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Pomological Definition of Native Walnuts (*Juglans regia* L.) Grown in Central Bitlis

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Abstract: In this research conducted in native walnut population during 2003-2004 years in Bitlis, 17 walnut genotypes having kernel weight over 5 g were selected and pomologically defined. Selected genotypes were determined to have a range of 32.90-41.22 mm for nut width, 29.96-38.32 mm for nut thickness, 32.14-36.86 mm for nut length, 10.94-17.20 g for nut weight, 5.48-8-50 g for kernel weight, 41.63-51.92% for kernel percentage and 1.22-1.98 mm for shell thickness. The kernel fullness of all genotypes except for one was good, kernel rottenness was not run into all genotypes. In addition, kernel colors of genotypes were light, dark, yellow and extreme dark. Findings pointed out that Central Bitlis district had valuable walnut genetic resources.

Key words: Walnut, pomology, selection, fruit, central Bitlis

INTRODUCTION

Turkey, one of the motherland of walnut, has rather rich and valuable walnut genetic resources. Turkey is the first in walnut tree existence, fourth in walnut production after China, America and Iran (Anonymous, 2000). Uptill now, several selection breeding studies were performed with a view to be appraised this genetic wealth in terms of walnut breeding works in different locations of Anatolia where were performed and some natural promising walnut selections were found (Celebioglu, 1978; Sen, 1980; Akca, 1993; Ozkan, 1993; Askin and Gun, 1995; Balci, 1999; Kuden *et al.*, 1997; Yarilgac, 1997; Yavic, 2000; Sutyemez *et al.*, 2001; Yilmaz, 2001; Taskin, 2004; Muradoglu, 2005).

In Turkey, eastern Anatolia has the widest native walnut population (Sen, 1986; Yarilgac, 1997). Bitlis, take places in the east Anatolia region, an important potential with regard to walnut cultivation comes between prosperous locations on account of valuable walnut genus sources. Accordingly, it has a great consideration that precious walnut genotypes should be examined in detail, determined of their superior qualified on account of breeding characteristics and protected for standart walnut cultivars improving (Sen, 1986; Akca, 1993; Yarilgac, 1997; Muradoglu, 2005). The modern breeding efforts of walnut include superior nut properties, high and in order production, late leafing, resistance to diseases and harmfuls are from their significant characteristics (Forde, 1975; Sen, 1986; McGranahan and Leslie, 1991; Germain, 1997; Akca, 2001). This research aims at

selecting superior walnut genotypes grown in central Bitlis located in eastern Turkey and defining their desirable pomological characteristic for breeding efforts.

MATERIALS AND METHODS

This research was completely carried out on walnut trees growing from seed with different genetic properties and ages in Bitlis province, which has rich walnut genetic resources, located in the Eastern Anatolia of Turkey during 2003 and 2004. Initially, by being walked around one by one walnut trees in district, preliminary study was done and then nut samples were randomly collected from seedling walnut trees which were not infected by walnut diseases such as anthracnose and walnut blight, high quality fruit and good yield at the harvesting time. Some information about the tree characteristics of genotypes were asked from the tree owners and recorded on the selection survey notebooks during the work. Seventeen walnut genotypes were selected. In genotypes, some fruit characteristics, important on account of modern walnut breeding aims such as nut width (mm), nut thickness (mm), nut length (mm), nut weight (g), kernel weight (g), kernel percentage (%), shell thickness (mm), kernel texture, kernel fullness, kernel color, kernel shrink, kernel removal, kernel rottenness and kernel veined were ascertained. Twenty fruit samples were used from each genotype concerning measurements and evaluations. For nut height, width and thickness measurements were also taken by using a compass (0.05 mm).

RESULTS AND DISCUSSION

In this study, aimed to be described superior walnut genotypes in native walnut population growing from seed in Bitlis, by taking into consideration kernel weight, important nut quality property, some nut characteristics of 17 walnut genotypes, which were found over 5 g for kernel weight, were examined pomologically.

As seen Table 1, of the genotypes selected in the research, nut weight ranged between 10.94 g (BW-15) and 17.20 g (BW-11), kernel weight ranged between 5.48 g (BW-15) and 8.50 g (BW-11), kernel percentage %41.63 (BW-7) and 51.92 (BW-19). It had determined three genotypes for nut weight over 15 g, two genotypes for kernel weight over 8 g, three genotypes for kernel percentage over 50%. Yarilgac *et al.* (2001), in a study that conducted on some promising walnut selections, were fixed nut weight between 10.38 and 17.04 g, kernel weight between 5.85 and 7.88 g, kernel percentage between 45.09 and 59.27% and shell thickness between 0.86 and 1.75 mm. In other work, selected by Muradoglu (2005) in central county of Hakkari and Ahlat, the genotypes had 9.91-15.22 g for nut weight, 5.00-6.50 g for kernel weight, 40.90-55.50% for kernel percentage and 1.04-2.05 mm for shell thickness. In order to select promising native walnut genotypes characteristics of trees in Rize, a research was done and the genotypes exhibited a range of 11.8-18.7 g for inshell fruit weight, 6.25-9.23 g for kernel weight, 48-60% for kernel percentage, 1.02-1.75 mm for shell thickness (Balci, 1999).

Fruit dimensions, the other important fruit quality criteria for the selections we investigated had nut width between 32.90 and 41.22 mm, nut thickness between 32.92 and 38.32 mm, nut length between 32.34 and 36.86 mm (Table 1). According to these data determined,

the genotypes we investigated indicated that some of them could take up a position between a lot of standard cultivars.

Indeed, in Turkey and the World, from many studies carried out both on various standard walnut cultivars and on promising walnut genotypes in different plantations, similar evaluations have been reported (Celebioglu, 1978; Sen, 1986; Akca, 1993; Ozkan, 1993; Askin and Gun, 1995; Balci, 1999; Kuden *et al.*, 1997; Yarilgac, 1997; Yarilgac *et al.*, 2000; Yavic, 2000; Ayanoglu and Bayazit, 2001; Kazankaya *et al.*, 2001; Sharma and Sharma, 2001; Sutyemez *et al.*, 2001; Yilmaz, 2001; Taskin, 2004; Muradoglu, 2005).

Fruit color and other kernel characteristics varied as shown in Table 2. For the majority of selections, kernel removal was easy and kernel fullness was good. In selected genotypes was not run into kernel rottenness at all. As well, all genotypes concerning kernel fullness, except one genotype (BW-5), were regarded as good and kernel texture was detected as smooth for five genotypes, medium for eight genotypes and rough for four genotypes (Table 2). Taskin (2004) selected 20 types in Yuksekova and Semdinli districts and kernel fullness of them found medium (1) and good (19) and reported that in these types were not at all coincide with kernel rottenness as well. In addition to this, all our selections were found as absent for kernel shrink, except one genotype (BW-5) and thirteen genotypes as whole and four genotypes as half for kernel removal, four genotypes as veined and thirteen genotypes as few veined for kernel veined (Table 2).

In 20 genotypes selected by Yarilgac (1997), kernel ratio had been detected as light 70-100% for 17 types and 30-50% for three types. In the genotypes we fixed kernel color had light (5 genotypes), brown (7 genotypes), yellow (4 genotypes) and dark (1 genotype) (Table 2).

Table 1: Some fruit traits belonging to 17 walnut genotypes selected from central Bitlis, Turkey

Genotype No.	Nut width (mm)	Nut thickness (mm)	Nut length (mm)	Nut weight (g)	Kernel weight (g)	Kernel (%)	Shell thickness (mm)
BW-11	39.20±0.37	38.32±0.38	36.86±0.24	17.20±0.42	8.50±0.32	49.42±0.92	1.60±0.11
BW-21	40.74±0.41	33.84±0.51	35.50±0.66	16.02±0.35	8.06±0.07	50.31±1.22	1.74±0.07
BW-16	40.34±0.60	36.12±0.42	35.60±0.36	14.48±0.56	6.98±0.52	48.20±0.91	1.32±0.11
BW-10	39.94±0.52	32.54±0.41	34.56±0.65	13.92±0.46	6.84±0.28	49.13±1.20	1.60±0.08
BW-19	32.90±0.94	34.12±0.50	33.28±0.42	12.98±0.29	6.74±0.16	51.92±0.44	1.22±0.12
BW-7	37.76±0.53	33.38±1.09	33.90±0.44	15.95±0.41	6.64±0.23	41.63±0.50	1.98±0.08
BW-20	40.92±0.72	33.18±0.50	34.74±0.62	13.88±0.27	6.50±0.07	46.83±1.13	1.58±0.02
BW-6	39.42±1.22	33.54±0.36	33.70±0.45	13.25±0.56	6.28±0.34	47.39±1.13	1.40±0.10
BW-13	37.88±0.95	33.70±0.73	36.26±0.57	13.68±0.49	6.26±0.20	45.76±0.96	1.45±0.20
BW-12	41.22±0.60	31.06±0.35	34.40±0.25	14.14±0.62	6.24±0.15	44.13±1.03	1.48±0.07
BW-14	40.00±0.48	33.68±0.32	33.04±0.31	12.10±0.44	6.24±0.23	51.57±0.87	1.28±0.12
BW-9	38.80±0.37	31.24±0.51	33.32±0.41	13.04±0.50	6.14±0.22	47.08±2.99	1.64±0.09
BW-8	39.16±0.92	33.24±0.33	34.22±0.61	12.56±0.37	5.98±0.37	47.61±1.71	1.26±0.12
BW-18	41.00±0.47	32.80±0.45	33.20±0.27	13.80±0.27	5.84±0.06	42.31±2.31	1.88±0.08
BW-17	34.32±0.35	32.22±0.45	34.64±0.31	12.78±0.47	5.74±0.26	44.91±1.89	1.60±0.08
BW-5	38.22±1.14	36.98±1.57	35.40±1.01	12.68±0.52	5.52±0.21	43.53±0.68	1.41±0.14
BW-15	35.18±1.08	29.96±0.29	32.14±0.37	10.94±0.14	5.48±0.07	50.09±0.56	1.52±0.06

Table 2: Some fruit traits belonging to 17 walnut genotypes selected from central Bitlis, Turkey

Genotype No.	Shell texture	Kernel fullness	Kernel color	Kernel shrink	Kernel removal	Kernel rottenness	Kernel veined
BW-11	Medium	Good	Brown	Absent	Whole	Absent	Light-veined
BW-21	Rough	Good	Brown	Absent	Whole	Absent	Medium-veined
BW-16	Rough	Good	Brown	Absent	Whole	Absent	Light-veined
BW-10	Smooth	Good	Yellow	Absent	Half	Absent	Light-veined
BW-19	Medium	Good	Light	Absent	Whole	Absent	Light-veined
BW-7	Medium	Good	Yellow	Absent	Half	Absent	Light-veined
BW-20	Medium	Good	Brown	Absent	Whole	Absent	Light-veined
BW-6	Medium	Good	Brown	Absent	Half	Absent	Light-veined
BW-13	Medium	Good	Brown	Absent	Whole	Absent	Light-veined
BW-12	Medium	Good	Brown	Absent	Whole	Absent	Light-veined
BW-14	Rough	Good	Light	Absent	Whole	Absent	Medium-veined
BW-9	Smooth	Good	Light	Absent	Whole	Absent	Light-veined
BW-8	Smooth	Good	Light	Absent	Whole	Absent	Light-veined
BW-18	Smooth	Good	Light	Absent	Whole	Absent	Light-veined
BW-17	Rough	Good	Yellow	Absent	Whole	Absent	Medium-veined
BW-5	Medium	Medium	Dark	Half	Half	Absent	Light-veined
BW-15	Smooth	Good	Yellow	Absent	Whole	Absent	Medium-veined

Consequently, our evaluations have identified promising walnut genotypes and that will be used to further breeding efforts as well.

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