

EVALUATION OF LOW CHILLING WALNUTS

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ABSTRACT

An evaluation trial was conducted on natural population of walnuts plants collected from high chilling area of Dir Koistan and planted at the Experimental Garden of Ikramullah Khan, Drab House, Mardan. Different parameters were collected in 2003 and 2004 to screen out low chilling walnuts for low chilling regions (plains) of NWFP in particular and Pakistan in general. Maximum plant height was presented by MS-18 (22m) and MS-21 (21.67m). Plant spreadth was outstanding in varieties MS-6 (256.7m²). Stem diameter was maximum in MS-21(2.13m). Better yield was produced by MS-1 (63.3kg). Weight of nut was prominent in MS 14-(14.8g). Diameter of nut was maximum in MS-18(6.75g). Kernal percentage was dominated by varieties MS-12 (58.21%) and MS-9 (56.67%). Paper thin shell was recoded in MS-17. The thin shell varieties are from MS-9. The walnut varieties have given significantly better performance at low chilling areas. It shows that the varieties have flexible genes and can adopt to low as well as high chilling areas. Hence forth, these are recommended for commercial plantation in the plain areas of the province in particular and the country in general. The superior germplasm of low chilling walnut is under vegetative propagation for distribution amongst the farming community to enhance their socio-economic conditions.

INTRODUCTION

Geographically, Pakistan lies between the two major diversified centers of temperate fruit species. According to Vavilo (1951), Bailey (1930) and Chandler, (1957) these centers are the origin of the most temperate fruits and nuts. These centers provide a better chance to select superior germplasm from its wild relatives. Khattak et al. (2000) studied genetic variation amongst 200 plants of wild walnut at Kurram Agency Parachinar. Out of the variants four varieties like, Kurram 1, 2, 3 and 4 were selected on the basis of plant height, stem diameter, plant spread, nut weight and maturity, kernel and oil percentage.

These varieties had shown better performance for yield and quality of nuts. Likewise, Walnut (*J. regia* L.) is highly cross pollinated due to its monoecious character therefore its progenies will provide a better chance to select superior genotypes from the ancestor. The indigenous fruit species have more stable genes to the existing environment, more yielder, better quality of fruit, longer life, resistant to insects, pests diseases and adverse soil and climatic conditions than exotic species.

The present commercial production of walnut in the country is mainly dependent upon seedling

trees (18002 tones Annum⁻¹), Agric. Statistics, NWFP, 1999-2000).

Therefore, a research project was envisaged at the Experimental Garden of Ikramullah Khan, Drab House, Mardan, to isolate superior varieties of walnut from the segregating population for genetic conservation and its utilization with a view to increase the yield and nut quality in the low chilling areas (Plain) of NWFP in particular and Pakistan in general. The superior germplasm is under vegetative multiplication and would be distributed among the farming community to enhance their socio-economic condition.

MATERIALS AND METHODS

Screening trial on 15 years old walnut was conducted at the Experimental Garden of Ikramullah Khan, Drab House, Mardan. It is located towards the North East about 25 KM away from Mardan. It is lying between 34-30°N latitude and 72-10°E longitude. The altitude is 293m above sea level. Mean annual temperature is 23°C The annual precipitation is 310mm. The soil pH is 8.1, the soil tends to be clay loam in nature. There were 600 plants of wild walnut and seedling in origin and collected from Dir (Kohistan). Dir is 2000m above sea level and annual temperature is 13°C and receiving 1200-1500mm annual rain fall. These seedlings were planted in the garden during

March, 1995. Horticultural management practices like manuring, irrigation, pruning, spraying chemicals against insects and diseases were continued since their emergence. The trees were uniform in age, there were no disease symptoms and general appearance were excellent and demarcated as usual. Various parameters were analyzed according to LSD test. The experiment was repeated in the proceeding year 2004.

RESULT AND DISCUSSION

Plant Height

Data on plant height was depicted in Table I which showed that there was significant variation among the varieties. Maximum height was presented by MS-18(22m) and MS-21 (22.33m). These varieties are statistically at par with each other. This was followed by MS-8 (8.16m). The superiority had

shown by MS-18 and MS-21 over other varieties could be attributed to their genetic make up.

Plant Spreadth

Plant spreadth was outstanding in case of variety MS-6 (256.7m²) and MS-18(263.7m²). (Table I). Both these varieties are statistically at par with each other. The other group of varieties showed intermediate position, which are MS-1 (179.58m²) MS-2 (179.70m²), MS-15 (180.1m²) and MS-19 (179.8m²). These group of varieties are also identical. Lowest plant spreadth of 20.95m² was shown by MS8 (20.95m²). Maximum spreadth of MS-6 and MS-18 over the other varieties are due to their genetic potential. The same results were obtained by Khattak *et al.* 2000. They repeated that Kurram-2 walnut is more potent than other varieties.

Table I *Morphological characteristics of low chilling walnut*

Name of variety	Plant height (m)	Plant spread (m ²)	Stem diameter (m)	Yield (Kg)
MS1	19.00d	179.58b	1.63bcd	63.33a
MS2	21.76ab	179.70b	1.110hij	29.33ij
MS-3	15.33fg	115.8d	1.433cdefg	42.67d
MS4	13.00h	97.17e	1.333 efh	39.67ef
MS5	16.00ef	102.1e	1.250 fghij	42.5de
MS-6	21.33ab	256.7a	1.30fghi	55.90b
MS7	17.00e	117.7d	1.360defgh	50.50c
MS8	8.16j	20.95j	0.9833 ijk	25.00jk
MS-9	10.00wh	29.97i	1.133 hij	48.33g
MS10	14.17gh	47.37h	1.067hij	35.00h
MS11	13.00h	30.67i	1.500cdef	55.00f
MS12	12.20h	46.30h	1.300fghi	30.00hij
MS13	14.50gh	56.57g	1.067hij	45.00def
MS14	15.47fg	69.40f	1.600 cde	40.00f
MS15	19.00d	180.1b	1.183 ghij	56.50b
MS16	16.00d	145.4c	1.70 bc	54.0c
MS17	14.77gh	32.67i	1.033 iz	20.00k
MS18	22.00a	263.7a	1.240 fghij	30.00hijk
MS19	19.67cd	179.8b	1.167 ghij	31.00hi
MS20	20.67	65.92f	1.900 assistant Botanist	43.0d
MS21	22.33a	148.1c	2.133a	54.5b
LSD at 1%	1.594	7.572	0.2963	5.359

Means followed by different letters are significantly different from each other at 1% level of probability.

Table-II *Nut characteristics of low chilling walnut*

Name of variety	Weight of nut (g)	Diameter of nut (cm)	Kernel %	Shell Thickness
MS1	8.56j	6.06de	54.14b	Thin
MS2	13.58bc	6.50abc	49.76cd	"
MS-3	8.70ij	6.32bcd	48.63d	"
MS4	7.63k	5.58f	45.33f	"
MS5	7.23k	6.250cd	36.33l	"
MS-6	8.81j	6.44abc	47.41e	"
MS7	10.93f	6.31bcd	33.67j	"
MS8	12.59df	6.62ab	23.77k	"
MS-9	10.57fg	6.52abc	56.67a	"
MS10	13.87b	6.390 bcd	36.71hi	"
MS11	10.54fg	6.22cde	44.62f	Hard
MS12	10.08gh	6.25cd	58.21a	"
MS13	9.45hi	6.43abc	54.60b	"
MS14	14.82a	5.89ef	39.57g	"
MS15	11.03f	6.52abc	18.87l	"
MS16	11.03f	6.61ab	49.24d	"
MS17	5.023l	3.28g	51.00c	Paper thin
MS18	12.28e	6.75a	38.45g	Hard
MS19	12.87cde	6.31bcd	39.44g	Hard
MS20	13.75b	6.560abc	38.17gh	Hard
MS21	13.15bcd	6.310bcd	35.33ij	Hard
LSD at 1%	0.8171	0.3491	0.3044	

Means followed by different letters are significantly different from each other at 1% level of probability.

Stem Diameter

It is cleared from Table I that maximum stem thickness was observed in MS-21 (2.13m) followed by MS-20 (1.9m). Lowest stem diameter was recorded in MS-8 (98m). Maximum stem thickness of variety MS-21 is due to their genetic nature which showed good performance over the other varieties.

Yield

Data on yield was presented in Table I. The Table revealed that maximum yield of 63.33 Kg was recorded in variety MS-1 followed by SM -21 (50kg), MS -15 (54.5kg) and MS-6 (55.9kg).

These varieties are statistically similar in nature. The other group which gave similar yield were MS-16 (54.4kg) MS-7 (50kg). Very low yield was noted in MS-2 (29.3kg). Maximum yield of variety MS-1 is due to their genetic potential.

Weight of Nut

There is significant variation among various varieties regarding their weight of nut Table II showed that MS-14 got the maximum weight (14.82g). The 2nd best variety was MS-20, showing nut weight as 13.7g. Very low weight (5.02g) was recorded in MS-17 (5.03g). The

results of this study correlate with Bhatti et al. 1997.

Diameter of Nut

Diameter of nut was prominent in MS-18 (6.75cm) followed by MS-16 (6.61cm) and MS-8 (6.62cm) (Table II). The later two varieties had similar diameter to each other. Very low diameter was assumed by MS-17 (3.28cm). The superiority of MS-18 over the other varieties is due to their genetic characteristics.

Kernel Percentage

There is great variation among different varieties of walnut in terms of kernel percentage (Table-II). The leading varieties were MS-12 (58.21%) and MS-9 (56.67%) due to maximum kernel percentage. These two varieties had shown similar response statistically. The 2nd group which showed better results were MS-13 (54.60%) and MS-1 (54.1%). These varieties are also identical, very low kernel percentage was noted in MS-15 (18.87%). The superiority of varieties MS-12 and MS-9 are due to their genetic make up.

Shell Thickness

Soft and hard shell characteristics were found in different varieties. It is evident from Table –II, that paper thin shell was recorded in MS-17. The thin shell varieties were MS-1 to MS-9 and hard shell varieties were MS-11 to MS-21 except MS-17. Hard, thin and paper thin shell characteristics of the varieties are due to their genetic factor. In this case MS-17 was leading to show paper thin shell although the yield of variety is very low as compared to other varieties. From the experiment it can be concluded that no one variety was leading in all the characters to dominate the other varieties.

CONCLUSIONS AND RECOMMENDATIONS

It can be concluded from the experiment that walnut variety MS-1 got the maximum yield and hence recommended for plantation at plains areas of NWFP.

The variety MS-17 is due to their paper thin shell characteristics is also recommended for plantation in the plains areas of the province.

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