SOME CONSIDERATIONS REGARDING THE PRIMARY WHEAT SUPPLY IN ROMANIA AND ITS COMPOSITION (2014 – 2016)

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Abstract

The study seeks to establish an anchoring, in time, of the Romanian primary wheat supply, having regard to the importance of the respective product for the Romanian agricultural economy (the second crop plant at national level based on cultivated areas and total yields). In the same context, the importance of wheat crop can be revealed through the role that this product can play as an export item - especially in years characterized by considerable levels of yields. In the period 2014-2016, the levels of the cultivated area and the total production (2,119,062.67 ha and 7,992,788.67 t) are highlighted, but also the less appropriate performance in terms of average production (3,771 kg/ha). It is worth mentioning that certain aspects that influence the performances of the respective culture need to be improved: the stronger atomicity of producers, the financing measures (non-reimbursable EU funds not accessible to the large mass of producers), the adequate upgrading of capital items mechanical capital and the upgrading of storage and preservation areas), the protection of certain categories of producers from the sensitive aspects of the market (for example, the evolution of the marketing prices).

Key words: wheat, offer, average production, total production, area

INTRODUCTION

The offer of a product is the amount of goods and services traders want to sell at a certain price [7]. The supply in the agricultural commodity market is scattered and quantitatively irregular [2]. In the long run, the supply of agricultural products is relatively stable depending on the volume of annual agricultural produce, the level of stocks accumulated over time, the impact of agricultural policies, etc. [4].

Wheat is the most important cultivated plant, the largest share food [9]. Wheat is one of the most important cereals grown in Romania and occupies between 22 and 28% of the country’s arable land [12].

In Romania, the most favorable areas for wheat are: the Western Plain, the Romanian Plain, the Transylvanian Plain and a part of the Northeast of Moldova [10].

The wheat supply in Romania has seen different trends over time. Thus, for the period 2002-2007, the number of farms that cultivated wheat remained relatively constant, as well as the total area cultivated on the holding [14]. Wheat, as a grain production, is mostly used for human consumption in the form of flour, bakery products or as germs and to a lesser extent for animal feed [8].

In addition to bread and innumerable pastries, wheat can also be used in the manufacture of alcohol, starch, dextrin and glucose [9].

Shredding wheat in a suitable rotation provides convenient premises for obtaining the right produce. As a result, every time the wheat is sown after peas, considered a good predecessor to the recovery of peas [3].

At present, the total wheat production obtained in Romania ensures internal consumption and gives the possibility to export significant quantities of this culture [6]. Wheat is a current marketable product on the agrarian market. About 15% of total world cereal production and over 18% of wheat production are the subject of international trade. Wheat accounts for about 45% of world cereal trade [13].

The paper shows how the wheat production is...
distributed in the territory. From this point of view, it is intended to highlight the relative importance played by each macro region and development region.

MATERIALS AND METHODS

For the purpose of drafting the paper, it is aimed at the creation at national level of the primary supply: cultivated area (ha), total production (t) and average production (kg/ha), for the period 2014-2016.

This highlights the macroregional and regional contributions as follows:
- Macroregion 1 consisting of the North West Region and the Central Region;
- Macroregion 2 consisting of the North East Region and the South East Region;
- Macroregion 3 consisting of South Muntenia Region and Bucharest-Ilfov Region;
- Macroregion 4 composed of the South West Oltenia Region and the West Region.

The method of analysis used is the comparison. The comparison method evaluates the results obtained and compares them with certain reference bases. Comparisons are done over time, in space and mixed [1].

The paper used indices analysis, comparison over time being highlighted through the mobile base index, calculated by formula:

\[
I_m = \frac{Y_m - x100}{Y_{m-1}},
\]

in which: \( Y_n \) - the level of indicator for each component of the dynamic series; \( Y_{n-1} \) - the level of temporal sequence indicator considered as a basis for comparison or reference period. It starts from the national, macro-regional and regional level of the indicators, determining the structure indices (for the cultivated area and the total production). In the case of average production, the macroregional and regional levels are reported at the national level of the indicator, with a position towards it being established.

In order to establish a correlation between cultivated area and total production, we used it:
- equation for the correlation coefficient:

\[
Corr(X, Y) = \frac{\sum (x-x)(y-y)}{\sqrt{\sum (x-x)^2 \sum (y-y)^2}}
\]

\( \bar{x} \) and \( \bar{y} \) - are the averages for samples, average (matrix1) and average (matrix2);

RESULTS AND DISCUSSIONS

The cultivated area. Data extracted from the site [15], refers to the evolution of the cultivated area (on the three reference levels - national, macroregional and regional) and is presented in Table 1.

In the case of 2014, a total area of 2,112,866 ha was cultivated, characterized by the following structure:
- 31.49% Macro-region 2 (665,414 ha total area of which 507,013 ha in the South East respectively 23.99% and 158,401 ha for the North East - 7.50%);
- 29.55% Macroregion 4 (a total area of 624,280 ha, which at regional level was divided as follows: 11.47% in the West and 18.08% in the South West, 242,244 and 382,036 ha respectively);
- 28.82% Macroregion 3 (608,942 ha cultivated area, while the regions of West and South West Oltenia held shares of 11.14 and 17.27%, starting from 234,756 and 363,815 ha);
- 10.14% Macroregion 1 (total cultivated area of 214,230 ha, with 5.82% for North West and 4.32% for Center, corresponding to areas 122,922 and 91,308 ha).

At the level of 2015, the structure of the national area (2,106,591 ha) was as follows:
- 11.21% Macroregion 1 (total cultivated area of 236,133 ha, distributed in two component regions: 89,519 ha Center and 146,614 ha North West, actual values that determined weights of 4.25 and 6.96% respectively);
- 28.41% Macroregion 4 (598,571 ha cultivated area, while the regions of West and South West Oltenia held shares of 11.14 and 17.27%, starting from 234,756 and 363,815 ha);
- 28.67% Macroregion 3 (total area of 603,965 ha, for which the component regions contributed 18,531 and 585,434 ha respectively - Bucharest-Ilfov and South Muntenia - so that the structural weights were
0.88 and 27.79% at national level); -31.71% Macroregion 2 (667,922 ha total area, with the percentage contributions being 7.98 and 23.73% on the basis of the actual values of the 168,028 ha for North East and 499,894 ha for the South East).

Table 1. Area cultivated with cereals (ha)

<table>
<thead>
<tr>
<th>Specification</th>
<th>2014</th>
<th>2015</th>
<th>2015/14</th>
<th>2016</th>
<th>Average*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eff.</td>
<td>Str. (%)</td>
<td>Eff.</td>
<td>Str. (%)</td>
<td>Eff.</td>
</tr>
<tr>
<td>Total</td>
<td>2,112,866</td>
<td>100</td>
<td>2,106,591</td>
<td>99.70</td>
<td>2,137,731</td>
</tr>
<tr>
<td>Macro region 1</td>
<td>214,230</td>
<td>10.14</td>
<td>236,133</td>
<td>11.21</td>
<td>235,339</td>
</tr>
<tr>
<td>Region North West</td>
<td>122,922</td>
<td>5.82</td>
<td>146,614</td>
<td>6.96</td>
<td>144,662</td>
</tr>
<tr>
<td>Region Centre</td>
<td>91,308</td>
<td>4.32</td>
<td>89,519</td>
<td>4.25</td>
<td>90,677</td>
</tr>
<tr>
<td>Macro region 2</td>
<td>665,414</td>
<td>31.49</td>
<td>667,922</td>
<td>31.71</td>
<td>647,598</td>
</tr>
<tr>
<td>Region North East</td>
<td>158,401</td>
<td>7.50</td>
<td>168,028</td>
<td>7.98</td>
<td>167,812</td>
</tr>
<tr>
<td>Region South East</td>
<td>507,013</td>
<td>23.99</td>
<td>499,894</td>
<td>23.73</td>
<td>479,786</td>
</tr>
<tr>
<td>Macro region 3</td>
<td>608,942</td>
<td>28.82</td>
<td>603,965</td>
<td>28.67</td>
<td>606,413</td>
</tr>
<tr>
<td>Region South Muntenia</td>
<td>590,583</td>
<td>27.95</td>
<td>585,434</td>
<td>27.79</td>
<td>588,039</td>
</tr>
<tr>
<td>Region Bucharest Ilfov</td>
<td>18,359</td>
<td>0.87</td>
<td>18,531</td>
<td>0.88</td>
<td>18,374</td>
</tr>
<tr>
<td>Macro region 4</td>
<td>624,280</td>
<td>29.55</td>
<td>598,571</td>
<td>28.41</td>
<td>648,381</td>
</tr>
<tr>
<td>Region South West Oltenia</td>
<td>382,036</td>
<td>18.08</td>
<td>363,815</td>
<td>17.27</td>
<td>399,710</td>
</tr>
<tr>
<td>Region West</td>
<td>242,244</td>
<td>11.47</td>
<td>234,756</td>
<td>11.14</td>
<td>248,671</td>
</tr>
</tbody>
</table>


** own calculation

The year 2016 is characterized by a total national area of 2,137,731 ha to which development regions contributed as follows: 27.51% South Muntenia (588,039 ha), 22.44% South East (479,786 ha), 18.70% South West Oltenia (399,710 ha), 11.63% West (248,671 ha), 7.85% North East (167,812 ha), 6.77% North West (144,662 ha), 4.24% Center (90,677 ha) and 0.86% Bucharest-Ilfov (18,374 ha). As a result of these situations, at macregional level we can find variable weights from 11.01% for Macroregion 1 (235,339 ha) to 30.33% for Macroregion 4 (648,381 ha). The other two macro-regions had contributions of 28.37 and 30.29% (3 and 2 respectively) as a result of actual levels of the cultivated areas of 606,413 and 647,598 ha, respectively.

The average of the analyzed period was 2,119,062.67 ha highlighting variable structures at macroregions and development regions:
- 31.16% Macroregion 2, 29.43% Macroregion 4, 28.62% Macroregion 3, 10.79% Macroregion 1 (660,311.34, 623,744, 606,440 and 228,567.33 ha);
- 0.87% Bucharest-Ilfov Region (18,421.33 ha), 4.27% Central Region (90,501.33ha), 6.52% North West Region (138,066 ha), 7.77% North East Region (164,747 ha), 11.41% West Region (181,890.33 ha), 18.02% Region South West Oltenia (381,853.67 ha), 23.39% South East Region (495,564.34 ha), 27.75% South Muntenia Region (588,018.67 ha), Figure 1.

**Total production.** Wheat acreage nationwide is an important factor that directly influences the production realized by farmers [11].

Table 2, according to the site [15], the data are shown for the total production.
In the case of 2014, when total national production was 7,584,814 t, the structural weights (by regions and macro regions) reached:
-30.28% Macroregion 2 - 2,296,563 t (weights of 23.30 and 6.98% for the South East and North East, 1,767,518 and 529,045 t respectively);
-30.15% Macroregion 3 - 2,286,473 t (29.17% South Muntenia and 0.98% Bucharest-Ilfov, starting from the actual levels of 2,212,388 and 74,085 t respectively);
-28.89% Macroregion 4 - 2,191,580 t (16.10% South West Oltenia and 12.79% West, actual production of 1,221,507 t and 970,073 t, respectively);
- 10.68% Macroregion 1 – 810,198 t (6.23% North West and 4.45% Center, which was based on productions of 472,422 and 337,776 t respectively).

Table 2. Total cereal production (t)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>104.98</td>
<td>105.89</td>
<td>7,992,788.67</td>
<td>100</td>
<td>94.80</td>
</tr>
<tr>
<td>Macro region 1</td>
<td>810.19</td>
<td>10.68</td>
<td>904.947</td>
<td>113.77</td>
<td>833,039</td>
<td>9.88</td>
<td>92.05</td>
</tr>
<tr>
<td>Region North West</td>
<td>472,422</td>
<td>6.23</td>
<td>570,476</td>
<td>7.17</td>
<td>488,888</td>
<td>5.90</td>
<td>85.69</td>
</tr>
<tr>
<td>Region Centre</td>
<td>337,776</td>
<td>4.45</td>
<td>334,471</td>
<td>4.20</td>
<td>344,151</td>
<td>4.08</td>
<td>102.89</td>
</tr>
<tr>
<td>Macro region 2</td>
<td>2,296,563</td>
<td>30.28</td>
<td>2,359,482</td>
<td>29.63</td>
<td>2,621,451</td>
<td>31.09</td>
<td>111.10</td>
</tr>
<tr>
<td>Region North East</td>
<td>529,045</td>
<td>6.98</td>
<td>509,032</td>
<td>6.39</td>
<td>605,596</td>
<td>7.18</td>
<td>118.97</td>
</tr>
<tr>
<td>Region South East</td>
<td>1,767,518</td>
<td>23.30</td>
<td>1,850,450</td>
<td>23.24</td>
<td>2,015,855</td>
<td>23.91</td>
<td>108.94</td>
</tr>
<tr>
<td>Macro region 3</td>
<td>2,286,473</td>
<td>30.15</td>
<td>2,443,208</td>
<td>30.68</td>
<td>2,493,160</td>
<td>29.57</td>
<td>102.04</td>
</tr>
<tr>
<td>Region South Muntenia</td>
<td>2,212,388</td>
<td>29.17</td>
<td>2,364,796</td>
<td>29.70</td>
<td>2,416,773</td>
<td>28.66</td>
<td>102.19</td>
</tr>
<tr>
<td>Region Bucharest Ilfov</td>
<td>74,085</td>
<td>0.98</td>
<td>78,412</td>
<td>0.98</td>
<td>76,387</td>
<td>0.91</td>
<td>97.42</td>
</tr>
</tbody>
</table>

** own calculation

At the level of 2015, the structure of national production (7,962,421 t) was as follows:
- 11.37% Macroregion 1 - 904,947 t (4.20% Center and 7.17% North West, weights resulting from total regional productions of 334,471 and 570,476 t respectively);
- 28.32% Macroregion 4 - 2,254,784 t (13.12% West and 15.20% South West Oltenia, percentages based on actual levels of the indicator of 1,044,787 and 1,209,977 t in
the situation of the two regions);
- 29.63% Macroregion 2 - 2,359,482 t (23.24% South East and 6.39% North East, with total outputs of 1,850,450 and 509,032 t respectively);
- 30.68% Macroregion 3 - 2,443,208 t (0.98% Bucharest-Ilfov and 29.70% South Muntenia, based on total production of 78,412 and 2,364,796 t respectively).

For the year 2016, variable rates of the Macroregions were recorded at national level, from 9.88% for Macroregion 1 (833.039 t) to 31.09% for Macroregion 2 (2,621,451 t), while for the other two macro-regions finds 29.46 and 29.57% respectively Macroregion 4 (2,483,481 t) and Macroregion 3 (2,493,160 t). At the level of the development regions, variation limits from 4.08% for the Central Region (344,151 t) to 28.66% for the South Muntenia Region (2,416,773 t) are found.

For the analyzed period, the average total production (8,493,394.67 t) points out, on macroregions and development regions, variable structure as follows:
- the macro-region structure is as follows: 30.35% Macroregion 2 (2,425,832 t), 30.12% Macroregion 3 (2,407,613.67 t), 28.90% Macroregion 4 (2,309,948.33 t), 10.63% Macroregion 1 (849,394.67 t);
- the structure by regions was: 0.95% Bucharest-Ilfov (76,249.67 t), 4.24% Center (338,799.33 t), 6.39% North West (510,595.34 t), 6.86% North East (547,891 t), 15.67% South West Oltenia (1,252,185 t), 23.49% South East (1,877,941 t), 29.17% Sud Muntenia (2,331,319 t) - Figure 2.

**Average production.** Romania has the lowest yield of production in the EU, there have been years (2011, for example), in which the yield has been more than half of that of the EU [5]. Table 3 contains information on the evolution of average production (kg/ha) conform [15].

For the year 2014, variable weights of the Macroregions are observed at national level, from 96.13% for Macroregion 2 (3,451 kg/ha) to 105.35% for Macroregion 1 (3,782 kg/ha), while for the other two Macroregions 97.80 and 104.60% respectively Macroregion 4 and Macroregion 3 (3,511 and 3,755 kg/ha) are recorded, if compared to the 3,590 kg/ha recorded at national level. Regarding the situation on development regions, positioning limits from 89.05% for South West Oltenia (3,197 kg/ha) to 112.40% for Bucharest-Ilfov (4,035 kg/ha) are found.

The year 2015 is characterized by a national level of the indicator of 3,780 kg/ha, against which macro-regions and development regions were positioned as follows:
- 107.01% Macroregion 3 - 4,045 kg/ha (111.93% Bucharest-Ilfov and 106.85% South Muntenia, actual levels of 4,231 and 4,039 kg/ha respectively);
- 101.38% Macroregion 1 – 3,832 kg/ha (102.94% North West and 98.84% Center due to actual levels of 3,891 and 3,736 kg/ha respectively);
- 99.66% Macroregion 4 – 3,767 kg/ha (117.75% West and 87.99% South West Oltenia, based on average yields per hectare of 4,451 and 3,326 kg respectively);
- 93.47% Macroregion 2 – 3,533 kg/ha (97.94% South East and 80.13% North East, based on average yields per hectare of 4,451 and 3,326 kg respectively).

In 2016, compared to the national average (3,944 kg/ha), macro-regions and regions are positioned as follows:
- 89.76% Macroregion 1 - 3,540 kg/ha (85.70% North West and 96.22% Center due to average production levels per hectare of 3,380 and 3,795 kg/ha respectively);
- 97.11% Macroregion 4 – 3,830 kg/ha (84.05% South West Oltenia and 118.10% West on the basis of the actual levels of 3,315 kg/ha).
and 4.658 kg/ha respectively); -102.64% Macroregion 2 - 4,048 kg/ha (106.54% South East and 91.51% North East, starting from the actual levels of the indicator 4,202 and 3,609 kg/ha respectively);

-104.23% Macroregion 3 – 4,111 kg/ha (104.21% South Muntenia and 105.40% Bucharest-Ilfov, actual levels of 4,110 and 4,157 kg/ha respectively).

Table 3. Cereal average yield (kg/ha)

<table>
<thead>
<tr>
<th>Specification</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eff. % compared to the national level</td>
<td>Eff. % compared to the national level</td>
<td></td>
<td>Eff. % compared to the national level</td>
</tr>
<tr>
<td>Total</td>
<td>3,590</td>
<td>100</td>
<td>3,780</td>
<td>100</td>
</tr>
<tr>
<td>Macro region 1</td>
<td>3,782</td>
<td>105.35</td>
<td>3,822</td>
<td>101.38</td>
</tr>
<tr>
<td>Region North West</td>
<td>3,843</td>
<td>107.05</td>
<td>3,891</td>
<td>102.94</td>
</tr>
<tr>
<td>Region Centre</td>
<td>3,699</td>
<td>103.04</td>
<td>3,736</td>
<td>98.84</td>
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<tr>
<td>Macro region 2</td>
<td>3,451</td>
<td>96.13</td>
<td>3,533</td>
<td>93.47</td>
</tr>
<tr>
<td>Region North East</td>
<td>3,340</td>
<td>93.04</td>
<td>3,029</td>
<td>80.13</td>
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<td>Region South East</td>
<td>3,486</td>
<td>97.10</td>
<td>3,702</td>
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<td>Macro region 3</td>
<td>3,755</td>
<td>104.60</td>
<td>4,045</td>
<td>107.01</td>
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<td>104.35</td>
<td>4,039</td>
<td>106.85</td>
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<td>Region Bucharest Ilfov</td>
<td>4,035</td>
<td>112.40</td>
<td>4,231</td>
<td>111.93</td>
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<tr>
<td>Macro region 4</td>
<td>3,511</td>
<td>97.80</td>
<td>3,767</td>
<td>96.66</td>
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<tr>
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<td>3,197</td>
<td>89.05</td>
<td>3,326</td>
<td>87.99</td>
</tr>
<tr>
<td>Region West</td>
<td>4,005</td>
<td>111.56</td>
<td>4,451</td>
<td>117.75</td>
</tr>
</tbody>
</table>


* own calculation

The national average of the analyzed period (3,771 kg) signals variable positions on Macroregions and Development Regions, as follows:
- for Macroregions the situation is as follows: 105.28% Macroregion 3, 98.59% Macroregion 1, 98.20% Macroregion 4, 97.51% Macroregion 2 (actual macroregional levels of 3,970, 3,718, 3,703 and 3,677 kg/ha respectively);
- positioning on Development Regions is as follows: 89.95% South West Oltenia (3,279 kg/ha), 88.20% North East (3,326 kg/ha), 98.25% North West (3,705 kg/ha), 99.26% Center (3,743 kg/ha), 100.69% South East (3,797 kg/ha), 105.14% South Muntenia (3,965 kg/ha), 109.81% Bucharest-Ilfov (4,141 kg/ha) - Figure 3.

Fig. 3. Average yield - Macro regions and Regions of developing, position to the national situation (%), period average (2014-2016)

CONCLUSIONS

The cultivated area is characterized by a non-uniform evolution (amplitude of 1.78% - 31,140 ha and 1.46% of the average of the
indicator - relatively insignificant variation), characteristic of all regions and macroregions, with the exception of the South Est Region where the evolution was strictly descending. As such, some degree of uniformity of the indicator may be observed.

Romania manifests itself as an important cultivator at the continental and regional (EU) level, accounting for approximately 3.5 and 8% respectively (weights are based on 2014 data for Europe and the EU) [16].

The total output has grown upward at national level (amplitude of 5.89%, 846,317 t, ie 10.59% of indicator average - somewhat appreciable difference). Similar issues are found for Macroregion 2, South East Region, Macroregion 3, South Muntenia Region, Macroregion 4 and West Region. In the rest there are non-uniform evolutions.

At continental and regional level, Romania achieved about 3.2 and 5% of total production [16], less convenient situation (less weights than those registered for the cultivated area, situation resulting from the weaker results, due to the technological, capitalization, etc. specific to the Romanian producers);

The correlation between the cultivated area and the total production is evidenced by the values of the correlation coefficient (r = 0.999039) and the grade 2 polynomial function (R^2 = 0.9981), values based on the levels of the two indicators for the average of the analyzed period. These situations signal the direct correlation between the two phenomena; The average yield per hectare has been on a nationwide upward trend (variation amplitude of 354 kg - 9.38% in relative values, significant variation). Similar situations arise for the Central Region, Macroregion 2, South East Region, Macroregion 3, South Muntenia Region, Bucharest-Ipove and West Region. The rest of the analyzed units show an uneven trend.

It is noteworthy that in the regional and continental context, Romania achieved about 89% and 64%, respectively, of the reference levels [16].

The macro-region 1 has a secondary role in influencing national levels of total wheat production, with some balance between the other macro-regions (2.64% for cultivated area and 1.45% for total production). As a result, wheat is a culture that at national level has an increased adaptability to characteristic agro-productive conditions;

Wheat represents an important crop for Romania (the second one for corn), generating a favorable economic aspect at the level of the local producers, especially in the conditions of favorable climatic and economic conjuncture. Hence the need to apply appropriate measures to protect producers in order to adequately exploit the existing national potential.

REFERENCES


