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Adaptability of Old Varieties of Durum Wheat to a Hilly Internal Area of Campania Region

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Introduction

Durum wheat (*Triticum turgidum* L. subsp. durum) is one of the most economically important crops cultivated worldwide on about 30–35 million hectares, but especially in the Mediterranean basin where it is used to produce foods, such as pasta, couscous, bread, and bulgur. In Italy, almost 70% of the cultivation is concentrated in the Southern where meteorological factors positively influence crop yield. However, in Campania Region, the durum wheat is often cultivated in internal areas, identified as marginal lands where crop management is sometimes very difficult. Therefore, in the last years, a progressive abandonment of this cultivation and these lands was observed. A solution to this phenomenon could be the re-introduction of old grains, typically more rustic and therefore more suitable also to limiting cultivation condition. The aim of this research was to recover some old varieties of durum wheat and evaluate their productive behavior in a hilly internal area of the Campania Region.

Materials and Methods

Site	Sant'Angelo dei Lombardi –AV (Campania Region), 700 m a.s.l.
Soil	clay soil (clay = 44%, silt = 22%, sand = 34%).
Crop	Durum wheat (*Triticum turgidum* L. subsp. durum)
Seed	12 December 2019
Treatments	Six old varieties and/or landraces of common wheat were tested: Saragolla Bioland, Marzellina Fortore, Marzellina S. Giorgio La Molara, Cappella, Senatore Cappelli, and Saragolla Mirra. Completely randomized and replicated 3 times
Experimental Plot	4 m^2 (2 x 2 m)
Fertilization	urea 100 kg ha^{-1}
Harvest	14 July 2020

At the harvest, grain yield, harvest index (HI), culm height, spike length, and average weight; then on a grain sample, percentage of humidity, 1000 seeds weight, vitreousness, and shriveled seeds were determined.

Results

The mean yield of all varieties was 3.1 t ha^{-1} and it ranged between 4 t ha^{-1} of Saragolla Bioland and 1.6 t ha^{-1} of Senatore Cappelli (Fig. 1). Interestingly, the productive behavior was similar for each genetic group: the two Saragolla showed the highest yield value (about 3.9 t ha^{-1}); the two Marezellina reached 3.6 t ha^{-1}; finally, the two Senatore Cappelli had the worst productive performance (1.6 t ha^{-1}), also if Cappella wasn't different from Marzellina San Giorgio la Molara (Fig. 1). The two Saragolla also had the highest values of HI, but Saragolla Mirra was not different from Cappella, which was also not different from all other varieties (Table 1). At the harvest, the plant height overcame 100 cm in Saragolla Mirra, Saragolla Bioland, and Senatore Cappelli, the other three varieties were not different between them (about 90 cm) (Table 1). The high yield of the two Saragolla was only partially due to spike length, and greatly to 1000 seeds weight, which was 58.6 g on mean, and it overcame of about 26.8% and 80.5% the mean value of the varieties Cappelli and Marzellina, respectively (Table 2). No differences were found for grain humidity. Finally, the two Saragolla showed also the best performance in terms of quality, indeed they had the lowest values of vitreousness and shriveled seeds: 0.5%, and 0.85% on average, respectively. However also the other four varieties showed the low value of vitreousnes and shriveled seeds: 3.4% and 2.7%, respectively (Table 2).

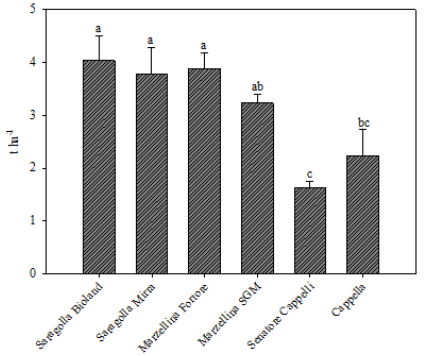

Figure 1. Yield of the six old varieties of durum wheat.

Table 1. Yield components of the six old variety of durum wheat.

Variety	Plant height	IR	Spike weight	Spike Lenght
	cm	%	g $spike^{-1}$	cm
Saragolla Mirra	103.3 a	25.8 ab	2.9 a	8.1 b
Saragolla Bioland	101.3 ab	29.3 a	3.9 a	8.9 a
Cappella	91.3 bc	22.8 bc	2.8 b	6.9 c
Senatore Cappelli	104.0 a	18.6 c	2.9 b	8.2 ab
Marzellina Fortore	88.7 c	21.5 c	1.7 c	7.4 bc
Marzellina S.G. M.	90.0 c	19.7 c	2.0 c	7.6 bc

Table 2. Yield quality of grain of the six old variety of durum wheat.

Variety	Grain Humidity	1000 seeds Weight	Vitreousness	Shriveled seeds
	%	g	%	%
Saragolla Mirra	9.8 ns	59.3 a	0.7 ab	1.0 b
Saragolla Bioland	10.2 ns	58.0 a	0.3 b	0.7 b
Cappella	10.3 ns	47.8 b	4.0 a	1.3 b
Senatore Cappelli	9.3 ns	44.7 b	2.7 ab	2.7 ab
Marzellina Fortore	11.6 ns	34.0 c	2.7 ab	4.0 a
Marzellina S.G. M.	9.5 ns	31.0 c	4.0 a	2.7 ab

Conclusions

Our preliminary results highlight that the two Saragolla seem more suitable to cultivation in the internal hilly area of the test, both in terms of yield and quality.

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