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Genetic Bio-diversity in the Segregating Population of Walnut (*Juglans regia* L). At Kurram Agency, Parachinar

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Abstract: Four varieties for instance, Kurram-1, Kurram-2, Kurram-3 and Kurram-4 were screened out from the segregating population at Kurram Agency, Parachinar. Maximum Stem diameter, wider plant spread, significantly higher yield were observed in Kurram-2. Early nut maturity, average Kernel weight, average Kernel percent, lesser number of nuts/Kg and very thin shelled were noted in Kurram-1. Kurram-3 had late matured, more nuts/Kg, thin shelled and more oil percent. Maximum nuts/Kg, very thin shelled and maximum oil percentage were dominanted in Kurram-4. Scion/bud wood of these walnut varieties are available on request to the Director, Agriculture Research, FATA, Agricultural Research Institute, Tarnab, Peshawar.

Key words: Genetic biodiversity, *Juglan regia* L., Segregating population, Kernel percentage, oil percentage

Introduction

Geographically, Pakistan lies between the two major diversity centres of temperate fruit species. The Causauses Mountains and China. According to Vavilov (1951) that these centres are the origin of the most temperate fruits and nuts. These centres provide a better chance to select superior germplasm from its wild relatives. Likewise, Westwood (1993), highlighted the survey work of Dr. Maxim Thompson. He spent 7 month in Northern Pakistan during 1989 and collected 102 varieties of apricot from wild parents, some of which had sweet Kernel and very sweet flesh, upto 30% sugar at harvest.

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 ancestors. 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 condtion than exotic species.

The present commercial production of walnut in the country is mainly dependent upon seedling trees. The products (17383 tonnes/Annum nuts (Agril. Stat. NWFP 1983-84) is highly variable in terms of size, shape, yield and nut quality.

Therefore, a research project was envisaged at Kurram Agency, Parachinar, 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. The impact of this research would enhance the socio-economic condition of walnut growers.

Materials and Methods

An investigation was conducted at the Agril. Extension Farm, Parachinar. It is located towards South West and 280 Kms away from Peshawar. It is highly elevated area, 5500 feet above sea level and receiving an annual precipitation of 424 mm. The soil pH is nearly normal. The soil tends to be light and well drained and sandy loam to clay loam in nature.

There are 200 plants of walnut growing in wild form and are seedlings in origin. No horticulture managements like, manuring, irrigation, pruning, spraying against insects, pests and diseases etc. were practiced since their emergence. Four varieties namely Kurram-1, Kurram-2, Kurram-3 and Kurram-4 of Walnut from the existing segregating population in the Farm were selected. The trees were uniform in age, having no disease symptoms and general appearance of the trees were excellent and demarcated as usual. Various parameters like, Stem diameter, Plant spread, yield data of the plants, average kernel weight, average kernel percentage, No. of nuts/Kg, shell thickness, and oil percent on dry basis, were collected. Data presented as average ± standard deviation.

Results and Discussion

There was a great variation among the different varieties of walnut in stem diameter. Maximum Stem diameter was produced in Var. Kurram-2 followed by Kurram-4. Kurram-3 and Kurram-1 had resulted thinner stem diameter of 1.48 m and 1.33 m respectively. It can be assumed from the result that var. Kurram-2 is genetically more potent than remaining varieties in diameter.

Plant spread (m) data was collected from different varieties of walnut, in this case Kurram-2 dominated over the other varieties, where 352.51 m plant spread was noted. The next best Var. was Kurram-1 where 184.87 m spread was observed. Very low spread of 154.25 m was noted in Kurram-4.

Early nut maturity on 6/8/1998 was noted in Kurram-1. Kurram-2 had matured the nut on 15/8/1998. Kurram-3 and Kurram-4 gave similar date of maturity on 20/8/1998.

Table 1 shows that significantly higher yield was obtained in Kurram-2. Kurram-3 was the next to give 80 Kg nuts/tree. Kurram-1 and Kurram-4 were equal in yield. From the result it shows that Kurram-2 had shown superiority over others due to its genetic nature for the aforegoing character.

There was a great variation in response of different varieties of walnut to average kernel weight (gm). Kurram-1 had shown outstanding weight of 8.94 gm as compared to other varieties. Kurram-2 achieved 6.75 gm kernel weight. Kurram-4 and Kurram-3 were lowest and resulted 5.67 gm and 5.45 gm kernel weight respectively.

Average kernel percentage was significant in Kurram-1. Kurram-2 and Kurram-3 were equally resulted 44% kernel. The lowest kernel of 43% was given by Kurram-4.

Bigger size of nuts 53 was prominent in Kurram-1. The second bigger size nuts of 65 was collected in Kurram-3. The varieties Kurram-3 and Kurram-4 produced the similar number of nuts/Kg. From the result it shows that Kurram-2 had shown superiority due to its genetic nature for the foregoing characters.

The Shell thickness of Kurram-1 and Kurram-3 was very thin shelled. Thick shelled was noted in Kurram-2 and Kurram-4.

Great variation was found among varieties in oil percentage. Significant increase in oil percentage was found in Kurram-3. Kurram-4 had also shown better percentage of oil. Kurram-2 was intermediate in this regard, Kurram-1 was the lowest in oil content.

Table 1: Showing Characteristics of Walnut varieties at Kurram Agency, Parachinar (Mean of 3 years)

Name of variety	Stem Diameter (m)	Spread (m)	Date of maturity	Yield Kg (g)	Av.Nut weight (g)	Av. Kernel Weight (g)	Av. Kernel %	No. of nut/Kg	Shell Thickness	oil %
Kurram-1	1.33 ± 0.5	184.87 ± 11	6.8.98	70 ± 5	18.90 ± 2	8.94 ± 2	47 ± 5	53 ± 4	Very thin	65.77
Kurram-2	1.84 ± 0.4	352.51 ± 12	15.8.98	130 ± 10	15.25 ± 4	6.75 ± 2	44 ± 4	65 ± 10	Very thin	72.20
Kurram-3	1.48 ± 0.6	170.15 ± 15	15.8.98	80 ± 12	12.30 ± 5	5.43 ± 3	44 ± 6	81 ± 8	Very thin	74.67
Kurram-4	1.78 ± 0.8	154.25 ± 10	20.8.98	70 ± 8	13.18 ± 5	5.67 ± 2	43 ± 5	75 ± 10	Very thin	75.17

Mean ± standard deviation

From the above results it can be concluded that Kurram-2 had superior genes for maximum stem diameter, wider plant canopy and significantly higher yield. Kurram-1 had shown superiority over the other varieties in terms of early maturity, maximum Kernal weight, Kernel percent and shell thiness. Kuram-3 had superseded other varieties for more number of nuts/Kg, late maturing, thin shelled and more oil percent, very thin shelled and maximum oil percent was prominent in Kurram-4.

It is cleared that none of the variety was found to have dominated genes for all the characters. Early maturing varieties have significant importance in the horticulture industry.

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