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Evaluation of fruit characteristics of *Elaeagnus latifolia* L. in the north eastern hill region, India

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ABSTRACT

*Elaeagnus latifolia L., locally known as Sohshang is a very important fruit species among the tribes of Meghalaya. The fruit has been grown for its edible fruits and ornamental value since time immemorial. A study was carried out to find the variation among genotypes of the species during 2015-17. Result showed significant variation among genotypes ($p \leq 0.05$). RCE-2 was found to produce highest fruit length (3.63 cm) and fruit diameter (2.84 cm), while, maximum fruit weight and edible flesh content was observed in RCE-2 (21.79 g) and RCE-1 (81.09%), respectively. RCE-2 produced maximum value for all seed characteristics. Total soluble solid was recorded maximum in RCE-4 (11.2%), titratable acidity in RCE-2 (4.03%), fruit juice pH in RCE-4 (3.7) and ascorbic acid in RCE-3 (15.03 mg 100 g^{-1} pulp). Similarly, a significant correlation was obtained among different physico-chemical traits. Fruit weight showed positive correlation with edible flesh (0.856**), seed weight (0.9210**), titratable acidity (0.867**), but negatively correlated with total soluble solid (-0.774*). Edible flesh had positive correlation with titratable acidity (0.903**) while had negative correlation with TSS (-0.878**) and ascorbic acid (-0.707*). Therefore, in view of the above, popularization of the crops is the need of the hour. Variation observed might be useful for selection of promising genotypes and inclusion as parental line in breeding programme.*

Keywords : *Elaeagnus latifolia*, fruit, variation, biochemical

INTRODUCTION

Sohshang (*Eleaegnus latifolia* L.) has traditionally been known for centuries as one of the most potential underutilized fruit crops among the tribal habitat of North Eastern Himalayan region, India (Rymbai *et al*., 2016a). The crop is a member of the family Elaeagnaceae, genus *Elaeagnus* which is vernacularly known as Sohshang in Khasi Hills, Slangi in Jaintia Hills and Muslerhi in Sikkim. Geographically, the region expanses between 21°50¹ and 29°34¹ N latitude and 85°34¹ and 97°50¹ E longitude, with elevation varies from near sea-level to over 7,000 m above MSL. The shrub occurs very commonly in the foothills of Eastern Himalayas, which could be observed in large number in the hills of Khasi and Jaintia, Meghalaya, India. It is found to be grown in semi-wild condition in the kitchen garden / or back yard for its ornamental values and edible fruits. It is a perennial and semi-deciduous mutli-stem shrub, belonging to the family Elaeagnaceae. The family consists of three genera, *viz*., *Elaeagnus*, *Hippophae* and *Shepherdia*. The genus *Elaeagnus* consists about 40 species of shrubs and trees, however, only 3 species are known for planting in other part of the world, *viz*., Russian olive (*E. angustifolia*), silverberry (*E. commutate* Bernh. Ex Rydb) and autumn olive (*E. umbellate* Thunb). Apart from fruits, seeds of most of the species including *E. latifolia* are edible. Recently, the genus has become a critical underutilized fruit crops because the trees of the genus *Elaeagnus* have a symbiotic relationship with certain soil bacteria like the genus *Actinomycetes* responsible for producing root nodules and fix atmospheric nitrogen (Follstad Shah *et al*., 2010). Because of its atmospheric nitrogen fixing abilities, an increase in fruit production up to 10% on intercropping with plum and nuts was reported (Plant for a Future, 2014). It was also observed that the species are quite resistant to high wind velocity and performed well even on nutrient poor acidic soil and soil moisture stress conditions (Rymbai *et al*., 2017). More importantly, the fruits are also capable of minimizing the incidence of cancer and halting or reversing the growth of cancers (Matthews, 1994).

Few researches has been undergoing in this crop, flower morphology of *E. latifolia* has already

been reported by Rymbai *et al*. (2017), which noted a hermaphrodite and actinomorphic flower promote selfing and outcrossing. In addition, reports of identity of hyperparasite *Simplicillium lanosoniveum*on *Aecidium elaeagni-latifoliae* in Umiam (Baiswar *et al*., 2014), standardization of agro-techniques and strategies for development of the crop (Deka and Rymbai, 2014) has also been made an efforts. However, information on fruit and biochemical characteristics of this fruirs are sporadically available. Therefore, attempt is made to study the physico-chemical characteristics of *E. latifolia* for better understanding of its fruit characteristics and its potential utilization.

MATERIAL AND METHODS

Experiment was carried out during 2015-17 in five genotypes of *Elaeagnus latifolia* planted in the Horticulture Experimental Farm of the Division of Horticulture, ICAR Research Complex for NEH Region, Umiam, Meghalaya. About 20 twenty matured fruits were collected randomly from all directions of the tree for analysis of variability exist among genotypes with respect to physical and biochemical characteristics. Fruit samples were washed and kept at room temperature for 10 minutes to remove the adhering water before analysis. The fruit and seed weights were determined using electronic balance (Adiar Dutt-1620C). Fruit length and diameter, seed length and seed diameter were measured using digital verniercallper (Mitutoya Digimatic Caaliper, Code No. 500-147).The edible flesh percentage was calculated as fruit weight – seed weight/ fruit weight x 100. The total soluble solids (TSS) was determined with the help of digital hand refractometer (Model - *HI 96801*) from three different points, *i.e*. shoulder, middle and distal end portion of the fruit after mixing thoroughly. The values were expressed in percentage (Ranganna, 1997). Titratable acidity and ascorbic acid were also estimated as per methods described by Ranganna (1997). The data on different parameters were analyzed using analysis of variance (ANOVA) by employing SPSS (version 14.00). Difference were considered statistically significant at $P \leq 0.05$. Relationship among different parameters were analysed using Pearson's correlation.

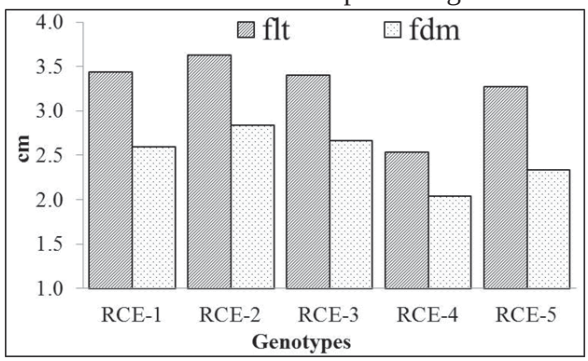

Fig. 1. Fruit length (flt) and fruit diameter (fdm) of *Elaeagnus latifolia*

RESULT AND DISCUSSION

Physical characteristics

Result indicate significant different among genotypes ($p \leq 0.05$). RCE-2 was found to produce highest fruit length (3.63 cm) and fruit diameter (2.84 cm), which was followed by RCE-1 (fruit length, 3.43 cm**)** and RCE -3 (fruit diameter, 2.66 cm; Fig 1). Similarly, maximum fruit weight was noted in RCE-2 (21.79 g) followed by RCE-1 (16.60 g). Edible flesh content was recorded highest in RCE-1 (81.09%), which was followed by RCE-2 (79.30%; Fig 2). Seed characteristics were recorded maximum in RCE-2 for all the characteristics (Fig 3). RCE-2 showed maximum seed length (3.04 cm) and seed diameter (1.47 cm). Seed weight was recorded highest in RCE-2 (4.51 g) which was significantly higher over all other genotypes. Result showed variation among genotypes which was in accordance with the finding of Devachandra *et al*. (2018). The variation might be due to genetically variation of the genotype (Rymbai *et al*., 2016b).

Biochemical characteristics

Biochemical parameters showed significant different among genotypes ($p \leq 0.05$; Fig 4). Total soluble solid was recorded maximum in RCE-4 (11.2%), followed by RCE-5 (9.2%) and minimum in RCE-3 (8.8%). With regards to titratable acidity, RCE-2 showed highest value (4.03%), followed by RCE-1 (3.74%). Fruit juice pH was highest in RCE-4 (3.7) while lowest in RCE-2 (3.1). Ascorbic acid was recorded highest in RCE-3 (15.03mg 100 g^{-1} pulp), followed by RCE-4 (13.27 mg 100 g^{-1} pulp), while lowest was recorded in RCE -1 (9.83 mg 100

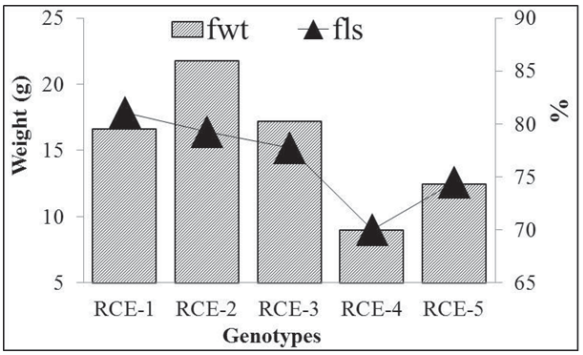

Fig. 2. F**ruit weight (fwt) and edible flesh (fls) of *Elaeagnus latifolia***

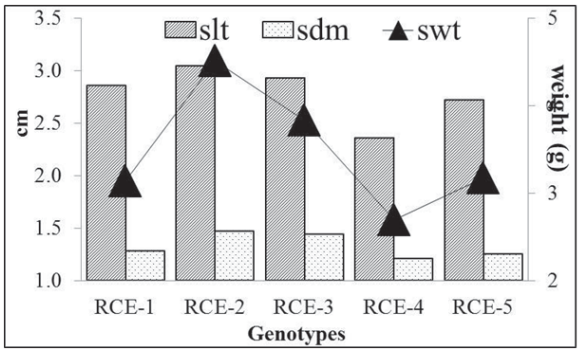

Fig. 3. Seed length (slt), seed diameter (sdm) and seed weight (swt) of *Elaeagnus latifolia*

g^{-1} pulp).Similar trend has also been reported by Hussain (2011) in *E. umbellata*. The variations among genotypes might due to influence of genetical traits of individual genotypes (Rymbai *et al*., 2019).

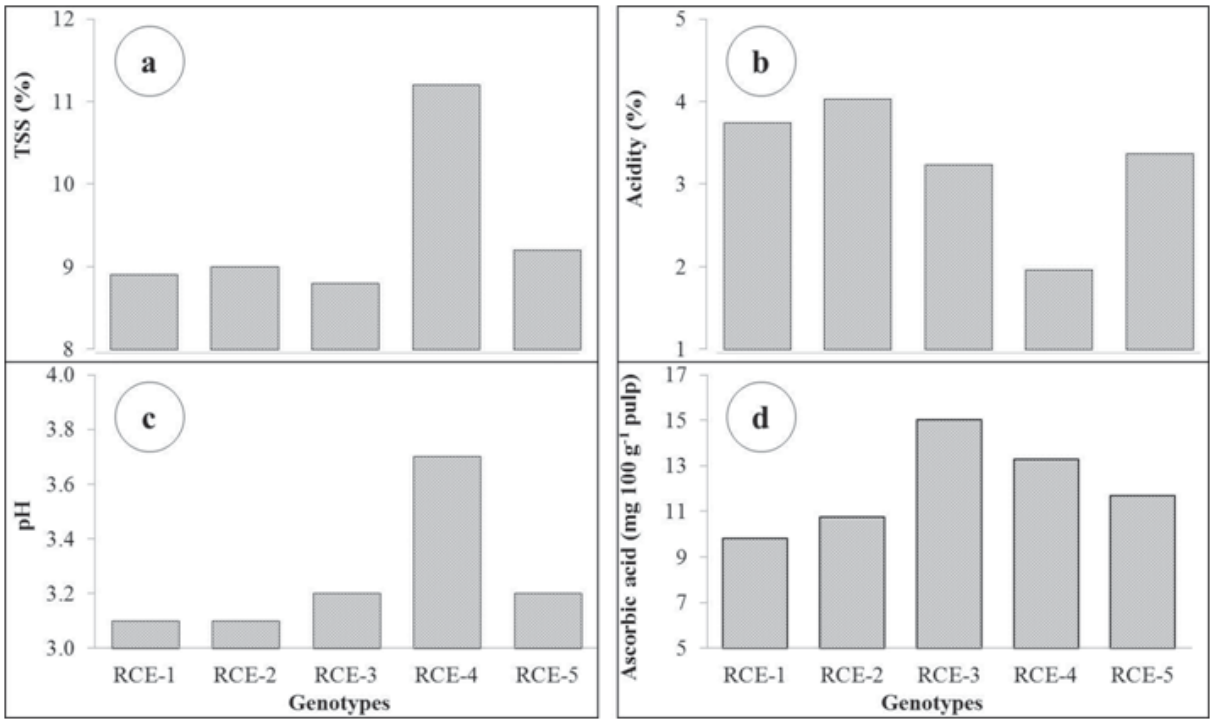

Fig. 4. Biochemical characteristics of *Elaeagnus latifolia*, a – TSS (%), b – Acidity (%), c – pH, d – ascorbic acid (mg 100 g^{-1} pulp)

Relationship among importance characteristics

A significant correlation was observed among different physico-chemical traits of *Elaeagnus latifolia* (Table 1). Fruit weight showed positive correlation with edible flesh (0.856**), seed weight (0.9210**), titratable acidity (0.867**), but negatively correlated with total soluble solid (-0.774*). Edible flesh had positive correlation with titratable acidity (0.903**) while showed negative correlation with TSS (-0.878**) and ascorbic acid (-0.707*). Result indicated that higher the fruit weight tends to produce higher edible parts, while lower might be the total soluble solid. Our finding has also been in line as reported by Bhowmick and Banik (2008).

Table 1. Pearson's correlation coefficient among physico chemical characteristics of *Elaeagnus latifolia*

Characters	Fruit weight	Edible flesh	Seed weight	Total soluble solid	Titratable acidity	Ascorbic acid
Fruit weight	1.000	0.856**	0.920**	-0.774*	0.867**	-0.609
Edible flesh		1.000	0.600	-0.878**	0.903**	-0.507
Seed weight			1.000	-0.632*	0.712*	-0.379
Total soluble solid				1.000	-0.905**	0.495
Titratable acidity					1.000	-0.592
Ascorbic acid						1.000

**significant at P ≤ 0.01; *significant at P ≤ 0.05

CONCLUSION

A significant variation was observed among genotypes of *Elaeagnus latifolia* with respect to fruit and seed characteristics. It divulged that RCE-2 and RCE-3 can be potential genotypes, which allowed for further selection for commercial cultivation. In addition, these genetic resources can be employed in breeding programme.

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