Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.4, No.20, 2014

Comparative Study on Germination and Seedling Growth in Walnut Genotypes

Javed Rahman, Noor Habib Khan, Muhammad Junaid and Ahmad Zada
Agricultural Research Institute Mingora, swat, Pakistan
*Corresponding Author's Email: javedmiandam@gmail.com

Abstract
Germination and seedling growth in different walnut genotypes were investigated in Randomized complete block design at Agricultural Research Institute Mingora, Swat, Pakistan in the year 2012. Three walnut genotypes one hard shelled and two thin shelled were studied in the experiment. Both thin shelled genotypes Sanoghar-I and Sen Lasht –IV were at par with each other but excelled significantly over hard shelled genotypes in all study parameters except seedling diameter. Sanoghar-I and Sen Lasht –IV showed germination percentage (77.66% and 60.33%), seedling height (121.58 and 86.3 cm) and number of leaves (30.81 and 27.57) respectively.
Keywords: Germination, Walnut Genotypes.

INTRODUCTION

Walnut belongs to the family Juglandaceae and genus Juglans. The family consists of about 60 species, however, the most important among them are Juglans regia L, and Juglans nigra L. (Manning, 1978). Persian walnut (Juglans regia) is an ancient species originated in Central Asia, the West Himalayan chain and Kyrgyzstan (Fernandez-Lopez *et al.,* 2000). It has been cultivated in southern Europe since 1000 BC (Ducci *et al.,* 1997).

Walnut has high nutritional value. It is rich in proteins (14-24%), fats (52-70%) and vitamins; especially vitamins B group and E, while in minerals; K and Mg are worth mentioning. Important amino acids are glutamic acid, arginine and leucine. Taurine (2-aminoethylsulfonic acid), an organic acid and a derivative of the sulfur-containing amino acid cystine, is found in variable quantities between 0.2 and 0.6 mg). It is an important compound and involved in many functions; homeostatic regulation, thermoregulation, nervous conduction, protection against oxidative stress (Cannella and Dernini, 2005). Nut consumption is associated with a protective effect against coronary heart disease, partly due to its high antioxidant content (Davis *et al.,* 2006). Walnut husk yields valuable oil and yellowish dye when pressed. The oil is used in soaps, paints, and making dye.

Walnuts are growing in the Northern Pakistan since time immemorial and are one of important nut crop grown in Malakand division.

In Malakand division walnut trees are mostly of seedling origin and have considerable variability in nuts size, shape, shell thickness, color of kernel and in other morphological attributes. There are no regular orchards of walnut in the area however; significant numbers of trees are grown on marginal lands giving of additional income to the farmers.

Walnut is propagated both sexually and asexually. Hard shed genotypes are usually used for raising rootstock seedlings. Rootstocks are generally propagated through seeds. Seeds are sown in November which germinates in March. Germination is less than 80% because of the high chilling requirements of the hard shelled genotypes. Hard shelled genotypes also have thick, hard shell to rupture, imbibe water and decompose. The scion varieties are budded/grafted on germinating seedlings.

The aim of this study was to explore alternatives for hard shelled rootstocks that have better performance in term of germination and seedling growth.

MATERIALS AND METHODS

The experiment "Evaluation of walnut genotypes for germination and seedling growth" was carried out at horticulture nursery in Agricultural Research Institute Mingora, Swat; during the year 2012. Three walnut genotypes (Hard shelled, Sanoghar-I, Seenlasht-IV) were studied in RCBD experiment with three replications. Data was collected on Germination percentage, Seedling height, Seedling diameter (mm), and number of leaves seedling^{-1}.

RESULTS AND DISCUSSION

Germination percentage:

It is cleared from Table-1 that high germination (77.67%) was recorded in Sanoghar-I followed by Seen Lasht-IV (60.33%) while minimum germination (52.33%) was noted in hard shelled walnut genotype. This may be due to the fact that thin shelled genotypes easy to imbibe water and rupture compare haard shelled. Dormancy in thin shelled may be break easily than hard shelled genotypes. Morever, hardshelled genotypes have high chillig

requirement than thin shelled genotypes (Rehman *et al.,* 1999).

Seedling height (cm):

It is evident from Table-2 that maximum height (121.58 cm) was recorded in Sanoghar-I followed by Seen Lasht-IV (86.30 cm). However minimum height (86.00 cm) was noted for hard shelled walnut genotype.

More germination percentage in thin shelled genotypes ultimately resulted in dense plant population, promoting the competition among the plants for sunlight and encouraging seedlings height. These results were in line with the findings of Rehman *et al*, 1999.

Seedling diameter (mm)

Table-1 revealed that hard shelled genotypes gained significantly more seedling diameter (16.10a mm) compared to Sanoghar-I (13.00b) but at par with Seen Lasht-IV (14.53ab). This may be due to the fact that thin shelled seeds have higher germination percentage and thick seedling population in the field. Hard shelled genotypes have genetically bolder seedling and vigorous growth than thin shelled genotypes. Hard shelled genotypes being indigenous species of the area have more adaptation to the climatic condition (Aslantas, 2006).

Number of leaves seedling^{-1}

Table-4 indicated that there are maximum numbers of leaves (30.81a) in genotype Sanoghar-I followed by genotype Seen Lasht-IV (27.57a) and Seen hard Shelled having minimum number of leaves (21.51b). Maximum number of leaves in genotypes thin shelled may be due to the fact that they attained maximum seedling height so having more number of leaves.

LITERATURE CITED

Aslantas, R. 2006. Identification of superior walnut (Juglans regia) genotypes in north-Eastern Anatolia, Turkey. New Zealand J. of Crop and Hort. Sci. 34:231–237.

Cannella, C and S. Dernini. 2005. Walnut insights and nutritional value. Acta Hort. 705:547-550.

Davis, L., W. Stonehouse, D. T. Loots, J. M. Petersen, F. H. Van, D. Westhuizen, S. M. Hanekom and J. C. Jerling. 2006. The effects of high walnut and cashew nut diets on the antioxidant status of subjects with metabolic syndrome. Eup. J. Nutri. 46(30):155-164.

Ducci, F., A. Rogatis and R. Proietti. 1997. Protezione delle risorse genetiche di Juglans regia L. Ann. Inst. Sper. Selv. (25)26: 35–55.

Fernandez-Lopez, J., N. Aleta and R. Alia. 2000. Forest genetic resources conservation of Juglans regia L. IPGRI, Rome, Italy. Pp. 20-25.

Manning, W. E. 1978. The classification within the Juglandaceae. Annals Missouri Bot. Garden. 65:1058-1087.

Rahman, N., I. Hussain, Z. U. Nisa, and A. A. Awan. 1999. Germination study of five different varieties of pecan nut. Pak. J. Biol. Sci. 2(3): 917-918.

Table 1: Mean values regarding parameters of interests.

Genotypes	Germination %	Seedling height	Seedling diameter (mm)	Number of leaves seedling^{-1}
Sanoghar-I	77.67a	121.58a	13.00b	30.81a
Seen Lasht-IV	60.33b	86.30b	14.53ab	27.57a
Hard Shelled	52.33c	86.00b	16.10a	21.51b
LSD	3.4214	1.9576	3.4214	3.561

Means sharing different letters are significant to each other while that of same letters are non significant at 5% level of probability

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar