

Bio-Agronomic and Merceological Features of Sicilian Durum Wheat Landraces and Old Varieties

Paolo Guarnaccia¹, Sebastiano Blangiforti², Umberto Anastasi¹, Silvia Zingale¹, Michele Bizzini², Santo Virgillito¹, Maria Allegra³, Alfio Spina⁴

¹Dipartimento di Agricoltura, Alimentazione e Ambiente (Di3A), Università di Catania, (CT), IT.
paolo.guarnaccia@unict.it

²Stazione Consorziale Sperimentale di Granicoltura per la Sicilia, Caltagirone (CT), IT.

³Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA) - Centro di ricerca Olivicoltura, Frutticoltura e Agrumicoltura, Acireale (CT), IT.

⁴Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA) - Centro di ricerca Cerealicoltura e Colture Industriali, Acireale (CT), IT.

Introduction

Durum wheat landraces represent a collection of important genetic resources with traits of biological and economic significance, as they have been subjected to several cycles of artificial and natural selections, as reported by De Cillis (1942). The preservation of "historical cultivars" or landraces could be important to avoid genetic erosion, fostering their utilization in the new breeding programs (Colomba and Gregorini, 2011). The new EU agricultural policy, aimed at preserving agrobiodiversity and promoting low-input, organic agriculture has stimulated an interest for these landraces and old varieties, also in order to deepen the knowledge from the agronomic point of view and redirect the targets of breeding (Spina *et al.*, 2011; Guarnaccia *et al.*, 2015; Venora and Blangiforti, 2017).

Materials and Methods

Sixteen durum wheat genotypes, eleven Sicilian landraces, three old improved varieties 'Bidi', 'Cappelli' and 'Margherito' and two modern cultivars 'Claudio' and 'Simeto' (Tab. 1) were compared in a field experiment conducted in 2013/14 year in south-east Sicily (Caltagirone, Catania province, 37° 05' 58" N., 14° 29' 56" E., 280 m a.s.l.) in a medium-sandy soil, in order to assess the main bio-agronomic traits and quality of the grain and wholegrain flour. The genotypes were laid out in the field in 10 m² plots according to a randomized blocks experimental design with three replicates, adopting an ordinary agronomic management consisting in a pre-sowing fertilization with 40 kg ha⁻¹ N and 90 kg ha⁻¹ P₂O₅ and 50 kg ha⁻¹ N topdressing, and a post-emergence weeds control with dicotyledonicide. Official field survey and analysis methods were used. The experimental data were subjected to one-way ANOVA and Tukey test was applied to compare the means ($p \leq 0.001$).

Results

Among the landraces evaluated, 'Tripolino' was found to be the earliest compared to the other old genotypes, whereas 'Ciciredda', 'Paola' and 'Bidi' were found to be very late. Our historical Sicilian wheat collection, investigated here, showed the plant height ranged from 113 for 'Tripolino' and 149 cm for 'Gioia' (Tab. 1). Grain yield (2.2 t ha⁻¹), on average, was higher for the modern tester varieties 'Claudio' and 'Simeto'. Three Sicilian landraces ('Russello-Priziusa', 'Scorsonera' and 'Tripolino') and two old varieties ('Bidi' and 'Margherito') exceeded the average yield. The hectolitre weight were appreciably higher for 'Biancuccia', 'Tripolino', 'Urria' and 'Cappelli'. 'Farricello-Regina', 'Gioia', 'Paola', 'Russello', 'Cappelli' and 'Margherito' evidenced very high thousand kernels weight (≥ 50 g). Almost all genotypes, with the exception for 'Timilia', show high thousand kernels weight values and, therefore, large seeds. The incidence of non-vitreous kernels (starchy), recorded on genotypes studied, ranged from 0 or 0.5% ('Scorsonera', 'Ciciredda') to 96% ('Tripolino'). All the other genotypes recorded values between these two. The SDS sedimentation test values have been reduced for almost all vintage genotypes, with the exception for 'Ciciredda', and for old varieties 'Bidi', 'Cappelli' and 'Margherito'.

Table 1. Bio-agronomic and merceological characteristics of the studied durum wheat genotypes. (data are means \pm standard deviations). Different letter in the same column indicates significant difference ($p \leq 0.001$) according to the Tukey test.

Genotype	Days to heading) (from 01/04	Plant height (cm)	Yield (t/ha)	Hectolitre weight (kg/hL)	Thousand kernels weight (g)	Starchy kernels (%)	SDS sedimentation test (mL)
Biancuccia	34 \pm 0.71CDE	122 \pm 0.28E	1.6 \pm 0.85EFG	79.2 \pm 0.14D	41.9 \pm 0.14G	2.5 \pm 0.71EFG	29 \pm 0.71DE
Ciciredda	43 \pm 1.41A	143 \pm 0.14B	1.2 \pm 0.35GH	78.4 \pm 0.07DE	42.8 \pm 0.21G	0.5 \pm 0.71G	43 \pm 0.00A
Farricello (Regina)	32 \pm 0.71DE	142 \pm 0.35B	1.3 \pm 0.35FGH	76.4 \pm 0.21GH	56.6 \pm 0.28A	4 \pm 1.41EFG	30 \pm 0.00DE
Gioia	31 \pm 0.71EF	149 \pm 0.64A	1.9 \pm 0.42DE	75.5 \pm 0.21HI	53.5 \pm 0.14B	1.5 \pm 0.71FG	27 \pm 0.00DE
Martinella	38 \pm 0.71BC	125 \pm 0.28DE	1.1 \pm 0.14H	75.1 \pm 0.14I	46.9 \pm 0.14E	7 \pm 1.41DEFG	31 \pm 1.41DE
Paola	43 \pm 1.41A	123 \pm 0.28DE	1.6 \pm 0.14EFG	76.9 \pm 0.07FG	57.4 \pm 0.14A	66 \pm 3.54B	37 \pm 0.00BC
Russello (Priziusa)	33 \pm 0.00CDE	126 \pm 0.71D	2.6 \pm 0.85B	77.1 \pm 0.07FG	57.4 \pm 0.21A	10 \pm 1.41DEF	29 \pm 0.71DE
Scorsonera	32 \pm 0.71DE	141 \pm 0.49B	2.5 \pm 0.57BC	73.3 \pm 0.21L	44.7 \pm 0.14F	0.0 \pm 0.00G	29 \pm 0.71DE
Timilia	34 \pm 1.41CDE	116 \pm 0.64F	1.9 \pm 0.07DE	75.3 \pm 0.28I	33.5 \pm 0.00I	9 \pm 1.41DEFG	27 \pm 0.71E
Tripolino	26 \pm 0.71FG	113 \pm 0.00F	2.3 \pm 0.42BCD	82.3 \pm 0.07AB	39.3 \pm 0.07H	96 \pm 1.41A	32 \pm 1.41CD
Urria	30 \pm 0.00EF	122 \pm 0.57DE	1.6 \pm 0.64EF	80.7 \pm 0.00C	45.7 \pm 0.14EF	38 \pm 1.41C	32 \pm 1.41CD
Bidi	42 \pm 1.41AB	116 \pm 0.35F	2.3 \pm 0.85BCD	77.6 \pm 0.14EF	39.2 \pm 0.14H	5.5 \pm 0.71DEFG	42 \pm 0.71AB
Cappelli	36 \pm 0.00CD	135 \pm 0.21C	2.1 \pm 0.78 CD	81.4 \pm 0.07BC	49.6 \pm 0.58D	9 \pm 1.41DEFG	39 \pm 0.71AB
Margherito	33 \pm 0.71CDE	135 \pm 0.42C	2.3 \pm 0.35BCD	75.4 \pm 0.07I	51.5 \pm 0.07C	14 \pm 1.41D	37 \pm 0.71BC
Claudio	21 \pm 0.71GH	86 \pm 1.41G	4.3 \pm 1.41A	82.5 \pm 0.28A	48.4 \pm 0.35D	0.0 \pm 0.00DE	42 \pm 0.71AB
Simeto	18 \pm 0.71H	77 \pm 1.41H	3.9 \pm 0.99A	79.1 \pm 0.14D	52.3 \pm 0.28BC	0.0 \pm 0.00EFG	41 \pm 0.71AB
Mean	32.6	123.1	2.2	77.9	47.5	16.4	34.0

Conclusions

The results obtained highlighted an appreciable variability for the bio-agronomic and merceological features of the Sicilian durum wheat landraces and old varieties. While producing about half of modern cultivars on average, a re-evaluation of this germplasm could be contribute to the safeguarding of cereals agrobiodiversity and to diversification of farming systems, focusing in particular on low input and/or organic agriculture. In particular, the high plant height of these genotypes can be an advantage in terms of competitiveness against weeds.

Literature

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