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A preliminary survey on pomegranate (*Punica granatum* L.) genotypes localized in Apulia region, Southeastern Italy

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Abstract. Little information is available about the pomegranate genotypes present in Italy and in particular in Apulia (Southeastern region of Italy). A two-year study (2008-2009) was carried out in order to evaluate morphological, organoleptic and chemical parameters of 8 pomegranate genotypes (4 sweet and 4 sour) localized in some small orchards. Significant differences were observed among the 8 genotypes for many of the parameters investigated.

Keywords. Sweet – Sour – Morphological measurements – Polyphenols – Antioxidant activity.

I – Introduction

Some studies have been published on the morphological and biochemical characteristics of pomegranate fruits in various Mediterranean countries (Barone *et al.*, 2001; Drogoudi *et al.*, 2005; Tzulker *et al.*, 2007; Martínez *et al.*, 2006) but no information is available about the genotypes present in Apulia region (Southeastern of Italy), where no hectares result officially under cultivation (ISTAT, 2010).

The objective of this research was to analyze morphological, organoleptic and chemical parameters of 8 genotypes of pomegranate localized in some orchards in order to better characterize genotypes that may be used for cultivation or for breeding programs in the next future and as a perspective of further development of pomegranate cultivation in the region.

II – Materials and methods

The collection of pomegranate fruits was conducted in the years 2008 and 2009 from adult trees located in private small orchards. For both years harvesting time ranged from mid-end September to mid October. Four genotypes were sour and four were considered sweet. The genotypes analyzed were: Common Triggiano (ComTri), Modugno Triggiano (ModTri), Common Molfetta (ComMol), A dente S. Giorgio (AdeSgi), Sour Molfetta (SouMol), Sour Ostuni (SouOst), Sour S.Giorgio (SouSgi), Sour Triggiano (SouTri).

Morphological measurements (Mars and Marrakchi, 1999; Martínez *et al.*, 2006) and organoleptic and chemical analyses were carried out on samples of 15 mature fruits per genotype and per year. Total phenolic contents (TPC) of the pomegranate juices were assayed according to Folin-Ciocalteu method. The antioxidant activity was measured with a spectrophotometric method by using DPPH (Brand-Williams *et al.*, 1995) and slightly modified. The antioxidant activity was expressed as TEAC and AEAC.

III – Results and discussion

The average weight of the fruit was 338.7 g and a significant difference was observed between the two years (317.7 g, in 2008 and 359.7 g, in 2009). The weight of the fruit ranged from a minimum of 168.9 g (SouMol) to a maximum of 574.9 g (SouOst), as shown in Table 1. Mean fruit weight was similar to that measured for some Spanish cultivars (Martínez *et al.*, 2006). The mean weight of the arils was lower than that obtained for new varieties in Spain, 505 mg (Martínez *et al.*, 2006) and for Iranian accessions, 444 mg (Sarkhosh *et al.*, 2009) but are close to the mean weight of Greek accessions (Drogoudi *et al.*, 2005).

SouOst presented the highest juice volume (72.2 cm^3) and SouTri the least (65.2 cm^3); the mean value was 67.8 cm^3, higher than the value reported in Spain, 59.13 cm^3 for new varieties (Martínez *et al.*, 2006). The highest °Brix (Table 1) value was surprisingly measured in a sour genotype, SouMol (18.0), and the lowest in a sweet genotype, ComTri (14.7). The °Brix mean value of the apulian genotypes was 16.0, very similar to what reported for Spanish varieties (Martínez *et al.*, 2006). Total acidity ranged from 5.4 (ComMol) up to 25.0 g/l (SouTri). The results for the morphological and organoleptic characteristics indicated a significant difference among the 8 examined genotypes. AdeSgi seemed the most interesting for the fresh market both for the size of fruit and arils.

Table 1. Mean values of the morphological and organoleptic characteristics of the fruits

Genotype	Fruit weight (g)	Aril weight (mg)	Seed weight (mg)	Juice volume (cm^3/100g)	°Brix	Total acidity (g/l citric acid)
SouTri	374.2	367.1	21.2	65.2	16.3	25.0
ComTri	267.2	435.1	21.9	70.8	14.7	4.3
ModTri	226.5	335.5	23.6	65.8	15.3	5.7
ComMol	173.5	426.9	21.7	69.5	16.4	5.4
SouMol	168.9	277.4	20.8	66.2	18.0	21.7
SouOst	574.9	403.9	23.5	72.2	14.8	19.6
SouSgi	543.4	323.4	23.1	65.5	16.8	23.6
AdeSgi	381.3	519.1	24.9	67.3	15.5	5.5

The content of total polyphenols (Table 2) determined by HPLC ranged from 6.4 (AdeSgi) to 97.1 (SouMol) mg/l. The content of total polyphenols determined by Folin–Ciocalteu method (Table 2) was higher than the values obtained by HPLC and varied from 303 (SouOst) to 1328 (SouSgi) mg of gallic acid equivalent/l of juice. Our values are similar to polyphenols values recently reported for Chilean genotypes (676-1280) (Sepúlveda *et al.*, 2010). Antioxidant activity of pomegranate juices varied from 8.0 (ComTri) to 17.7 (SouMol) and from 6.0 (ComTri) to 13.7 (SouMol), respectively for AEAC and TEAC (Table 2). Sour genotypes presented the highest antioxidant activity even higher than red wine and green tea (6-8 TEAC) and similar to values (12-14 TEAC) reported for juice of 'Wonderful' (Gil *et al.*, 2000). Vitamin C content (Table 2) ranged from 89 (SouOst) to 236 (SouMol) mg/l, values much higher than the values (13-52 mg/l) reported in the Greek accessions (Drogoudi *et al.*, 2005). In conclusion, significant differences have been observed among the pomegranate genotypes. Considering all the morphological, organoleptic and chemical parameters analyzed, some genotypes are worthy to be considered either for the fresh market or for the juice industry.

Table 2. Polyphenols, antioxidant activity and vitamin C content of the juice

Genotype	Polyphenols (HPLC-UV) (mg/l)	Total Polyphenols (mg/l GAL)	Antioxidant activity (mM AEAC)	Antioxidant activity (mM TEAC)	Vitamin C (mg/l)
SouTri	17.2	788.3	11.3	9.3	144.3
ComTri	12.8	1020.0	8.0	6.0	156.0
ModTri	11.0	1020.0	10.7	8.0	144.7
ComMol	13.2	630.7	10.9	8.3	156.7
SouMol	97.1	960.7	17.7	13.7	236.3
SouOst	6.6	303.0	10.5	8.0	89.0
SouSgi	57.3	1328.0	16.0	12.0	192.0
AdeSgi	6.4	436.3	10.3	7.7	105.0

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