PARTIAL EXPERIMENTAL RESULTS REGARDING THE INFLUENCE OF CORN HYBRID ON GRAINS YIELD IN THE ROMANIAN PLAIN UNDER CLIMATIC CHANGES

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Abstract
The researches had as main aim the knowledge of both yielding potential and adaptability under Romanian Plain conditions, of five corn hybrids. The generic material originates from Greek Golden West concern. These hybrids are known for their resistance to drought under Greece conditions.

The experiment was performed in 2010, at ARDS Caracal, ARDS Braila and ARDS Valu lui Traian.

On average experiments, the semi-early hybrid GW 480001 emphasized by yield, achieving 9503 kg grains/ha, being, as earliness, at middle level of hybrids Organza și GW 480002. The highest yield was achieved by the hybrid Konsur, with an average of 10569 kg grains/ha.

The water utilization degree during the entire vegetation period was different at all five hybrids as well as from a location to another. On the three testing centers, the first place was occupied by the hybrids Konsur and GW 480001 with 28,4, and 25,4 kg grains/mm water, respectively. The highest utilization degree was registered during june-August, at ARDS Caracal, with an average of 49 kg grains/mm water. The results are part of Ph.D. thesis.

INTRODUCTION
The cultivation of the most adequate hybrids, with superior yielding ability, adapted to specific conditions of the main Romania agricultural areas [1,2], with resistance to main abiotic (frost, drought) and biotic (pests and diseases) stresses frequent under different cultivation areas, and with qualitative traits required by market is recognized as major factor in obtaining some high economical performances of crops, especially corn [3,4].

According to European legislation, Romania allows the commercialization on its territory of any corn hybrid registered in EU countries, even if it has not been tested under Romanian conditions and registered in Romanian Official Catalogue [6]. Following these circumstances, Romanian farmers are not covered by the risks arising from the cultivation of some hybrids un-adapted to specific conditions or exceeded by the new ones [6].
The aim of the research was to bring a contribution to obtaining some yielding superior performances, quality and stability of corn yields, with a view to meet the general and specific market requirements, by introduction of some hybrids with resistance to drought.

MATERIAL AND METHODS
The experiments were performed in three localities, namely ARDS Caracal, ARDS Valu lui Traian and ARDS Brâila in 2010, as randomized blocks, in three replication, with a sowing area of 20 m$^2$, of which 15 m$^2$ harvested ones.
The applied technology: the sowing was done on Aprilie, 18th at ARDS Braila, May, 3rd at ARDS Valu lui Traian and May, 5th at ARDS Caracal. The complex fertilizers (30:15:0) were used in rates of 350 kg/ha. The weeds control was performed with Acetogan 2.2 l/ha, after sowing and with Calisto+Mistral 0.3 l/ha+1 l/ha, during 5-6 leaves stage. The following determinations were made: emergence time, silking time and physiological maturity time, sum of useful unit degree, plant height, height of ear insertion, resistance to drought, lodging (%), breaking (%), resistance to diseases (rot and smut), to Ostrinia, “stay green” feature, grains yield, number of grains/ear ratio, moisture to harvesting, TGW, TW.
As regards the average monthly temperatures, the agricultural year 2009 – 2010 was warmer than multiannual average, in all testing centers.
Pluviometrically, during the agricultural year 2009 – 2010, there were registered 729 mm at ARDS Caracal, 715 mm at ARDS Braila and 707 mm at ARDS Valu lui Traian, exceeding multiannual average with 192, 268 and 192, in each testing center respectively.

RESULTS AND DISCUSSION
Generally, the agricultural year 2009-2010 was favorable to corn, fact that led achieving high yields, which, on testing center average were between 7372 kg grains/ha at ARDS Caracal and 11844 kg kernels/ha at ARDS Brâila. At ARDS Valu lui Traian, 9686 kg grains/ha were achieved.
The yield level was strongly influenced by the way of rainfall repartition, so figure 1 shows that the rainfall quantity/total agricultural year was very close, such as 729 mm at ARDS Caracal, 715 mm at ARDS Brâila and 707 mm at ARDS Valu lui Traian.
As regards the soil water reserve in early spring, it had close values at Caracal and Valu lui Traian and was of 332 mm at ARDS Caracal, 330 mm at ARDS Valu lui Traian and 360 mm at ARDS Brâila. Based on analysis of rainfall during the vegetation period, Aprilie – September, one can ascertain that the highest quantity
was registered at Caracal, of 397 mm, followed by Valu lui Traian, of 377 mm and Braila, of 355 mm, the last station registering the highest yield.

The large yield differences were determined by the rainfalls registered during June-August, period of maximum consumption for corn. At ARDS Caracal, the total rainfall, of 143 mm, was distributed as follows: 107 mm in June, 6.6 mm in July and 19 mm in August, while in the other two stations, the rainfall quantity was double/total period, of which in July, 88 mm at Braila and 200 mm at Valu lui Traian.

Under these conditions, at both ARDS Braila and Valu lui Traian, selection regarding the tolerance to drought could not be performed, although in August and September, the rainfall was slightly low, between 19 and 35 mm.

An obvious difference regarding the tolerance to drought could be only performed at ARDS Caracal, so that, the best behaviour was registered by the semi-early hybrid GW 480001. This earliness trait help this hybrid to avoid the drought during June and to achieve an yield of 8236 kg grains/ha, exceeding the experiment average with 11.2%, followed by the hybrid Konsur, with 7955 kg grains/ha and a gain of 8% vs. experiment average.

At ARDS Valu lui Traian, these two hybrids have achieved 10190 and 10730 kg grains/ha respectively, exceeding the tested hybrid average with 5-11%, plus the hybrid GW 480002 with an yield equal with that of GW 480001 one.

Under ARDS Braila conditions, the rainfalls during vegetation period, as repartition, better met the hybrid requirements and have allowed beside the semi-early hybrid GW 480001(10083 kg grains/ha) the obtainment of high yield of the hybrid Konsur, of 13021 kg/ha, exceeding the experiment average with 10%. Under ARDS Braila conditions, very good results gave the hybrid Organza, with 12572 kg grains/ha, distinctly significant gain statistically ensured.

On experiment average of the three locations placed under different climatic conditions of Romanian Plain, one can highlight the semi-early hybrid GW 480001, with an average yield of 9503 kg grains/ha, being, as earliness, at middle hybrid level, Organza and GW 480002. The highest yield was achieved by the hybrid Konsur, with an average yield of 10569 kg grains/ha. The data presented in figures 1 and 2 emphasize the way of water utilization by the tested hybrids, expressed by the achieved grain yield, kernel/mm water. The report depends on total rainfall, rainfall registered during vegetation period or maximum consumption one.

On the three testing center average (figure 2), the hybrid Konsur was firstly placed as regards the water utilization capability (14,9; 28,4; 47 kg grains/mm water), followed by the hybrid GW 480001, with 13,4; 25,4; 43,4 kg grains mm water and the hybrids GW 480002 and Organza, with 13,45; 25,75; 42,2 kg grains/mm water.
### Table 1

Grains yield achieved by corn hybrids tested at ARDS Caracal, ARDS Valu lui Traian and ARDS Braila

<table>
<thead>
<tr>
<th>Nr. crt.</th>
<th>Hybrid</th>
<th>Braila (t/ha)</th>
<th>Valu-Traian (t/ha)</th>
<th>Caracal (t/ha)</th>
<th>Average (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Konsur</td>
<td>13021 110**</td>
<td>10730 111*</td>
<td>7955 108*</td>
<td>10569 110*</td>
</tr>
<tr>
<td>2</td>
<td>GW 480001</td>
<td>10083 85***</td>
<td>10190 105</td>
<td>8236 112**</td>
<td>9503 99</td>
</tr>
<tr>
<td>3</td>
<td>Organza</td>
<td>12572 106</td>
<td>9210 95</td>
<td>6955 94</td>
<td>9579 99</td>
</tr>
<tr>
<td>5</td>
<td>GW 480002</td>
<td>11738 99</td>
<td>10190 105</td>
<td>6746 92</td>
<td>9558 99</td>
</tr>
<tr>
<td>6</td>
<td>Status</td>
<td>11808 100</td>
<td>8110 84**</td>
<td>6968 95</td>
<td>8962 93</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>11844 100</td>
<td>9686 100</td>
<td>7372 100</td>
<td>9634 100</td>
</tr>
<tr>
<td>LSD 5%</td>
<td></td>
<td>710 6</td>
<td>969 10</td>
<td>369 5</td>
<td>683 7</td>
</tr>
</tbody>
</table>

**Fig.1- Rainfall registered under different periods of agricultural year 2009-2010**
The physiological maturity was achieved after accumulation of 1146.2°C in the case of the semi-early hybrid GW 480001 and of 1217.9°C – 1336.1°C at the middle hybrids GW 480002, Konsur, Status and Organza, in the second half of August (table 2).

There were no significant differences between hybrids as regards the resistance to ear rot, shrivelling and drought.

The kernel moisture to harvesting ranged between 21.1% at GW 480001 hybrid and 29% at GW 480002 one.

**Table 2**

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Date of physical-logical material</th>
<th>Resistance to drought*</th>
<th>Resistance to la breaking (%)</th>
<th>Resistance to rot*</th>
<th>Resistance to smut*</th>
<th>Resistance to <em>Ostrinia</em></th>
<th>Moisture to harvesting (%)</th>
<th>% kernels</th>
<th>Stay green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Konsur</td>
<td>25.08</td>
<td>7</td>
<td>0.0</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>29.0</td>
<td>83.0</td>
<td>4.7</td>
</tr>
<tr>
<td>Organza</td>
<td>25.08</td>
<td>7</td>
<td>1.2</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>26.8</td>
<td>79.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Status</td>
<td>24.08</td>
<td>8</td>
<td>1.8</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>25.8</td>
<td>81.6</td>
<td>4.3</td>
</tr>
<tr>
<td>GW-48002</td>
<td>15.08</td>
<td>8</td>
<td>1.1</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>24.0</td>
<td>84.5</td>
<td>3.4</td>
</tr>
<tr>
<td>GW-48001</td>
<td>14.08</td>
<td>7</td>
<td>0.0</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>21.1</td>
<td>83.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*) = quotation 1-9, in which, 1=very weak and 9 =very good
CONCLUSIONS
1. The tested hybrids emphasized by a high degree of water utilization;
2. The hybrids Konsur, GW 480001 and Organza revealed by yields ranging between 9505 and 10569 kg grains/ha;
3. Under drought and heat conditions, during June-August, at ARDS Caracal, the semi-early hybrid GW 480001 has achieved an yield of 8236 kg/ha.

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REFERENCES