Tri and tetralobed walnut fruits are first reported from walnut germplasm of Jammu Province

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ABSTRACT: A survey was done to characterize of walnut (*Juglans regia* L.) germplasm in Jammu province during the year 2015 and 2016 at different walnut growing areas of Chenab valley region of district Kishtwar, Doda and Rajouri of Jammu and Kashmir, to select promising accession among the diverse walnut genotypes and assess variability in their physiological and morphological characteristics. Regular visits were made during the period of flowering, fruit setting, fruit maturity and ripening stages during the year of 2015– 2016. Finally, plants of more than hundred walnut genotypes with divergent characters were selected at fruit maturity stage on the basis of size, thickness of shell and locally famous grown walnuts. Among more than hundred selected seedling walnut genotypes we found some trilobed i.e. three segments and tetralobed i.e. four segmented shells among the selected walnut genotypes. These traits can be utilized for the walnut development programme to increase the cracking quality and kernel yield to of agreeable size and aroma.

Keywords: walnut, shell, trilobed, tetralobed

Introduction

The common name walnut derives from Old English wealhhnutu, literally foreign nut (from wealh foreign + hnutu nut), because it was introduced from Gaul and Italy. The Latin name for the walnut was nux Gallica, "Gallic nut". The generic name comes from Latin juglans, meaning 'walnut, walnut tree, juglans in turn is a contraction of Jovis glans, nut of the god Jupiter. Folklore. China is presently the largest commercial producer of walnuts in the world, with about 360,000 metric tons produced per year. The United States is second, with about 294,000 metric tons of production. Within the U.S., about 90% of all walnuts are grown in California, particularly within the San Joaquin and Sacramento Valleys. Walnuts are delicious and can add extra nutrition, flavor and crunch to a meal. While walnuts are harvested in October to November, they are available year round, an excellent source of those hard to find omega-3 fatty acids and a rich source of heart-healthy monounsaturated fats. The fruits of the walnut are a type of accessory fruit known as a pseudodrupe (or drupelike nut), the outer covering of the fruit is an involucre in a drupe the covering would be derived from the carpel. Walnuts are heavily used in India. In Jammu, it is used widely as a Prasad (offering) to Mother Goddess Vaishno Devi and, generally, as a dry food in the season of festivals such as Diwali. The state of Jammu and Kashmir is the major producer of walnuts in India, infact, the entire quantity of walnuts the country exports is from J&K state. In this northwestern area of the country, walnuts are grown all over the Kashmir valley and the hill regions of Jammu. The most important districts for walnut cultivation in Kashmir valley are Anantnag, Pulwana, Kupwara, Budgam, Baramulla and Srinagar. In Jammu, the largest areas under walnut cultivation are district Doda, followed by Poonch and Udhampur, with minor quantities grown in Rajouri and Kathua districts. Mainly

three varieties of walnuts are grown in the state. These varieties are locally called WONTH, KAGAZI AND BURZUL. The Wonth is a hard Nut to crack and has thick and large outer shell and small kernel. It is mostly sold locally and used for extracting oil. The Kagazi is better sized walnut and has thin outer shell but thick and good sized inner kernel. one can crack Kagazi in hands only. The inner kernel of the Kagazi variety is white. The Burzul, a medium size variety a little dark and with a little thicker outer shell. The inner kernel is not so white but tasty. This walnut too breaks easily. It is presently acid washed make it look like Kagzi.

Material and method

The study on "Characterization of walnut (*Juglans regia* L.) germplasm in Jammu province" was carried out during the year 2015 and 2016 at different indigenous germplasm growing areas of walnut. This study included a survey of Chenab valley region of district Kishtwar, Doda and Rajouri of Jammu and Kashmir, to select promising accession among the diverse walnut genotypes and assess variability in their physiological and morphological characteristics. The study area is situated between an altitude of 915-1638 m above sea level. The area is situated in North Western Himalayan region of Jammu and Kashmir. The area is mainly hilly and mountainous with valleys and stretches of plains. During the survey to get the first hand information local inhabitants were consulted about production of thin shelled/ Kagzi, uses and present status of different seedling origin genotypes grown in the region at various places. The location was selected with respect to the availability of diversity in walnut genotypes. Regular visits were made during the period of flowering, fruit setting, fruit maturity and ripening stages during the year of 2015– 2016. Finally, plants of more than hundred walnut genotypes with divergent characters were selected at fruit maturity stage on the basis of size, thickness of shell and locally famous grown walnuts. Codes were allotted to each genotype on the basis of their size, shell thickness, location and permanent tagging was done on the selected plants. Three bearing plants were selected per study site for the elaborative investigation of morpho-physiological characteristics. All three plants of each walnut genotype were the same in age, vigour and health. A short description of all walnut genotypes/ accessions was recorded in the form of passport data for different morpho-physiological chracters with the help of walnut descriptor developed by International Board of Plant Genetic Resources (1994)

Results

After full ripening, the removal of the husk reveals the wrinkly walnut shell, which is usually found in two segments (Figure 1). But during survey we found trilobed i.e. three segments (Figure 2) and tetralobed i.e. four segmented shells (Figure 3) among the selected KAGZI walnut genotypes in the Kishtwar district from the areas of padder, Dacchan and Marwah. Such characteristics may also be found in hard shelled walnuts, but these are not accepted for commercial production and expert, due to its poor hulling and ease of kernel removal. An ideal walnut variety must have >50% kernel recovery in addition to other characteristics. The average shelling rate in India is 40 per cent, but could go as high as 70 per cent in the case of the thin-shelled walnut having such characteristics. After evaluation of such walnuts we recorded 90 percent and above good cracking and yield kernels of agreeable taste and aroma. The figure 4 shows the shelled walnut kernel and four equal segments of the walnut shell. This characteristic can be utilized for the development of walnut varieties from which the kernels can be easily removed which is one of the most important attributed to be incorporated for expert and from the consumers point of view. As no literature is available related to this characteristic, it needs further study to explore its importance for walnut improvement programme.

Fig.1. Two segmented walnut shell (Most common type)

Fig.2. Trilobed (Three segmented walnut shell)

Fig.3. Tetralobed (Four segmented walnut shell)

Figure.4. Two completely kernel halves along with the four equal segments of the tetralobed walnut shell