



3rd INTERNATIONAL MEETING AGRISCIENCE & PRACTICE (ASP 2023)

19th and 20th April 2023
Stip, Republic of North Macedonia



Introduction and determination of new tomato hybrids

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Abstract

The determination of the organoleptic characteristics in tomato *Lycopersicon esculentum* Mill. is a significant part in the basic needs and requirements of the market, but also in increasing the export potential. The aim of the research is the selection of new red tomato hybrids *Lycopersicon esculentum* Mill. According to their organoleptic, morphological and sensory characteristics, for possible commercialization. In the research, 23 coded new indeterminate hybrids of red tomato were analyzed and compared with 5 already present commercial hybrids (Brave F1, Adriatik F1, Matissimo F1, Alamina RZ F1, Signora F1). The tomato was produced from seedlings by a registered nursery grower Agro Koni, and it was planted in sheltered areas at a grower in Tirana, R. Albania. The properties that were examined: type of tomato (1 late / 5 early), plant strength (1 weak / 5 strong), length of internodes (1 long / 5 short), fruit quality (1 bad / 5 excellent), size of fruit (1 small / 5 large), as well as fruit color, fertility potential (yield), as well as overall evaluation of the plants in a rank from 1 (bad) to 5 (excellent). The relationships between analyzed properties, descriptive and the variance's analysis provided an insight into those hybrids that satisfy the methodological requirements. Based on the results and determination of new hybrids with improved properties from the existing ones, the needs of the market and consumers are influenced. According to the genetic potential and phenotypic characteristics, 3 new hybrids (TME221276, TME220244 and TME220245) were determined, which satisfied the examined criteria, thus giving the opportunity to be included in the cluster of commercial hybrids on the market.

Introduction

Tomato (*Lycopersicon esculentum* L.) is the globally most consumed vegetable. The fruit shape is an important agronomic trait that affects fruit quality and economic value (Azzi *et al.*, 2015). Tomato is considered as a model plant for fruit shape study (Bergougnoux, 2014). Globally, more than 5 million ha of tomatoes have been cultivated (Argento *et al.*), with an average yield of 35.9 t/ha and an annual production of more than 180 million tons, according to FAOSTAT (FAO, 2020). Tomatoes contain many nutrients, such as vitamin A, vitamin B, vitamin C, magnesium, potassium, sodium, iron, flavonoids, and lycopene (Oboulbiga *et al.* 2017; Mubarak *et al.* 2019). The choosing of adaptive plant variety (Macholdt and Honermeier, 2016; van Etten *et al.* 2019) can be the recommended practice to overcome the occurrence of drought stress in the agro-eco system. The genotypes (cultivars), plant growing conditions (ecological and technological), the time of fruit harvest, physiological and biochemical changes that fruits undergo after harvest, as well as many other different factors, decisively influence the fruit quality, understood as a complex concept, which includes all agronomic, commercial, nutritional, and gustatory components of fruits. (Felföldi *et al.* 2021, Fortis *et al.* 2021, Bădulescu, *et al.* 2020)..

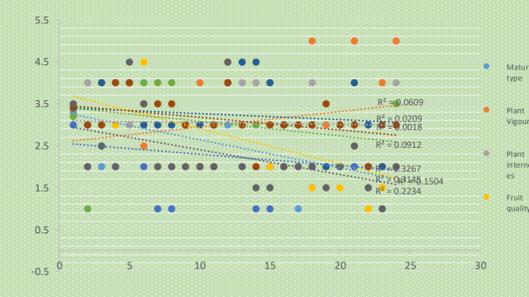
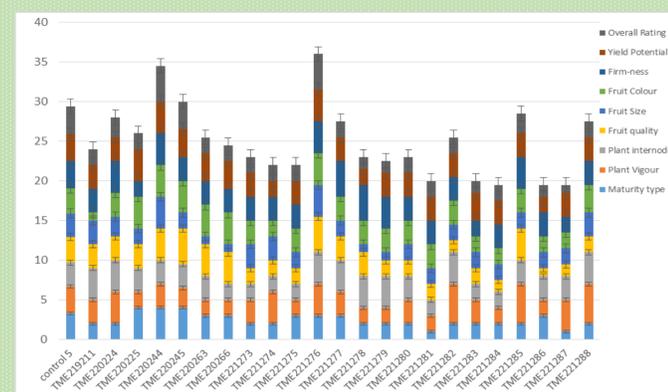


Results and Discussion

The sensory analysis of the new red tomato hybrids was done to define and compare the differences in terms of plant and fruit morphological characteristics between the analyzed genotypes and to highlight the differences between the new genotypes and commercial hybrids. Table 1 presents data on the Pearson correlation coefficient of new hybrids compared to commercial hybrids. High correlation of 0.85 to 1 has between TME 220263 with TME 220266, TME 220245 with TME 220266, TME221277 with TME 221288



	control 5	TME219211	TME220224	TME220225	TME220244	TME220245	TME220263	TME220266	TME221273	TME221274	TME221275	TME221276	TME221277	TME221278	TME221279	TME221280	TME221281	TME221282	TME221283	TME221284	TME221285	TME221286	TME221287	TME221288	
control 5	1																								
TME219211	-0.3003	1																							
TME220224	-0.0156	0.55213	1																						
TME220225	-0.0996	-0.36293	-0.3435	1																					
TME220244	0.3467	-0.57735	-0.7032	0.0898	1																				
TME220245	0.2193	0.45644	-0.3380	0.6532	-0.3953	1																			
TME220263	0.0693	-0.21651	0.1125	0.7184	0.0625	0.8301	1																		
TME220266	0.2458	-0.39546	-0.0363	0.6802	0.2619	0.8537	0.9468	1																	
TME221273	0.0877	-0.09129	0.3024	-0.1136	-0.0791	-0.5000	-0.1581	0.0235	1																
TME221274	0.1273	0.25491	0.4775	0.6093	-0.4918	-0.7255	0.5775	-0.4897	0.5804	1															
TME221275	0.3070	-0.45444	-0.1423	0.6248	0.3162	0.8500	0.5139	0.5988	0.3500	-0.2598	1														
TME221276	0.0801	0.16667	0.2923	-0.0896	0.1443	0.0000	0.0000	0.0000	0.0000	-0.5477	0.3751	1													
TME221277	-0.0296	0.39707	0.7095	-0.0916	-0.4984	0.0652	0.4770	0.3280	0.0652	0.0592	-0.1796	0.9318	1												
TME221278	-0.1591	0.27013	0.6843	0.0646	-0.3959	0.2162	0.5759	0.4060	-0.0559	-0.1073	0.3618	0.0623	0.9119	1											
TME221279	-0.0217	0.27217	0.6763	0.2540	-0.3936	0.1118	0.5568	0.3704	0.1118	-0.1621	0.4472	0.0680	0.9117	0.8907	1										
TME221280	0.0877	0.18257	0.7827	0.1400	-0.5534	-0.2000	0.3162	0.2039	0.5500	0.2538	0.3500	0.0000	0.6523	0.5577	0.7826	1									
TME221281	0.1233	-0.0712	0.4500	0.0449	0.1250	-0.0395	0.3438	0.3727	0.6720	0.0287	0.3953	0.4330	0.3223	0.3869	0.5303	0.6770	1								
TME221282	0.0620	0.3227	0.7799	-0.1406	-0.8385	-0.4936	-0.0819	-0.2072	0.3889	0.5643	-0.0707	-0.0645	0.4267	0.2736	0.4480	0.8132	0.2236	1							
TME221283	0.2431	0.2725	0.2807	0.2664	-0.3108	-0.1176	0.1180	0.1576	0.5330	0.3093	0.2345	-0.1168	0.0974	-0.1504	0.1430	0.5330	0.3202	0.5126	1						
TME221284	0.4160	0.1443	0.2813	0.0645	0.1250	-0.2372	0.0625	0.1007	0.5534	0.1147	0.6325	-0.1443	0.4384	0.2519	0.5303	0.5534	0.6250	0.2236	0.4719	1					
TME221285	0.3120	0.2887	0.7735	-0.3143	-0.5000	-0.0395	0.2188	0.2317	0.2767	0.5735	-0.1581	0.3608	0.4512	0.4229	0.2946	0.5139	0.3125	0.5870	0.3877	0.0625	1				
TME221286	-0.1471	0.2041	0.2586	0.1270	-0.3536	-0.2705	-0.0442	-0.1852	0.0559	0.0811	0.4472	-0.7144	0.6382	0.4454	0.5833	0.3913	-0.0884	0.3558	-0.0238	0.4419	-0.1768	1			
TME221287	-0.0693	0.5052	0.7313	-0.1123	-0.8125	-0.5139	-0.0897	-0.1514	0.5139	0.5735	-0.1581	0.0722	0.2965	0.1260	0.3241	0.7510	0.3125	0.8544	0.7416	0.2500	0.5938	0.1326	1		
TME221288	-0.1596	0.3085	0.7999	-0.1919	-0.8425	-0.5719	-0.1747	-0.2815	0.5199	0.6412	-0.1690	0.0000	0.3010	0.1834	0.3197	0.7538	0.2569	0.9466	0.4766	0.1027	0.5446	0.2470	0.9145	1	



Materials and Methods

In our research, 23 indeterminate red tomato hybrids were examined compared to 5 tomato hybrids that exist on the market. Tomato is produced from seedlings in a specialized company for the production of seedlings Agro Koni - Tirana in R. Albania. The produced seedlings are planted in protected areas by an individual producer in the Republic of Albania. The sensory analysis of the samples are rated from 1 to 5. The characteristics of tomato type were examined, of which 1 late / 5 early, plant strength 1 weak / 5 strong, length of internodes 1 long / 5 short, fruit quality 1 bad / 5 excellent, fruit size 1 small / 5 large, fruit color, fertility potential (yield) and overall rating of the plants are determined by poor/5 excellent. Comparative studies of the introduced hybrids with the hybrids Brave F1, Adriatik F1, Matissimo F1, Alamina RZ F1, Signora F1, which are present on the market, have been made.

Conclusions

The success of tomato breeding is closely linked to adequate knowledge of the market and consumer requirements, but also of the users, processors, and the preferences and needs of growers. The hypothesis of this study was based on the creation of new commercial hybrids that could meet the needs of the consumer and market chains, regarding the overall quality of the tested genotypes. From our research and the obtained data on the quality characteristics of the new red tomato hybrids and the statistical processing of the data, it was found that the hybrids: TME221276 showed good quality and size of fruit, good yield with round and smooth fruits, TME220244 gave fruits with good characteristics and potential of yield and TME220245 showed very good fruit quality and yield potential as well as good plant vigor. These quality characteristics and the analyzes of the three hybrids give us the right to recommend that they be included in the variety lists of tomato hybrids that will satisfy market and economic aspects.

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