

EVALUATION OF SOME MAIZE GENOTYPES BASED ON THE TKW PARAMETER

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Abstract. The study made a comparative analysis between twenty maize hybrids based on a seed quality index. The maize hybrids were created within Agricultural Research and Development Station Suceava (ARDS Suceava). The comparative crop of the twenty hybrids was done within ARDS Lovrin. Maize crop was organized in randomized repetitions, in a non-irrigated system. The experimental name of the hybrids was SV1 to SV20. Adequate crop technology ensured uniform vegetation conditions for the maize hybrids studied. Thousand kernel weight (TKW) was considered as an index of seed quality. The Anova test (PHC) was applied for the comparative analysis of the twenty hybrids. 190 combinations were made in the comparative analysis. According to the recorded results, in the case of 71 comparative analyses, differences were recorded in terms of statistical safety; 31 positive differences and 40 negative differences. Compared to the mean value calculated at the experiment level (TKW = 195.95 g), 12 hybrids presented values above the mean, and eight hybrids presented values below the mean. Positive growth of the TKW parameter associated with the genotype potential (compared to the mean value), was between $\Delta\text{TKW} = 0.23$ g (SV2) and $\Delta\text{TKW} = 33.17$ g (SV13). Negative growth of the TKW parameter, associated with the potential of the hybrid, was included between $\Delta\text{TKW} = -0.90$ g (SV11) and $\Delta\text{TKW} = -60.04$ g (SV5). The cluster analysis facilitated the grouping of hybrids based on Euclidean distances in the cluster dendrogram (Coph.corr. = 0.837). The hybrids were grouped based on similarity, in relation to the recorded TKW values. Independent positioning was recorded in the case of the SV5 hybrid with the lowest TKW value. Subcluster C2-A contained four hybrids, with high values of the TKW parameter ((SV8,SV12),SV6,SV13). Based on similarity, the other hybrids were grouped into two other subclusters (C2-B, and C2-C). The highest level of similarity was recorded between SV7 and SV15 hybrids (SDI = 0.11).

Keywords: Anova test, cluster diagram, comparative analysis, maize, TKW

INTRODUCTION

In vegetation studies of species from the spontaneous flora, biometric parameters of seeds have shown interest to understand and explain the potential of species and their spread, the mechanisms and dynamics of seeds to germinate, the succession of plant communities and other aspects of promoting plant species (Patrício and Trovão, 2020). The large seeds have advantaged the pioneer species of plants in relation to the occupied areas.

Seed parameters are determined genetically, but they can register certain variations in relation to environmental and technological management factors (Peñaloza and Durán, 2015). The authors studied tomato seeds and recorded a strong relationship between the physical parameters of the seeds and the quality of the seedlings. Dimensional parameters of grains are primarily genetically determined and influence grain yield in agricultural crops and grain quality indices (Zuo et al., 2021). The variation of the TKW parameter was recorded in relation to different maize genotypes cultivated in similar conditions, which showed the genetic potential of the genotypes and the adaptation to the crop conditions (Namo et al., 2012). The variability of some biometric parameters and quality indices of corn seeds was studied in relation to different genotypes and their cultivation areas (Semassa et al., 2016). The TKW parameter showed correlation with different quality indices of corn kernels, with importance for use in the food industry and human nutrition (Semassa et al., 2016).

The TKW parameter (thousand kernel weight) has practical agronomic utility to calculate the amount of seed per surface unit in relation to density, as well as for other practical uses, such as determining the number of seeds in a sample, estimating seed sizes (Felix et al., 2021). Physical parameters of corn seeds are important in relation to the quality of grain production and the processing and use in the food industry of corn production (Tang et al., 2021). The variation of seed weight, along with other parameters, was studied and analyzed in relation to different levels of seed wetting (Gierz et al., 2022). Physical parameters of the seeds were studied in relation to the process of cleaning and sorting the seeds (Fouda et al., 2022).

As the classical method, based on the counting of seed samples, has as a disadvantage the high consumption of time for counting, and possible human errors, the authors proposed new methods of determination based on imaging analysis (Felix et al., 2021). Descriptive methods of analysis, based on

morphological parameters of seeds, were used to study different characteristics of seeds in various plant species (Jamanca-Gonzales et al., 2024).

The increase in TKW values contributes positively to the increase in seed yield in agricultural crops (Hladni et al., 2016). Positive correlations were recorded between the increase in TKW values and the increase in sunflower seed size (Hladni et al., 2016). The close relationship between the thousand kernel weight and yield was also recorded in other studies, in white maize genotypes grown in soils specific to the rainy season, in Nepal (Bastola et al., 2021). Seed weight is an important morphological parameter in determining the yield of agricultural crops (Rod et al., 2021; Kumagai et al., 2022; Saroha et al., 2023). Seed weight and seed treatments contributed positively to plant growth in different plant species, starting with the root system and biomass produced by plants in the first stages of vegetation (Bečka et al., 2024).

Some studies showed that corn production was below the potential of the genotypes, as a result of some technological inadequacies, especially in the application of fertilizers (Debele et al., 2023). The yield and productivity indices varied significantly in relation to the fractional application of nitrogen, in the form of urea (Debele et al., 2023). Similar studies were carried out in relation to the optimization of fertilization with phosphorus and potassium for the purpose of efficient utilization of nitrogen (Boldea and Sala, 2010; Sala et al., 2016; 2019). The performance and yield of corn crops were analyzed in laboratory conditions and in field conditions, in relation to seed quality parameters (e.g. seed size) used for sowing (Omar et al., 2023).

The present study analyzed a collection of 20 maize hybrids created at ARDS Suceava, under specific crop conditions of ARDS Lovrin, in terms of the TKW.

MATERIAL AND METHODS

The study comparatively analyzed twenty maize hybrids created within ARDS Suceava. The comparative field crops were made in the specific climate and soil conditions within ARDS Lovrin.

According to the crop technology, the land was prepared by the sequence of plowing - disc - combiner works, in order to prepare the soil for sowing. Sowing was done in the first decade of April, 2024. The surface of an experimental plot was 6.7 m². The experiment was carried out in three repetitions.

In order to control the weeds, pre-emergence weeding was done, and mechanical and manual works were done in the vegetation. Fertilization was done with complexes (1:1:1) in a dose of 300 kg ha⁻¹, and ammonium nitrate 200 kg ha⁻¹. The climatic conditions of the 2023-2024 agricultural year are presented in table 1.

Table 1. Climatic conditions during the experimental period

Table 1. Climatic conditions during the experimental period													
Climatic parameters	Period												2023-2024
	2023				2024								
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
	Rainfall regime												Amount
Monthly amount	79.0	23.2	63.8	49.4	38.0	7.4	35.0	23.0	15.4	24.4	33.8	25.0	417.4
Multiannual mean	42.4	40.5	48.0	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	-22.0	-7.3	-104.0
	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 production was harvested on each experimental variant and repetitions, at the moment of biological maturity (Meier, 2001). From the grain production obtained on each variant, samples were taken to determine the thousand kernel weight (TKW). The determination of the TKW parameter was done by counting the seeds and weighing with a laboratory balance, precision ± 0.002 g.

Appropriate tools for mathematical and statistical analysis of the experimental data were used, respectively the analysis module in EXCEL, dedicated software (Hammer et al., 2001; JASP, 2022).

RESULTS AND DISCUSSIONS

The values of the TKW parameter recorded in the twenty corn hybrids created at ARDS Suceava were analyzed to check the safety of the data, the presence of variance in the data set and the differences between the corn genotypes. The values of the Anova Test confirmed the presence of variance and the statistical safety of the data ($p < 0.001$), table 2.

The Anova Test (PHC) facilitated the comparative analysis of the corn hybrids based on the recorded TKW values, and led to the results presented in table 3.

Table 2. Anova Test results

Cases	Sum of Squares	df	Mean Square	F	p
Trial	26881.52	19	1414.817	21.856	< .001
Residuals	2589.333	40	64.733		

Table 3. Statistical data for the comparative analysis of maize hybrids based on TKV values

Trials and differences		95% CI for mean difference		Statistical parameters and significance			
Trials		Mean difference	Lower	Upper	t	Pukey	
0	1	2	3	4	5	6	7
SV1	SV2	11.667	-13.220	36.553	1.776	0.955	ns
	SV3	19.333	-5.553	44.22	2.943	0.31	ns
	SV4	23.333	-1.553	48.22	3.552	0.089	ns
	SV5	72	47.113	96.887	10.96	< .001	***
	SV6	-15	-39.887	9.887	-2.283	0.734	ns
	SV7	8	-16.887	32.887	1.218	0.999	ns
	SV8	-12	-36.887	12.887	-1.827	0.942	ns
	SV9	33.333	8.447	58.22	5.074	0.001	**
	SV10	5.667	-19.220	30.553	0.863	1	ns
	SV11	13	-11.887	37.887	1.979	0.892	ns
	SV12	-11	-35.887	13.887	-1.674	0.973	ns
	SV13	-21	-45.887	3.887	-3.197	0.192	ns
	SV14	43	18.113	67.887	6.546	< .001	***
	SV15	8	-16.887	32.887	1.218	0.999	ns
	SV16	10	-14.887	34.887	1.522	0.99	ns
	SV17	24.667	-0.220	49.553	3.755	0.054	ns
	SV18	2	-22.887	26.887	0.304	1	ns
	SV19	26.333	1.447	51.22	4.009	0.028	*
	SV20	-0.333	-25.220	24.553	-0.051	1	ns
SV2	SV3	7.667	-17.220	32.553	1.167	1	ns
	SV4	11.667	-13.220	36.553	1.776	0.955	ns
	SV5	60.333	35.447	85.22	9.184	< .001	***
	SV6	-26.667	-51.553	-1.78	-4.059	0.025	o
	SV7	-3.667	-28.553	21.22	-0.558	1	ns
	SV8	-23.667	-48.553	1.22	-3.603	0.079	ns
	SV9	21.667	-3.220	46.553	3.298	0.156	ns
	SV10	-6	-30.887	18.887	-0.913	1	ns
	SV11	1.333	-23.553	26.22	0.203	1	ns
	SV12	-22.667	-47.553	2.22	-3.45	0.112	ns
	SV13	-32.667	-57.553	-7.78	-4.973	0.002	oo
	SV14	31.333	6.447	56.22	4.77	0.003	**
	SV15	-3.667	-28.553	21.22	-0.558	1	ns
	SV16	-1.667	-26.553	23.22	-0.254	1	ns
	SV17	13	-11.887	37.887	1.979	0.892	ns
0	1	2	3	4	5	6	7

SV2	SV18	-9.667	-34.553	15.22	-1.471	0.993	ns
	SV19	14.667	-10.220	39.553	2.233	0.765	ns
	SV20	-12	-36.887	12.887	-1.827	0.942	ns
SV3	SV4	4	-20.887	28.887	0.609	1	ns
	SV5	52.667	27.780	77.553	8.017	< .001	***
	SV6	-34.333	-59.220	-9.447	-5.226	< .001	ooo
	SV7	-11.333	-36.220	13.553	-1.725	0.965	ns
	SV8	-31.333	-56.220	-6.447	-4.77	0.003	oo
	SV9	14	-10.887	38.887	2.131	0.822	ns
	SV10	-13.667	-38.553	11.22	-2.08	0.848	ns
	SV11	-6.333	-31.22	18.553	-0.964	1	ns
	SV12	-30.333	-55.22	-5.447	-4.617	0.005	oo
	SV13	-40.333	-65.22	-15.447	-6.14	< .001	ooo
	SV14	23.667	-1.22	48.553	3.603	0.079	ns
	SV15	-11.333	-36.22	13.553	-1.725	0.965	ns
	SV16	-9.333	-34.22	15.553	-1.421	0.995	ns
	SV17	5.333	-19.553	30.22	0.812	1	ns
	SV18	-17.333	-42.22	7.553	-2.639	0.496	ns
	SV19	7	-17.887	31.887	1.066	1	ns
	SV20	-19.667	-44.553	5.22	-2.994	0.283	ns
SV4	SV5	48.667	23.78	73.553	7.408	< .001	***
	SV6	-38.333	-63.22	-13.447	-5.835	< .001	ooo
	SV7	-15.333	-40.22	9.553	-2.334	0.702	ns
	SV8	-35.333	-60.22	-10.447	-5.379	< .001	ooo
	SV9	10	-14.887	34.887	1.522	0.99	ns
	SV10	-17.667	-42.553	7.22	-2.689	0.463	ns
	SV11	-10.333	-35.22	14.553	-1.573	0.986	ns
	SV12	-34.333	-59.22	-9.447	-5.226	< .001	ooo
	SV13	-44.333	-69.22	-19.447	-6.749	< .001	ooo
	SV14	19.667	-5.22	44.553	2.994	0.283	ns
	SV15	-15.333	-40.22	9.553	-2.334	0.702	ns
	SV16	-13.333	-38.22	11.553	-2.03	0.871	ns
	SV17	1.333	-23.553	26.22	0.203	1	ns
	SV18	-21.333	-46.22	3.553	-3.247	0.173	ns
	SV19	3	-21.887	27.887	0.457	1	ns
	SV20	-23.667	-48.553	1.22	-3.603	0.079	ns
SV5	SV6	-87	-111.887	-62.113	-13.243	< .001	ooo
	SV7	-64	-88.887	-39.113	-9.742	< .001	ooo
	SV8	-84	-108.887	-59.113	-12.787	< .001	ooo
	SV9	-38.667	-63.553	-13.78	-5.886	< .001	ooo
	SV10	-66.333	-91.22	-41.447	-10.097	< .001	ooo
	SV11	-59	-83.887	-34.113	-8.981	< .001	ooo
	SV12	-83	-107.887	-58.113	-12.635	< .001	ooo
	SV13	-93	-117.887	-68.113	-14.157	< .001	ooo
	SV14	-29	-53.887	-4.113	-4.414	0.009	oo
0	1	2	3	4	5	6	7

SV5	SV15	-64	-88.887	-39.113	-9.742	< .001	ooo
	SV16	-62	-86.887	-37.113	-9.438	< .001	ooo
	SV17	-47.333	-72.22	-22.447	-7.205	< .001	ooo
	SV18	-70	-94.887	-45.113	-10.656	< .001	ooo
	SV19	-45.667	-70.553	-20.78	-6.952	< .001	ooo
	SV20	-72.333	-97.22	-47.447	-11.011	< .001	ooo
SV6	SV7	23	-1.887	47.887	3.501	0.1	ns
	SV8	3	-21.887	27.887	0.457	1	ns
	SV9	48.333	23.447	73.22	7.357	< .001	***
	SV10	20.667	-4.22	45.553	3.146	0.213	ns
	SV11	28	3.113	52.887	4.262	0.014	*
	SV12	4	-20.887	28.887	0.609	1	ns
	SV13	-6	-30.887	18.887	-0.913	1	ns
	SV14	58	33.113	82.887	8.829	< .001	***
	SV15	23	-1.887	47.887	3.501	0.1	ns
	SV16	25	0.113	49.887	3.806	0.048	*
	SV17	39.667	14.78	64.553	6.038	< .001	***
	SV18	17	-7.887	41.887	2.588	0.53	ns
	SV19	41.333	16.447	66.22	6.292	< .001	***
	SV20	14.667	-10.22	39.553	2.233	0.765	ns
SV7	SV8	-20	-44.887	4.887	-3.044	0.258	ns
	SV9	25.333	0.447	50.22	3.856	0.042	*
	SV10	-2.333	-27.22	22.553	-0.355	1	ns
	SV11	5	-19.887	29.887	0.761	1	ns
	SV12	-19	-43.887	5.887	-2.892	0.338	ns
	SV13	-29	-53.887	-4.113	-4.414	0.009	oo
	SV14	35	10.113	59.887	5.328	< .001	***
	SV15	-3.553×10^{-15}	-24.887	24.887	-5.408×10^{-16}	1	ns
	SV16	2	-22.887	26.887	0.304	1	ns
	SV17	16.667	-8.22	41.553	2.537	0.565	ns
	SV18	-6	-30.887	18.887	-0.913	1	ns
	SV19	18.333	-6.553	43.22	2.791	0.398	ns
	SV20	-8.333	-33.22	16.553	-1.269	0.999	ns
SV8	SV9	45.333	20.447	70.22	6.901	< .001	***
	SV10	17.667	-7.22	42.553	2.689	0.463	ns
	SV11	25	0.113	49.887	3.806	0.048	*
	SV12	1	-23.887	25.887	0.152	1	ns
	SV13	-9	-33.887	15.887	-1.37	0.997	ns
	SV14	55	30.113	79.887	8.372	< .001	***
	SV15	20	-4.887	44.887	3.044	0.258	ns
	SV16	22	-2.887	46.887	3.349	0.14	ns
	SV17	36.667	11.78	61.553	5.582	< .001	***
	SV18	14	-10.887	38.887	2.131	0.822	ns
	SV19	38.333	13.447	63.22	5.835	< .001	***
	SV20	11.667	-13.22	36.553	1.776	0.955	ns
0	1	2	3	4	5	6	7

SV9	SV10	-27.667	-52.553	-2.78	-4.212	0.016	o
	SV11	-20.333	-45.22	4.553	-3.095	0.235	ns
	SV12	-44.333	-69.22	-19.447	-6.749	< .001	ooo
	SV13	-54.333	-79.22	-29.447	-8.271	< .001	ooo
	SV14	9.667	-15.22	34.553	1.471	0.993	ns
	SV15	-25.333	-50.22	-0.447	-3.856	0.042	o
	SV16	-23.333	-48.22	1.553	-3.552	0.089	ns
	SV17	-8.667	-33.553	16.22	-1.319	0.998	ns
	SV18	-31.333	-56.22	-6.447	-4.77	0.003	oo
	SV19	-7	-31.887	17.887	-1.066	1	ns
	SV20	-33.667	-58.553	-8.78	-5.125	0.001	oo
SV10	SV11	7.333	-17.553	32.22	1.116	1	ns
	SV12	-16.667	-41.553	8.22	-2.537	0.565	ns
	SV13	-26.667	-51.553	-1.78	-4.059	0.025	o
	SV14	37.333	12.447	62.22	5.683	< .001	***
	SV15	2.333	-22.553	27.22	0.355	1	ns
	SV16	4.333	-20.553	29.22	0.66	1	ns
	SV17	19	-5.887	43.887	2.892	0.338	ns
	SV18	-3.667	-28.553	21.22	-0.558	1	ns
	SV19	20.667	-4.22	45.553	3.146	0.213	ns
	SV20	-6	-30.887	18.887	-0.913	1	ns
SV11	SV12	-24	-48.887	0.887	-3.653	0.07	ns
	SV13	-34	-58.887	-9.113	-5.176	< .001	ooo
	SV14	30	5.113	54.887	4.567	0.006	**
	SV15	-5	-29.887	19.887	-0.761	1	ns
	SV16	-3	-27.887	21.887	-0.457	1	ns
	SV17	11.667	-13.22	36.553	1.776	0.955	ns
	SV18	-11	-35.887	13.887	-1.674	0.973	ns
	SV19	13.333	-11.553	38.22	2.03	0.871	ns
	SV20	-13.333	-38.22	11.553	-2.03	0.871	ns
SV12	SV13	-10	-34.887	14.887	-1.522	0.99	ns
	SV14	54	29.113	78.887	8.22	< .001	***
	SV15	19	-5.887	43.887	2.892	0.338	ns
	SV16	21	-3.887	45.887	3.197	0.192	ns
	SV17	35.667	10.78	60.553	5.429	< .001	***
	SV18	13	-11.887	37.887	1.979	0.892	ns
	SV19	37.333	12.447	62.22	5.683	< .001	***
	SV20	10.667	-14.22	35.553	1.624	0.98	ns
SV13	SV14	64	39.113	88.887	9.742	< .001	***
	SV15	29	4.113	53.887	4.414	0.009	**
	SV16	31	6.113	55.887	4.719	0.004	**
	SV17	45.667	20.78	70.553	6.952	< .001	***
	SV18	23	-1.887	47.887	3.501	0.1	
	SV19	47.333	22.447	72.22	7.205	< .001	***
	SV20	20.667	-4.22	45.553	3.146	0.213	
0	1	2	3	4	5	6	7

SV14	SV15	-35	-59.887	-10.113	-5.328	< .001	ooo
	SV16	-33	-57.887	-8.113	-5.023	0.002	oo
	SV17	-18.333	-43.22	6.553	-2.791	0.398	ns
	SV18	-41	-65.887	-16.113	-6.241	< .001	ooo
	SV19	-16.667	-41.553	8.22	-2.537	0.565	ns
	SV20	-43.333	-68.22	-18.447	-6.596	< .001	ooo
SV15	SV16	2	-22.887	26.887	0.304	1	ns
	SV17	16.667	-8.22	41.553	2.537	0.565	ns
	SV18	-6	-30.887	18.887	-0.913	1	ns
	SV19	18.333	-6.553	43.22	2.791	0.398	ns
	SV20	-8.333	-33.22	16.553	-1.269	0.999	ns
SV16	SV17	14.667	-10.22	39.553	2.233	0.765	ns
	SV18	-8	-32.887	16.887	-1.218	0.999	ns
	SV19	16.333	-8.553	41.22	2.486	0.6	ns
	SV20	-10.333	-35.22	14.553	-1.573	0.986	ns
SV17	SV18	-22.667	-47.553	2.22	-3.45	0.112	ns
	SV19	1.667	-23.22	26.553	0.254	1	ns
	SV20	-25	-49.887	-0.113	-3.806	0.048	o
SV18	SV19	24.333	-0.553	49.22	3.704	0.062	ns
	SV20	-2.333	-27.22	22.553	-0.355	1	ns
SV19	SV20	-26.667	-51.553	-1.78	-4.059	0.025	o

(SE = 6.569)

From the general evaluation of the results of the comparative analysis (190 comparative analyses), differences were recorded with statistical certainty in the case of 71 comparative analyzes (31 positive differences and 40 negative differences). In the case of the other comparative analyses, the differences did not show statistical certainty.

The mean value calculated at the level of the experiment was TKW = 195.95 g, figure 1. In relation to the average value, 12 hybrids placed above the mean, and eight hybrids placed below the mean value.

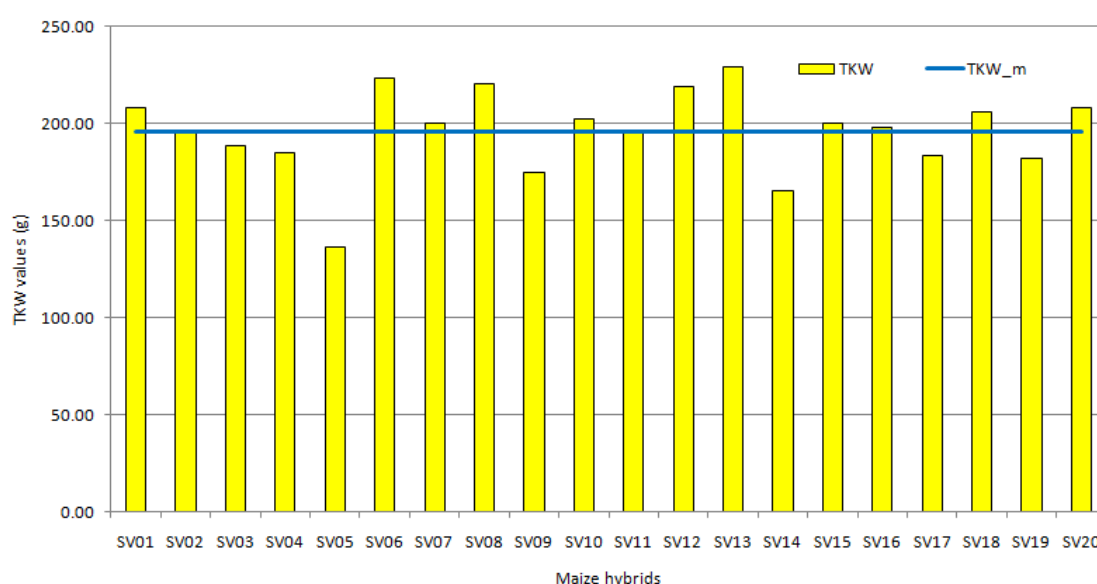


Figure 1. TKW values of maize hybrids compared to the mean value

Positive growth of the TKW parameter associated with the potential of the genotype (in relation to the

mean value), was between $\Delta\text{TKW} = 0.23$ g (SV2) and $\Delta\text{TKW} = 33.17$ g (SV13). Negative growth of the TKW parameter, associated with the potential of the hybrid, was between $\Delta\text{TKW} = -0.90$ g (SV11) and $\Delta\text{TKW} = -60.04$ g (SV5). The graphic distribution of TKW values on maize genotypes, compared to the calculated mean value, is presented in figure 1.

The Cluster Analysis led to the diagram in figure 2 (Coph.corr = 0.837). Hybrid SV5 was positioned separately (cluster C1), with the lowest value of TKW. The other hybrids were grouped in a cluster with three distinct subclusters. Subcluster C2-A included four hybrids with high values of the TKW parameter ((SV8,SV12),SV6,SV13). Based on similarity, the other hybrids were grouped into the other two subclusters (C2-B, and C2-C). The highest level of similarity was recorded between SV7 and SV15 hybrids (SDI = 0.11). At the level of subcluster C2-A, the level of similarity between SV8 and SV12 hybrids was SDI = 1.08. Hybrid SV13, with the highest TKW value, showed similarity with SV6 at SDI level = 5.90, with SV8 at SDI level = 9.22, and with SV12 at SDI level = 10.30, respectively.

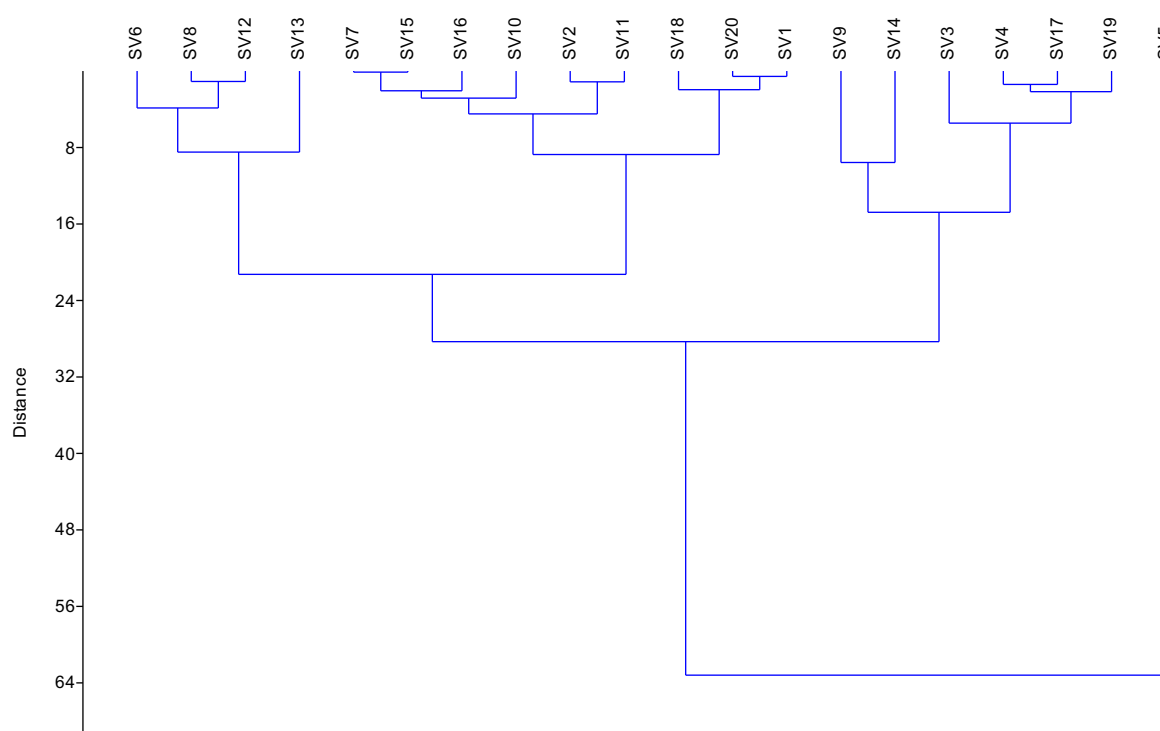


Figure 2. Grouping dendrogram of maize hybrids based on TKW values

The influence of seed size in agricultural practice, on plant growth yield, has been reported in many studies. In a study with 18 batches of tomato seed size, variations of tomato roots and seedling sizes were recorded in relation to the seed size category. Seedlings from larger seeds showed qualitative advantages (Peñaloza and Durán, 2015). Differences between the corn genotypes studied were recorded in close relation with seed vigor parameters (Omar et al., 2023). The authors of the study observed a direct relationship between the yield of plants and crops and the weight of a thousand seeds of the seed material.

Quality indices were studied in maize grains to characterize different genotypes from the agricultural perspective, the valorization of grain production, and genetic resources for maize breeding programs (Semasa et al., 2016; Tang et al., 2021; Agapie et al., 2024; Agapie and Sala, 2024).

Thousand kernel weight, along with other parameters, showed variability in relation to the plant species, with different maize genotypes, and the multiparameter analysis led to four groups associated with the parameters studied in the seeds (Semassa et al., 2016; Jamanca-Gonzales et al., 2024).

Under the conditions of the present study, the twenty maize hybrids studied expressed their genetic potential in terms of the TKW parameter, and four hybrids were positioned apart by the positive values recorded. The results are important for agricultural practice, but also for maize breeding programs.

CONCLUSIONS

The maize hybrids created at ARDS Suceava and cultivated in the comparative analysis under the conditions of ARDS Lovrin, expressed the potential regarding the seed quality parameter, thousand kernel weight (TKW) in the range of TKW = 135.91 g (SV5) and TKW = 229.12 g (SV13).

The comparative analysis of maize hybrids (190 comparative analyses) highlighted 71 comparative analyzes with statistically assured differences (31 positive differences, and 40 negative differences). Compared to the mean value (TKW = 195.95 g), twelve hybrids presented values above the mean, and eight hybrids presented values below the mean value.

The Cluster Analysis led to the dendrogram of hybrids grouping, based on Euclidean distances (Coph.corr = 0.837). The SV5 hybrid was positioned separately, with the lowest TKW value. The other hybrids were grouped into three subclusters, in relation to the recorded TKW values. A distinct subcluster C2-A comprised the first four hybrids, with high values of the TKW parameter (SV13, SV6, SV8, SV12).

The experimental data showed statistical reliability, according to the Anova Test ($p < 0.01$).

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