due to the proteins included in its grain [7] or for its approximately 400 products with various uses [10]. At the same time, we can say that rice is one of the most important cereals used in food worldwide [9].

In this context, the goal of the research was to analyze cereal production in Dolj County and in Romania in the period 2017-2021 in order to identify the main trends, based on the statistical data provided by National Institute

of Statistics and processing them by comparison method and time and structural indices.

MATERIALS AND METHODS

The paper refers to the defining indicators of cereal production (cultivated area - ha, total production - t, average production - kg / ha), which are collected from the level of the specific national database [14]. The indicators shall be presented at the general level of the product group for winter wheat, rye, barley and barley, oats, grain maize, sorghum and 'other cereals' respectively.

The analysis presents the state of affairs specific to the period 2017-2021, and anchoring the county in a national and regional context is achieved by establishing the average weights for the area and total production, respectively by positioning the

average yields compared to the reference levels.

The method of comparison in time and space, as well as the method of percentages, helps to carry out the analysis we set out to carry out.

RESULTS AND DISCUSSIONS

Cultivated area with cereals

Table 1 shows the area under cultivation at crop group level and for the main cereal species.

The total area varied from 326,327 ha in 2017 to 338,231 ha in 2019. It can be noted that the indicator increased from 2017 to 2019 (+0.6% in 2018 – 328,291 ha, +3.65% for 2019), after which it decreases to the level of 2020 and 2021 (exceedances by 2.37 and 1.23%, respectively, of the comparison term, given that the actual level of the indicator reached 334,070 and 330,335 ha).

Table 1. Area under cultivation (ha)

No.	Specify	Year										
		2017		2018			2019		2020		2021	
		Ef.*	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**		
1	Total	326,327	328,291	100.60	338,231	103.65	334,070	102.37	330,335	101.23		
2	Wheat	198,238	200,534	101.16	199,203	100.49	202,360	102.08	202,280	102.04		
3	Rye	2,606	2,462	94.47	2,381	91.37	2,545	97.66	1,854	71.14		
4	Barley and two row barley	29,094	29,005	99.69	28,796	98.98	30,180	103.73	33,208	114.14		
5	Oats	4,199	4,124	98.21	4,036	96.12	3,500	83.35	4,045	96.33		
6	Grain maize	85,294	85,006	99.66	97,165	113.92	88,872	104.19	83,335	97.70		
7	Sorghum	1,349	852	63.16	856	63.45	531	39.36	428	31.73		
8	"Other cereals"	5,592	6,308	112.80	5,794	103.61	6,082	108.76	5,185	92.72		

*<http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table> (26.05.2023) – AGR108A-Area cultivated with main crops, by forms of ownership, macro regions, development regions and counties [14].

Source: **own calculations.

For wheat, it is found that the indicator was between 198,238 ha in 2017 and 202,360 ha in 2020. Compared to 2017, there is an increase in cultivated areas as follows: +0.49% in 2019 (199,203 ha), +1.16% for 2018 (200,534 ha), +2.04% in 2021 (202,280 ha) and +2.08% in 2020.

Regarding the areas cultivated with rye, it can be noted that they were 2,606 ha in 2017, 2,462 ha in 2018 (-5.53% in dynamics), 2,381 ha for 2019 (-8.63%), 2,545 ha in 2020 (-2.34%) and 1,854 ha in 2021 (-28.86%).

As regards the areas occupied by barley and two rows barley, their uneven evolution can be observed for the analysis period. Thus, from 29,094 ha cultivated in 2017, it reaches 29,005 ha in 2018 (-0.31%), 28,796 ha for 2019 (-1.02%), 30,180 ha in 2020 (+3.73%) and 33,208 ha in 2021 (+14.14%).

The oat crop occupied variable land areas, ranging from 3,500 to 4,199 ha in 2020 (-16.65% compared to the reporting deadline) and 2017, respectively. Under these conditions, there are decreases in the indicator

in 2018 and 2019 (-1.79 and -3.88% - actual areas of 4,124 and 4,036 ha, respectively), decreases that also occur for 2021 (-3.67% - 4,045 ha).

Grain maize has consistently exceeded a level of 83,000 ha of cultivated area. Thus, 83,335 ha were cultivated in 2021 (-2.30% in dynamics), 85,006 ha in 2018 - 0.34%), 85,294 ha in 2017 (reference term), 88,872 ha in 2020 (+4.19%) and 97,165 ha in 2019 (+13.92%).

Sorghum was cultivated on areas between 428 and 1,349 ha in 2021 and 2017, respectively, observing the downward trend of the indicator compared to the first term of the dynamic series as follows: -36.84% in 2018 (852 ha), -36.55% for 2019 (856 ha), -60.64% in 2020 (531 ha) and -68.27% in 2021.

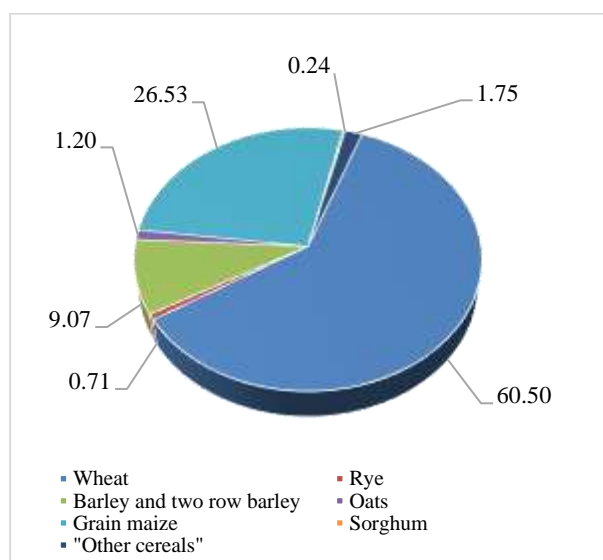


Fig. 1. Structure of area under cereals — average of period (%)

Source: own calculation.

If we refer to "other cereals", there are levels of 5,185 to 6,308 ha of cultivated area, in the case of 2021 and 2018, respectively (-7.28 and +12.80%). The indicator varied unevenly, compared to the specific situation of 2017 - 5,592 ha: +3.61% in 2019 (5,794 ha), +8.76% for 2020 (6,082 ha).

Starting from the situations presented above, the structure of the indicator for the average period (331,450.80 ha) was determined: 60.50% wheat (200,523 ha), 26.53% grain corn (87,925.40 ha), 9.07% barley and barley (30,0056.60 ha), 1.75% "other cereals"

(5,792.20 ha), 1.20% oats (3,980.80 ha), 0.71% rye (2,369.60 ha) and 0.24% sorghum (803.20 ha) (Figure 1).

Total cereal production

Information on total production is presented in Table 2.

Total cereal production exceeded the threshold of 1,250,000 t throughout the dynamic series analyzed. Thus, the lowest level was 1,250,576 t in 2020 (-24.56% in dynamics), followed by annual statements of 1,497,602 t in 2021 (-9.66%), 1,657,750 t for 2017 (base term), 1,680,949 t in 2019 (+1.40%) and 1,751,457 t for 2018 (+5.65%). Wheat is characterized by variable yields from 661,670 t in 2020 (-25.99%) to 945,187 t in 2021 (+5.73%). For the rest of the years, there were situations of: 894,001 t in 2017, 894,700 t in 2019 (+0.08%), 906,619 t in 2018 (+1.41%).

Rye production was 6,631 t in 2017, compared to which the following positions were recorded: 93.09% in 2018 (6,173 t), 90.11% in 2019 (5,975 t), 80.76% for 2020 (5,335 t) and 76.31% in 2021 (5,060 t).

Barley and barley provided total variable yields from 125,574 to 140,096 t in 2020 and 2021, respectively (-7.45 and +3.25% compared to the reporting deadline - 2017, 135,684 t). In the rest of the years (2019 and 2018), yields of 131,830 and 136,720 t were recorded, which represented 97.16 and 100.76% of the level of the first term of the dynamic series respectively.

For oats, the indicator exceeded the threshold of 7,500 t, falling to a level of 10,800 t, as follows: 7,623 t in 2020 (74.65% in dynamics), 8,946 t in 2019 (87.61%), 10,211 t in 2017, 10,416 t in 2018 (102.01%), 10,747 t in 2021 (105.25%).

Total grain maize production exceeded 370,000 t but did not exceed 670,000 t.

Thus, annual situations are found, as follows: 584,754 t in 2017, 661,290 t for 2018 (113.09% in dynamics), 615,240 t in 2019 (105.21%), 427,134 t in 2020 (73.05%), 373,749 t for 2021 (63.92%).

For sorghum, total yields between 718 and 1,905 t are observed in 2020 and 2018 (48.25 and 128.02% dynamics, respectively). For the

rest of the dynamic series terms, the situation was as follows: 1,452 t in 2019 (97.58%), 1,488 t for 2017, 1,671 t in 2021 (112.30%).

In the case of "other cereals", the indicator was as follows: 24,981 t in 2017, 28,334 t in

2018 (+13.42% in dynamics), 22,806 t in 2019 (-8.71%), 22,502 t in 2020 (-9.92%), 21,092 t in 2021 (-15.57%).

Table 2. Total production (t)

No.	Specify	Year											
		2017			2018			2019		2020		2021	
		Ef.*	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**	
1	Total	1,657,750	1,751,457	105.65	1,680,949	101.40	1,250,576	75.44	1,497,602	90.34			
2	Wheat	894,001	906,619	101.41	894,700	100.08	661,670	74.01	945,187	105.73			
3	Rye	6,631	6,173	93.09	5,975	90.11	5,355	80.76	5,060	76.31			
4	Barley and two row barley	135,684	136,720	100.76	131,830	97.16	125,574	92.55	140,096	103.25			
5	Oats	10,211	10,416	102.01	8,946	87.61	7,623	74.65	10,747	105.25			
6	Grain maize	584,754	661,290	113.09	615,240	105.21	427,134	73.05	373,749	63.92			
7	Sorghum	1,488	1,905	128.02	1,452	97.58	718	48.25	1,671	112.30			
8	"Other cereals"	24,981	28,334	113.42	22,806	91.29	22,502	90.08	21,092	84.43			

*[http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table\(26.05.2023\)](http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table(26.05.2023)) – AGR109A-Vegetal agricultural production by main crops, by forms of ownership, macro regions, development regions and counties [14].

Source: **own calculations.

If we analyze the total production in terms of values related to the average of the period, there is a general county level of 1,567,667 t, level based on sequential contributions of: 0.09% sorghum (1,446.80 t), 0.37% rye (5,8387.80 t), 0.61% oats (9,588.6 t), 1.53% "other cereals" (23,943 t), 8.55% barley and barley (133,980.80 t), 33.96% grain corn (532,433.40 t), 58.49% wheat (860,435.40 t) (Figure 2).

Average production per ha

The average production performance per surface unit (kg/ha) is shown in Table 3.

At the general level of the crop group, there are positions between 3,743 and 5,335 kg / ha in the case of 2020 and 2018, respectively (weights of 73.68 and 105.02%, respectively, compared to the reference land – 2017 characterized by a level of 5,080 kg / ha). In 2021, the indicator exceeded the level of 4,500 kg/ha (4,534 kg/ha – 89.25%), and for 2019 it stood at 4,970 kg/ha (97.83% compared to 2017).

The average wheat production per hectare constantly exceeded the threshold of 4,000 kg / ha, except for 2020 when it was 3,743 kg / ha (73.68% compared to 4,510 kg / ha, situation specific to 2017). For 2018 and

2019, the indicator was "almost constant" compared to the reporting deadline (+0.24 and -0.42% respectively in 2018 and 2019), only in 2021 a larger difference was found (+3.61%).

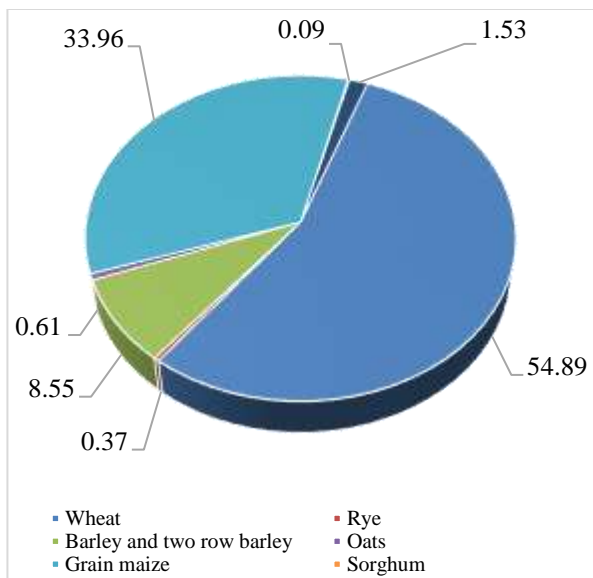


Fig. 2. Structure of total cereal production — average of period (%)

Source: own calculation.

In rye, the county shows low levels of average production per productive unit (between 2,000 and 3,000 kg/ha), levels that varied unevenly:

2,545 kg/ha in 2017, -1.49% for 2018 (2,507 kg/ha), -1.41% in 2019 (2,509 kg/ha), -17.33% in 2020 (2,104 kg/ha), +7.27% for 2021 (2,730 kg/ha).

If we refer to the specific situation of barley and two rows barley crops, there are variable

levels of average production, from 4,161 to 4,714 kg / ha in the case of 2020 and 2018 respectively (89.21 and 101.07% respectively compared to the first year of the dynamic series).

Table 3. Yields by cereal type (kg/ha)

No.	Specify	Year								
		2017	2018		2019		2020		2021	
		Ef.*	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**	Ef.*	Ibf**
1	Total	5,080	5,335	105.02	4,970	97.83	3,743	73.68	4,534	89.25
2	Wheat	4,510	4,521	100.24	4,491	99.58	3,270	72.51	4,673	103.61
3	Rye	2,545	2,507	98.51	2,509	98.59	2,104	82.67	2,730	107.27
4	Barley and two row barley	4,664	4,714	101.07	4,578	98.16	4,161	89.21	4,219	90.46
5	Oats	2,432	2,526	103.87	2,217	91.16	2,178	89.56	2,657	109.25
6	Grain maize	6,856	7,779	113.46	6,332	92.36	4,806	70.10	4,485	65.42
7	Sorghum	1,103	2,236	202.72	1,697	153.85	1,351	122.48	3,904	353.94
8	"Other cereals"	4,467	4,492	100.56	3,936	88.11	3,700	82.83	4,068	91.07

*<http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table> (26.05.2023) – AGR110A-Average yield per hectare, main crops, by forms of ownership, macro regions, development regions and counties [14].

Source: **own calculations.

The reference level (4,664 kg/ha) in 2017 was not reached for 2019 and 2021 (4,578 and 4,219 kg/ha).

For oats, there are average yield levels per hectare, as follows: 2,432 kg in 2017, 2,526 kg in 2018 (+3.87% in dynamics), 2,217 kg for 2019 (-8.84%), 2,178 kg in 2020 (-10.44%) and 2,657 kg for 2021 (+9.25%).

For grain maize, we can assume that the situation for the first three years is favorable (levels between 6,332 and 7,779 kg/ha in 2019 and 2018 respectively), while for 2020 and 2021 the indicator was below 5,000 kg/ha (4,806 and 4,485 kg).

For sorghum, it is found that 2017 (reference date – 1,103 kg/ha) was exceeded by the rest of the terms of the dynamic series – ahead of 1.22, 1.53, 2.02 and 3.53 times for 2020, 2019, 2018 and 2021 respectively (13,351, 1,697, 2,236 and 3,904 kg/ha).

For crops in the 'other cereals' group, levels ranged from 3,700 kg/ha in 2020 to 4,492 kg/ha in 2018. Compared to the first analyzed year (2017 – 4,467 kg / ha), there are three sub-unit levels of the indicator in 2020, 2019 and 2021 (82.82, 88.11 and 91.07%) and a supra-unitary level (2018 – 100.56%).

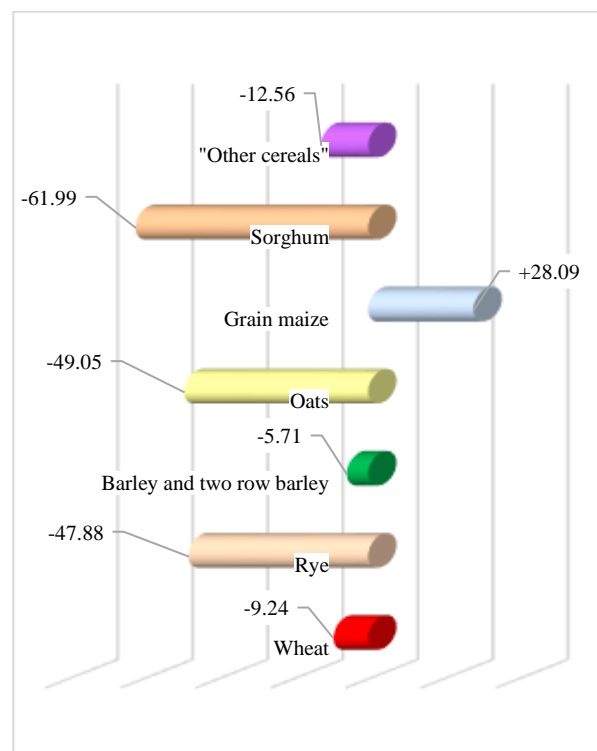


Fig. 3. Average production per hectare, positioning compared to the general level – average of the period (±%)

Source: own calculation.

Based on our own calculations, we determined the average of the period that reached 4,728 kg / ha, against which the crops

were positioned as follows: +28.09% grain corn (6,056 kg / ha), -5.71% barley and barley (4,458 kg / ha), -9.24% wheat (4,291 kg / ha), -12.56% "other cereals" (4,134 kg / ha), -47.88% rye (2,464 kg / ha), -49.05% oats (2,409 kg / ha), -61.99% sorghum (1,801 kg / ha) (Figure 3).

If we relate the county situation to the existing realities at national and regional level, we find the following aspects:

- For cultivated area, the county accounted for 6.21% of the total national area and 40.52% of the total regional area. For component crops, the county held between 2.94 and 22.54% of the national total for oats and rye, respectively, and at regional level, the extreme shares were 23.21% for oats and 89.68% for rye (Figure 4).

- In terms of total production, variable shares are observed at national level from 2.78% for sorghum to 19.92% for rye crops, with a share of 5.80% for the entire product group.

-In the regional context, the county accounted for 39.71% of the total grain production and made extreme contributions to sorghum and rye crops respectively (26.38 and 88.15%) (Figure 5).

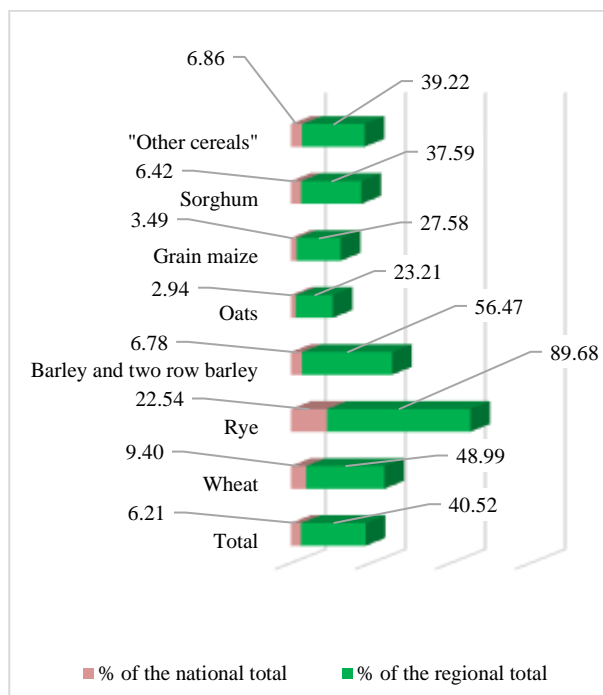


Fig. 4. Cultivated area, share of the county at national and regional level – average of the period (%)
Source: own calculation.

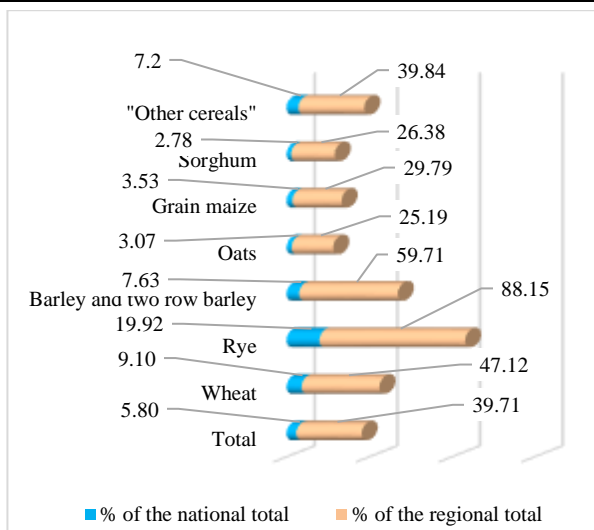


Fig. 5. Total production, share of the county at national and regional level – average of the period (%)
Source: own calculation.

- The average yield per hectare, places Dolj County below the national level for wheat, for the total group, for rye and sorghum (from -3.23 to -56.67%) and above it for the rest of the crops (exceeded from 1.34 to 12.69% for grain corn, respectively for barley and two rows barley).

In the regional context, the county has exceeded the specific situation for other cereals, barley and barley, grain corn and oats, while for the rest of the crops, the county is placed below the regional level (Figure 6).

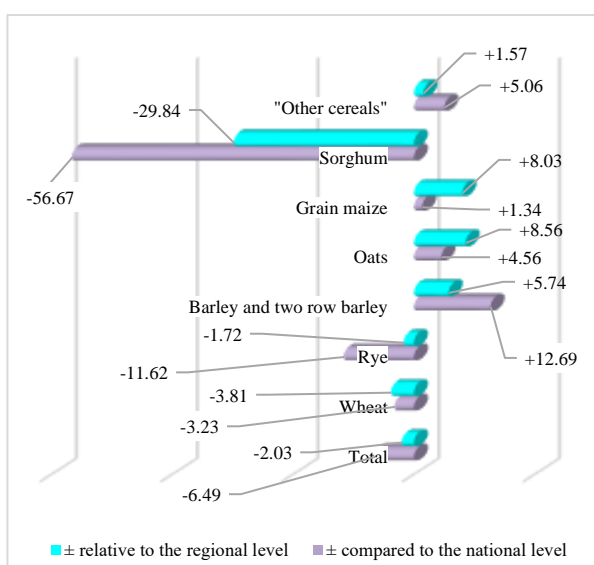


Fig. 6. Average yield per hectare, positioning of the county in relation to the national and regional level – average of the period (±%)
Source: own calculation.

CONCLUSIONS

At national level, Dolj County stands out by cultivating the largest grain and wheat area, ranks 2nd in the case of barley and barley respectively rye, 5th place in sorghum, 6th place in oats and only 13th place for grain corn. As such, we can say that the county is one of the most important grain growers in Romania, if not the most important. This situation must be linked to the agro-pedo-climatic context and the degree of capitalization of producers (sandy soils for rye cultivation, lack of significant irrigated areas if we refer to grain maize, especially for seed production).

In terms of total productions, it can be noted that the county ranks 4th nationally in terms of total cereal production, 1st place for wheat, 2nd place for rye, 3rd place for barley and barley, 6th place for oats and sorghum respectively and only 16th place for grain corn.

Starting from the above-mentioned spectrums, it is noted that the performances of Dolj cereal producers are lower than those obtained in other counties (positioning around the 10th place at the level of oats, sorghum, respectively barley and barley crops, in terms of average yield per hectare, around the 20th place for wheat and rye, 28th place for corn and 35th place at the general level of the product group).

It can be said that Dolj County decisively influences the production of cereals in Romania and implicitly in the South-West Oltenia Region, but producers and implicitly decision makers must be more active to improve performance, to better exploit the county potential for this side of the vegetal activity of the agricultural sector.

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