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Evaluation of diverse mediterranean castor genotypes

Alessandra Piccitto[1], Silvio Calcagno[1], Venera Copani[1], Giorgio Testa[1], Danilo Scordia[1], Cristina Patanè[2], Salvatore Luciano Cosentino[1]

[1]Dip. di Agricoltura, Alimentazione e Ambiente (Di3A), Università degli Studi di Catania, IT, gtesta@unict.it

[2]CNR-Istituto per la BioEconomia (IBE), Sede Secondaria di Catania, IT

Introduction

Castor (*Ricinus communis* L.) is a member of the Euphorbiaceae family that is found across all the tropical and semi-tropical regions of the world. Castor is an important non-edible oil crop thanks to its high annual seed production and yield, its tolerance to drought stress and adaptability to arid, semi-arid climate and several growing conditions. Castor plant is also considered an important renewable resource that has a high value for use as a biorefining feedstock for producing biofuel as biodiesel.

The present study compared 55 genotypes of castor in terms of seed and oil yield collected from native perennial plants in a site of Gafsa, in southwest Tunisia.

Materials and Methods

Field experiments were conducted over the period 2019-2020 at the Experimental farm of the University of Catania, Italy (10 m a.s.l., 37°25' N lat., 15° 03' E long.) in a typical xerofluvent soil. The soil of the experimental area was ploughed before sowing and fertilized with 70 kg ha^{-1} of N as ammonium nitrate and 60 kg ha^{-1} of P_2O_5 as mineral perphosphate. Sowing was carried out in July 2019.

The irrigation volume was calculated according to the soil maximum available water in a depth of 0.6 m where root system is predominantly distributed. The experiment was arranged in a randomized block design with four replicates and genotypes were randomly distributed. The harvest of primary racemes was carried out in December 2019, while secondary racemes were collected in the next harvests according to the different flowering time. The oil content was determined according to Randall method by the use of a solvent extractor SER 148 Velp Scientific.

Results

The total seed yield was mainly affected by yield of secondary racemes with a percentage that ranged between 68% and 89%. The total seed yield ranged between 3120 kg ha^{-1} (genotype 33) and 1746 (genotype 27) kg ha^{-1}. The percentage of oil content in castor seeds ranged between 38% (genotype 15) and 46% (genotype 27), with an average value of 42% for the primary raceme and between 42% (genotype 15) and 48% (genotype 22), with an average value of 46% for the secondary racemes. The total oil yield was mainly affected by the seed yield and ranged from 769 kg ha^{-1} (genotype 27) to 1459 kg ha^{-1} (genotype 26).

Genotype	Seed yield (kg ha^{-1})	Oil content primary raceme (%)	Oil content secondary racemes (%)	Oil yield (kg ha^{-1})	Genotype	Seed yield (kg ha^{-1})	Oil content primary raceme (%)	Oil content secondary racemes (%)	Oil yield (kg ha^{-1})
1	2041	43	45	911	**29**	1996	43	47	916
2	2784	41	43	1196	**30**	2091	41	46	931
3	2133	40	42	892	**31**	2115	43	46	961
4	2822	39	44	1226	**32**	2148	41	47	973
5	2812	43	44	1238	**33**	3120	39	45	1381
6	2366	45	47	1107	**34**	2246	40	47	1032
7	2940	41	45	1302	**35**	2856	41	47	1309
8	2321	42	47	1069	**36**	2491	45	48	1180
9	2502	44	45	1110	**37**	2643	42	45	1168
10	2533	43	45	1120	**38**	2807	42	48	1312
11	2283	42	48	1056	**39**	2343	42	43	1004
12	2494	44	46	1128	**40**	268	44	47	1242
13	2238	40	48	1027	**41**	2222	45	44	976
14	2228	42	47	1024	**42**	2245	39	47	1030
15	2318	38	42	951	**43**	2614	41	47	1196
16	2764	44	45	1243	**44**	2590	40	47	1176
17	2489	42	44	1086	**45**	2716	42	47	1257
18	3003	42	47	1393	**46**	3045	41	46	1378
19	2550	43	46	1153	**47**	2591	42	47	1194
20	2196	42	44	9471	**48**	2749	44	46	1262
21	2413	40	48	1114	**49**	2268	41	45	1003
22	2618	41	48	1212	**50**	2434	44	43	1059
23	2858	42	45	1266	**51**	2428	40	45	1061
24	1947	42	45	865	**52**	2423	43	47	1120
25	2090	41	44	909	**53**	2984	43	46	136
26	3110	44	47	1459	**54**	2230	43	46	1006
27	1746	46	43	769	**55**	2317	40	46	1042
28	2557	42	48	1195	***AVG***	*2470*	*42*	*46*	*1106*

Conclusions

These results highlight that the genotypes evaluated in this study are suitable to the semi-arid Mediterranean environment. This preliminary research shows a great variability among genotypes and suggest the possibility to select other interesting traits for next breeding programs.