JOURNAL of Horticulture, Forestry and Biotechnology
Volume 28(2), 2024, 92-101
https://jhfb.ro/index.php/jhfb
Print ISSN: 2066-1797
Online ISSN: 3045-1876

Comparative analysis of maize hybrids based on kernels production

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Manuscript received: 18 October 2024; revised: 5 November 2024; accepted: 6 November 2024

Abstract
The study comparatively analyzed twenty maize hybrids, in terms of kernels production. The maize hybrids were created at ARDS Suceava, and grown for testing under the conditions at ARDS Lovrin. In the study, the names of hybrids SV1 to SV20 were used. Based on the kernel production, the comparative analysis of the hybrids was done (ANOVA test). Each hybrid was analyzed compared to the other hybrids and differences were recorded in terms of statistical safety, $p<0.05$ (17 combinative analyses), $p<0.01$ (20 combinative analyses), and $p<0.001$ (48 combinative analyses). In relation to the mean value of kernel production calculated (KP_m= 1815.395 kg ha^{-1}), nine hybrids were positioned above the average value (SV1, SV7, SV8, SV9, SV11, SV13, SV15, SV16, and SV20), and 11 hybrids were positioned below the average value. The cluster analysis facilitated the grouping of hybrids in the cluster diagram, based on similarity (Coph.corr = 0.777). In cluster C1 (hybrids with a value above the average of the experiment), hybrid SV13 presented the independent position, with the highest level of kernel production. Associated, the hybrids [(SV7, SV1), SV15], respectively (SV8, SV20) were positioned. The results provided valuable information regarding the ranking of the tested hybrids, for the maize breeding program, as well as for agricultural practice.

Keywords: cluster dendrogram, comparative analysis, kernel production, maize hybrids

Introduction

The evaluation of maize hybrids in different environmental conditions is important for the evaluation of production potential, tolerance to environmental factors, yield and for the selection of genotypes of interest for breeding programs [11], [15].

The harmonization of maize hybrids with climatic conditions and crop technologies is important for high yields [9]. The influence of nitrogen fertilization rates on maize hybrids was analyzed to evaluate the yield potential [18]. The response of some maize hybrids was analyzed in relation to nitrogen reserves and fertilization with complex mineral fertilizers [4]. The increase in kernels production and maize yield was associated and studied in relation to plant density but also to the absorption capacity of the plant population for water and nutrients [8]. Kernels production was analyzed in different maize hybrids in relation to irrigation in arid maize growing regions [19]. Maize hybrids have been studied for dual use, namely for the production for food purposes, as well as for the production of fodder [6]. The authors of the study analyzed morphological parameters, quality indices, yield and selected hybrids to ensure the requirements of interest for agricultural practice. The interest in intercropping has led to studies to identify maize hybrids that lend themselves to such technologies [16].

Increasing the productivity of maize crops has been more and more studied and analyzed in the last period with abiotic stresses, especially with climate stress [12]. Testing maize hybrids in different areas is important to find out the response to the environmental and technological conditions and the promotion at a zonal level or on a large scale of the hybrids that present advantages [3]. Maize hybrids tolerant to drought conditions, produced at CIMMYT-Mexico, were studied under specific conditions in Nepal [14]. The authors of the study evaluated morphological parameters, physiological indices, agronomic characters in the tested hybrids, in order to identify suitable hybrids for the culture under the study conditions.

The identification of high-yield maize hybrids under non-irrigated crop conditions, associated with climate changes, is of interest both for breeding programs and for practice [20]. At the same time, the degree of farmers' satisfaction with maize hybrids is important to know [3].

The present study analyzed the behavior of a collection of twenty maize hybrids produced at ARDS Suceava, in the crop conditions specific to the Western Plain of Romania, within ARDS Lovrin.

Material and Method

The study and experimental research in field conditions were carried out within ARDS Lovrin, the Maize Breeding Laboratory. The comparative maize crops were placed on chernozem type soil, in a non-irrigated system.

The biological material included twenty maize hybrids, created at ARDS Suceava. The names of the breeds were noted SV1 to SV20. The study period was 2023 – 2024. Maize hybrids were cultivated in experimental plots, in repetitions, randomized. The climatic conditions during the study period, the pluviometric regime, and the thermal regime, are presented in table 1.

Table 1. Climatic conditions during the experimental period

Cliamtic parameters	Period												2023-2024
	2023				2024								
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
	Rainfall regime												Amount
Monthly amount	79	23.2	63.8	49.4	38	7.4	35	23	15.4	24.4	33.8	25	417.4
Multiannual mean	42.4	40.5	48	39.7	32.7	29.6	32.3	42.7	57.3	68.1	55.8	32.3	521.4
Deviation	36.6	-17.3	15.8	9.7	5.3	-22.2	2.7	-19.7	-41.9	-43.7	-22	-7.3	-104
	Thermal regime												Mean
Monthly mean	21.3	15.3	6.7	3.4	1.6	7.9	9.6	13.8	18.1	23.6	26.8	26.9	14.6
Multiannual mean	16.8	11.1	5.5	1.1	-1.1	0.9	5.3	10.7	16.3	19.8	22.2	21.7	10.9
Deviation	4.5	4.2	1.2	2.3	2.7	7.0	4.3	3.1	1.8	3.8	4.6	5.2	3.7

The preparation of the land was mechanized, through a system of works, in accordance with the specifics of the land and the soil: disk, followed by plowing at 30 cm depth (autumn); working with the combinator (spring). Fertilization was done with complex fertilizer (1:1:1) 300 kg ha^{-1} (March), and ammonium nitrate 200 kg ha^{-1} (vegetation period).

The maize hybrids were sown in the first decade of April 2024. To prevent weeding, pre-emergent weeding, mechanical weeding (the first decade of May), and manual weeding were done, in turn, for correction as needed.

The maize kernel production was harvested at physiological maturity, 99 BBCH code [13], at the end of August. The kernel production values were determined for each hybrid.

The ANOVA test and the Cluster Analysis were applied to make the comparative analysis between the maize hybrids and to generate the dendrogram of the grouping of the hybrids [7], [10].

Results and Discussion

The mean production (kg ha^{-1}) of the twenty maize hybrids was determined on each experimental plot, in repetitions. The mean values were calculated, and the ANOVA test was applied for the comparative analysis of the maize hybrids.

The result is the statistical data from table 2, in which the mean values of the differences, the range of variation (95%), and statistical safety parameters are presented.

Table 2. Statistical data for the comparative analysis of maize hybrids based on kernel production

Trials and difference			95% CI for Mean Difference		Statistical parameters and significance		
Trials		Mean Difference	Lower	Upper	t	p_{tukey}	
0	1	2	3	4	5	6	7
SV1	SV2	1116.214	581.083	1651.345	7.902	< .001	***
	SV3	765.016	229.885	1300.147	5.416	< .001	***
	SV4	771.476	236.345	1306.607	5.461	< .001	***

	SV5	1111.206	576.075	1646.337	7.867	< .001	***
	SV6	1150.912	615.781	1686.043	8.148	< .001	***
	SV7	35.323	-499.808	570.454	0.25	1	ns
	SV8	125.373	-409.758	660.504	0.888	1	ns
	SV9	495.257	-39.874	1030.388	3.506	0.099	ns
	SV10	759.742	224.611	1294.873	5.378	< .001	***
	SV11	439.536	-95.595	974.667	3.112	0.227	ns
	SV12	666.799	131.668	1201.93	4.72	0.004	**
	SV13	-365.506	-900.637	169.625	-2.588	0.531	ns
	SV14	1368.032	832.901	1903.163	9.685	< .001	***
	SV15	78.939	-456.192	614.07	0.559	1	ns
	SV16	530.527	-4.604	1065.658	3.756	0.054	ns
	SV17	741.987	206.856	1277.118	5.253	< .001	***
	SV18	615.257	80.126	1150.388	4.356	0.011	*
	SV19	950.182	415.051	1485.313	6.727	< .001	***
	SV20	163.35	-371.781	698.481	1.156	1	ns
SV2	SV3	-351.198	-886.329	183.933	-2.486	0.6	ns
	SV4	-344.738	-879.869	190.393	-2.44	0.631	ns
	SV5	-5.008	-540.139	530.123	-0.035	1	ns
	SV6	34.698	-500.433	569.829	0.246	1	ns
	SV7	-1080.89	-1616.02	-545.759	-7.652	< .001	ooo
	SV8	-990.841	-1525.97	-455.71	-7.014	< .001	ooo
	SV9	-620.957	-1156.09	-85.826	-4.396	0.01	oo
	SV10	-356.471	-891.602	178.66	-2.524	0.574	ns
	SV11	-676.678	-1211.81	-141.547	-4.79	0.003	oo
	SV12	-449.414	-984.546	85.717	-3.182	0.198	ns
	SV13	-1481.72	-2016.85	-946.589	-10.489	< .001	ooo
	SV14	251.818	-283.313	786.949	1.783	0.953	ns
	SV15	-1037.28	-1572.41	-502.144	-7.343	< .001	ooo
	SV16	-585.687	-1120.82	-50.556	-4.146	0.02	o
	SV17	-374.227	-909.358	160.904	-2.649	0.489	ns
	SV18	-500.957	-1036.09	34.174	-3.546	0.09	ns
	SV19	-166.031	-701.162	369.1	-1.175	1	ns
	SV20	-952.864	-1488	-417.733	-6.746	< .001	ooo
SV3	SV4	6.46	-528.671	541.591	0.046	1	ns
	SV5	346.19	-188.941	881.321	2.451	0.624	ns
	SV6	385.896	-149.235	921.027	2.732	0.435	ns
	SV7	-729.693	-1264.82	-194.562	-5.166	0.001	oo
	SV8	-639.643	-1174.77	-104.512	-4.528	0.007	oo
	SV9	-269.759	-804.89	265.372	-1.91	0.918	ns
	SV10	-5.274	-540.405	529.858	-0.037	1	ns
	SV11	-325.48	-860.611	209.651	-2.304	0.721	ns
	SV12	-98.217	-633.348	436.914	-0.695	1	ns
	SV13	-1130.52	-1665.65	-595.391	-8.003	< .001	ooo
	SV14	603.016	67.885	1138.147	4.269	0.014	o
	SV15	-686.077	-1221.21	-150.946	-4.857	0.003	oo

JOURNAL of Horticulture, Forestry and Biotechnology
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https://jhfb.ro/index.php/jhfb
Print ISSN: 2066-1797
Online ISSN: 3045-1876

	SV16	-234.489	-769.62	300.642	-1.66	0.976	ns
	SV17	-23.029	-558.16	512.102	-0.163	1	ns
	SV18	-149.759	-684.89	385.372	-1.06	1	ns
	SV19	185.166	-349.965	720.298	1.311	0.998	ns
	SV20	-601.666	-1136.8	-66.535	-4.259	0.014	o
SV4	SV5	339.73	-195.401	874.861	2.405	0.655	ns
	SV6	379.436	-155.695	914.567	2.686	0.465	ns
	SV7	-736.153	-1271.28	-201.022	-5.211	< .001	ooo
	SV8	-646.103	-1181.23	-110.972	-4.574	0.006	oo
	SV9	-276.219	-811.35	258.912	-1.955	0.901	ns
	SV10	-11.734	-546.865	523.398	-0.083	1	ns
	SV11	-331.94	-867.071	203.191	-2.35	0.691	ns
	SV12	-104.677	-639.808	430.454	-0.741	1	ns
	SV13	-1136.98	-1672.11	-601.851	-8.049	< .001	ooo
	SV14	596.556	61.425	1131.687	4.223	0.016	o
	SV15	-692.537	-1227.67	-157.406	-4.903	0.002	oo
	SV16	-240.949	-776.08	294.182	-1.706	0.968	ns
	SV17	-29.489	-564.62	505.642	-0.209	1	ns
	SV18	-156.219	-691.35	378.912	-1.106	1	ns
	SV19	178.706	-356.425	713.838	1.265	0.999	ns
	SV20	-608.126	-1143.26	-72.995	-4.305	0.013	o
SV5	SV6	39.706	-495.425	574.837	0.281	1	ns
	SV7	-1075.88	-1611.01	-540.751	-7.616	< .001	ooo
	SV8	-985.833	-1520.96	-450.702	-6.979	< .001	ooo
	SV9	-615.949	-1151.08	-80.818	-4.36	0.011	o
	SV10	-351.463	-886.595	183.668	-2.488	0.599	ns
	SV11	-671.67	-1206.8	-136.539	-4.755	0.003	oo
	SV12	-444.407	-979.538	90.725	-3.146	0.213	ns
	SV13	-1476.71	-2011.84	-941.581	-10.454	< .001	ooo
	SV14	256.826	-278.305	791.957	1.818	0.945	ns
	SV15	-1032.27	-1567.4	-497.136	-7.308	< .001	ooo
	SV16	-580.679	-1115.81	-45.548	-4.111	0.022	o
	SV17	-369.219	-904.35	165.912	-2.614	0.513	ns
SV5	SV18	-495.949	-1031.08	39.182	-3.511	0.097	ns
	SV19	-161.023	-696.154	374.108	-1.14	1	ns
	SV20	-947.856	-1482.99	-412.725	-6.71	< .001	ooo
SV6	SV7	-1115.59	-1650.72	-580.458	-7.898	< .001	ooo
	SV8	-1025.54	-1560.67	-490.408	-7.26	< .001	ooo
	SV9	-655.655	-1190.79	-120.524	-4.642	0.005	oo
	SV10	-391.17	-926.301	143.961	-2.769	0.411	ns
	SV11	-711.376	-1246.51	-176.245	-5.036	0.002	oo
	SV12	-484.113	-1019.24	51.018	-3.427	0.118	ns
	SV13	-1516.42	-2051.55	-981.287	-10.735	< .001	ooo
	SV14	217.12	-318.012	752.251	1.537	0.989	ns
	SV15	-1071.97	-1607.11	-536.842	-7.589	< .001	ooo
	SV16	-620.385	-1155.52	-85.254	-4.392	0.01	oo

Print ISSN: 2066-1797
Online ISSN: 3045-1876

	SV17	-408.925	-944.056	126.206	-2.895	0.336	ns
	SV18	-535.655	-1070.79	-0.524	-3.792	0.05	o
	SV19	-200.73	-735.861	334.401	-1.421	0.995	ns
	SV20	-987.562	-1522.69	-452.431	-6.991	< .001	ooo
SV7	SV8	90.05	-445.081	625.181	0.637	1	ns
	SV9	459.934	-75.197	995.065	3.256	0.17	ns
	SV10	724.419	189.288	1259.55	5.128	0.001	**
	SV11	404.212	-130.919	939.343	2.862	0.355	ns
	SV12	631.476	96.345	1166.607	4.47	0.008	**
	SV13	-400.829	-935.96	134.302	-2.838	0.369	ns
	SV14	1332.708	797.577	1867.839	9.435	< .001	***
	SV15	43.615	-491.516	578.746	0.309	1	ns
	SV16	495.203	-39.928	1030.335	3.506	0.099	ns
	SV17	706.664	171.533	1241.795	5.003	0.002	**
	SV18	579.934	44.803	1115.065	4.106	0.022	*
	SV19	914.859	379.728	1449.99	6.477	< .001	***
	SV20	128.027	-407.105	663.158	0.906	1	ns
SV8	SV9	369.884	-165.247	905.015	2.619	0.51	ns
	SV10	634.369	99.238	1169.5	4.491	0.008	**
	SV11	314.163	-220.969	849.294	2.224	0.77	ns
	SV12	541.426	6.295	1076.557	3.833	0.045	*
	SV13	-490.879	-1026.01	44.252	-3.475	0.106	ns
	SV14	1242.659	707.527	1777.79	8.797	< .001	***
	SV15	-46.434	-581.566	488.697	-0.329	1	ns
	SV16	405.154	-129.977	940.285	2.868	0.351	ns
	SV17	616.614	81.483	1151.745	4.365	0.011	*
	SV18	489.884	-45.247	1025.015	3.468	0.107	ns
	SV19	824.809	289.678	1359.94	5.839	< .001	***
	SV20	37.977	-497.154	573.108	0.269	1	ns
SV9	SV10	264.485	-270.646	799.616	1.872	0.929	ns
	SV11	-55.721	-590.852	479.41	-0.394	1	ns
	SV12	171.542	-363.589	706.673	1.214	0.999	ns
SV9	SV13	-860.763	-1395.89	-325.632	-6.094	< .001	ooo
	SV14	872.775	337.644	1407.906	6.179	< .001	***
	SV15	-416.318	-951.449	118.813	-2.947	0.307	ns
	SV16	35.27	-499.861	570.401	0.25	1	ns
	SV17	246.73	-288.401	781.861	1.747	0.961	ns
	SV18	120	-415.131	655.131	0.85	1	ns
	SV19	454.925	-80.206	990.056	3.221	0.183	ns
	SV20	-331.907	-867.038	203.224	-2.35	0.692	ns
SV10	SV11	-320.207	-855.338	214.924	-2.267	0.744	ns
	SV12	-92.943	-628.074	442.188	-0.658	1	ns
	SV13	-1125.25	-1660.38	-590.117	-7.966	< .001	ooo
	SV14	608.289	73.158	1143.42	4.306	0.013	*
	SV15	-680.804	-1215.94	-145.673	-4.82	0.003	oo
	SV16	-229.216	-764.347	305.915	-1.623	0.98	ns

	SV17	-17.755	-552.886	517.376	-0.126	1	ns
	SV18	-144.485	-679.616	390.646	-1.023	1	ns
	SV19	190.44	-344.691	725.571	1.348	0.997	ns
	SV20	-596.392	-1131.52	-61.261	-4.222	0.016	o
SV11	SV12	227.264	-307.867	762.395	1.609	0.982	ns
	SV13	-805.041	-1340.17	-269.91	-5.699	< .001	ooo
	SV14	928.496	393.365	1463.627	6.573	< .001	***
	SV15	-360.597	-895.728	174.534	-2.553	0.554	ns
	SV16	90.991	-444.14	626.122	0.644	1	ns
	SV17	302.451	-232.68	837.582	2.141	0.817	ns
	SV18	175.721	-359.41	710.852	1.244	0.999	ns
	SV19	510.647	-24.484	1045.778	3.615	0.076	ns
	SV20	-276.186	-811.317	258.945	-1.955	0.901	ns
SV12	SV13	-1032.31	-1567.44	-497.174	-7.308	< .001	ooo
	SV14	701.232	166.101	1236.363	4.964	0.002	**
	SV15	-587.861	-1122.99	-52.73	-4.162	0.019	o
	SV16	-136.272	-671.404	398.859	-0.965	1	ns
	SV17	75.188	-459.943	610.319	0.532	1	ns
	SV18	-51.542	-586.673	483.589	-0.365	1	ns
	SV19	283.383	-251.748	818.514	2.006	0.881	ns
	SV20	-503.449	-1038.58	31.682	-3.564	0.086	ns
SV13	SV14	1733.537	1198.406	2268.668	12.272	< .001	***
	SV15	444.444	-90.687	979.575	3.146	0.212	ns
	SV16	896.033	360.902	1431.164	6.343	< .001	***
	SV17	1107.493	572.362	1642.624	7.84	< .001	***
	SV18	980.763	445.632	1515.894	6.943	< .001	***
	SV19	1315.688	780.557	1850.819	9.314	< .001	***
	SV20	528.856	-6.275	1063.987	3.744	0.056	ns
SV14	SV15	-1289.09	-1824.22	-753.962	-9.126	< .001	ooo
	SV16	-837.505	-1372.64	-302.374	-5.929	< .001	ooo
	SV17	-626.045	-1161.18	-90.914	-4.432	0.009	oo
SV14	SV18	-752.775	-1287.91	-217.644	-5.329	< .001	ooo
	SV19	-417.849	-952.98	117.282	-2.958	0.302	ns
	SV20	-1204.68	-1739.81	-669.551	-8.528	< .001	ooo
SV15	SV16	451.588	-83.543	986.719	3.197	0.192	ns
	SV17	663.048	127.917	1198.179	4.694	0.004	**
	SV18	536.318	1.187	1071.449	3.797	0.049	*
	SV19	871.244	336.113	1406.375	6.168	< .001	***
	SV20	84.411	-450.72	619.542	0.598	1	ns
SV16	SV17	211.46	-323.671	746.591	1.497	0.991	ns
	SV18	84.73	-450.401	619.861	0.6	1	ns
	SV19	419.656	-115.475	954.787	2.971	0.295	ns
	SV20	-367.177	-902.308	167.954	-2.599	0.523	ns
SV17	SV18	-126.73	-661.861	408.401	-0.897	1	ns
	SV19	208.195	-326.936	743.326	1.474	0.993	ns
	SV20	-578.637	-1113.77	-43.506	-4.096	0.022	o

JOURNAL of Horticulture, Forestry and Biotechnology
Volume 28(2), 2024, 92-101
https://jhfb.ro/index.php/jhfb
Print ISSN: 2066-1797
Online ISSN: 3045-1876

SV18	SV19	334.925	-200.206	870.056	2.371	0.678	ns
	SV20	-451.907	-987.038	83.224	-3.199	0.191	ns
SV19	SV20	-786.833	-1321.96	-251.701	-5.57	< .001	ooo

Note: SE = ±141.258 kg ha^{-1} (SE – Standard Error); ns – not significance

The SV1 maize hybrid, analyzed compared to the other hybrids, the SV2-SV20 series, based on grain production, showed significant differences in relation to 11 hybrids, in conditions of p<0.001 (nine hybrids), p<0.01 (one hybrid), and respective p<0.05 (one hybrid). The SV2 hybrid, analyzed compared to the other hybrids, the SV3 – SV20 series, presented significant differences in relation to eight hybrids, under conditions of p<0.001 (five hybrids), p<0.01 (two hybrids), and respectively p<0.05 (one hybrid). The SV3 hybrid analyzed compared to the other hybrids, presented significant differences in relation to six hybrids, the SV4 - SV20 series, under conditions of p<0.001 (one hybrid), p<0.01 (three hybrids), and respectively p<0.05 (one hybrid). The SV4 hybrid presented significant differences in relation to six hybrids from the SV5 - SV20 series, under conditions of p<0.001 (two hybrids), p<0.01 (two hybrids), p<0.05 (two hybrids).

The SV5 hybrid presented significant differences in relation to eight hybrids, the SV6 - SV20 series, under conditions of p<0.001 (five hybrids), p<0.01 (one hybrid), and respectively p<0.05 (two hybrids). The SV6 hybrid presented significant differences in relation to the nine hybrids, the SV7 – SV20 series, under conditions of p<0.001 (five hybrids), p<0.01 (three hybrids), and respectively p<0.05 (one hybrid). The SV7 hybrid presented significant differences in relation to six hybrids, the SV8 - SV20 series, under conditions of p<0.001 (two hybrids), <0.01 (three hybrids), and respectively p<0.05 (one hybrid). The SV8 hybrid presented significant differences in relation to five hybrids, the SV9 - SV20 series, under conditions of p<0.001 (two hybrids), p<0.01 (one hybrid), and respectively p<0.05 (two hybrids). The SV9 hybrid presented significant differences in relation to two hybrids, the SV10 – SV20 series, under conditions of p<0.001. The SV10 hybrid presented significant differences in relation to four hybrids, the SV11 - SV20 series, under conditions of p<0.001 (one hybrid), p<0.01 (one hybrid), and respectively p<0.05 (two hybrids).

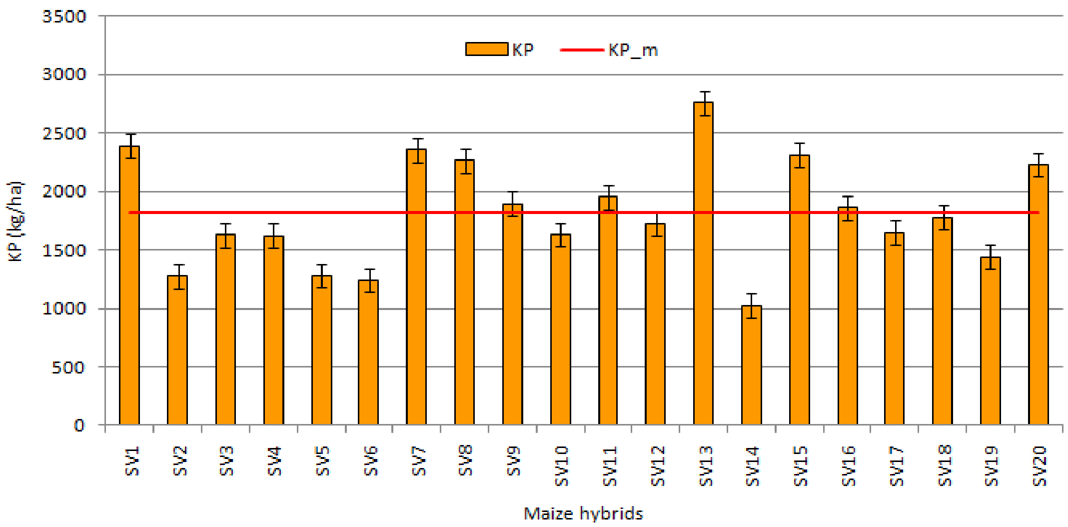

Figure 1. Representation of kernel production and positioning of maize hybrids compared to the mean value

The hybrid SV11 showed significant differences in relation to two hybrids, the SV12 – SV20 series, under conditions of p<0.001. The SV12 hybrid presented significant differences in relation to three hybrids, the SV13 - SV20 series, in terms of p<0.001 (one hybrid), p<0.01 (one hybrid), and respectively p<0.05 (one hybrid). The hybrid SV13 showed significant differences in relation to five hybrids, the SV14 – SV20 series, under conditions of p<0.001. The SV14 hybrid presented significant differences in relation to five hybrids, the SV15 – SV20 series, under conditions of p<0.001 (four hybrids), respectively p<0.01 (one hybrid). The SV15 hybrid presented significant differences in relation to three hybrids, from the SV16 - SV20 series, under conditions of p<0.001 (one hybrid), p<0.01 (one hybrid), respectively p<0.05 (one hybrid).

The SV16 hybrid did not present significant differences in relation to the analyzed SV17 – SV20 hybrids. The hybrid SV17 showed significant differences in relation to the hybrids from the SV18 – SV20 series, under conditions of $p<0.05$ (one hybrid). The SV18 hybrid did not present significant differences in relation to the SV19-SV20 hybrids. The SV19 hybrid presented significant differences ($p<0.001$) in relation to the SV20 hybrid.

The calculated mean value of the kernel production at the experience level was KP_m = 1815.395 kg ha^{-1}. In relation to the mean value, nine hybrids of maize were positioned above the mean value, and 11 hybrids were positioned below the mean value, figure 1.

The Cluster analysis facilitated the grouping of maize hybrids based on Euclidean distances in the cluster diagram, figure 2, under conditions of Coph.corr. = 0.777. Two distinct clusters were formed, based on the similarity of the hybrids, in relation to the kernel production.

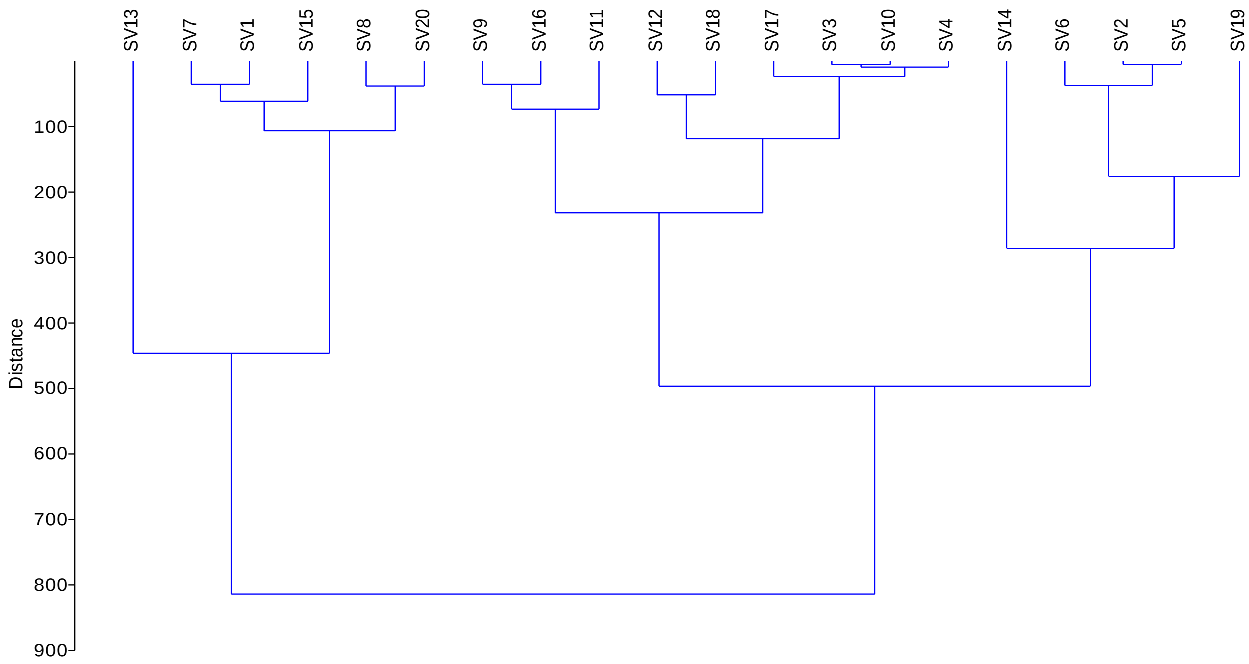

Figure 2. Grouping of tested maize hybrids in the cluster diagram

Two clusters resulted, a C1 cluster that includes six hybrids with high levels of kernel production, and a C2 cluster that includes 14 hybrids with lower levels of kernel production (compared to the mean value). Within the C1 cluster, the SV13 hybrid was positioned independently, with the highest level of kernel production. The other five hybrids were grouped in two subclusters, in relation to the level of kernel production, respectively [(SV7, SV1), SV15] and (SV8, SV20).

Comparative studies of the classification of some genotypes and commercial hybrids based on agronomic characters, productivity elements, yield and quality indices were carried out under similar conditions, specific to ARDS Lovrin [1], [2].

The crop technology ensured uniform conditions for the maize crop, and the level of fertilization ensured (complex fertilizer 300 kg ha^{-1}; ammonium nitrate 200 kg ha^{-1}) was utilized differently by the tested hybrids. Corn crop fertilization is important, and the response of the plants to macroelements was analyzed in order to optimize the fertilization of the corn crop, in conditions specific to the Western Plain of Romania [2], [5], [17].

The maize hybrids positioned above the mean value of the kernel production presented a high potential for exploiting the pedoclimatic conditions and technology in the experimental conditions, and present biological and agronomic advantages for maize breedings programs, and agricultural practice.

Conclusions

The twenty maize hybrids, produced by ARDS Suceava, tested in culture under the conditions of ARDS Lovrin, non-irrigated crop system, expressed differentiated production potential. The kernel production values varied between 1023.35±102.33 kg ha^{-1} (SV14), and 2756.88±102.33 kg ha^{-1} (SV13).

The comparative analysis between maize hybrids highlighted differences in terms of statistical safety, in conditions of $p<0.05$ (17 comparative analyses), $p<0.01$ (20 comparative analyses), respectively $p<0.001$ (48 comparative analyses).

Compared to the calculated mean value (KP_m = 1815,395 kg ha^{-1}), a number of nine hybrids were positioned above the mean value (SV1, SV7, SV8, SV9, SV11, SV13, SV15, SV16, and SV20), and 11 hybrids were positioned below the average value.

Based on the results, the production potential of each maize hybrid can be appreciated in relation to the other hybrids. Correlated with other attributes of the maize hybrids (physiological indices, agronomic characters, disease tolerance), they can be selected for the maize breeding program as well as for agricultural practice.

Acknowledgements

The present data were generated following the implementation of the ADER 2.1.2 project. Publishing of this journal is supported by the Institute for Plant Biotechnology of the University of Life Sciences “King Mihai I” from Timisoara.

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