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MORPHOLOGICAL STUDY OF VEGETABLE TYPE TOSSA JUTE GENOTYPE

S. S.U. Ahmed[1], N. Tasnime[1]*, K. Fatema[1], M. M. Mukul[1] and N. Akter[2]
[1]Breeding Division, [2]Director Agriculture
Bangladesh Jute Research Institute, Ministry of Agriculture, Dhaka-1207, Bangladesh
*Corresponding author's mail: naimatasnime1995@gmail.com

ABSTRACT

An experiment was conducted at BJRI, Dhaka during the year 2023 with two previously screened jute genotype Acc. 4592 and *C. incisifolias* and three control; BJRI Deshi pat shak 1, BJRI Deshi pat shak 2 and BJRI Deshi pat shak 3. The plants were harvested after 25 days. The highest leaf yield was found in BJRI Deshi pat shak 1 followed by *C. incisifolias* and there was no significant difference, respectively. Acc. 4592 is notable for its greater height and flowering habit, although it has somewhat lower green and dry twig weights compared to *C. incisifolias* and BJRI Deshi pat shak 1. BJRI Deshi pat shak 2 and BJRI Deshi pat shak 3 consistently exhibit lower green weight, green twig weight, and dry twig weight, suggesting they may be less vigorous in terms of biomass production. *C. incisifolias* and BJRI Deshi pat shak 1 share many similar traits, with strong green and dry weights, and neither of them flowered.

Key words: Vegetable type jute, jute leaf, *C. incisifolias* and twig weight.

Introduction

Jute species, *C. olitorius* and *C. capsularis* are used as vegetables mainly as a by-product of thinning jute fields at the seedling stage (Choudhary *et al*., 2013). The jute plant parts are palatable and have high nutritional value, containing lipids, protein, crude fiber, carbohydrates, vitamins (A, C, E) and the minerals calcium, sodium, potassium, phosphorus and iron (Choudhary *et al.*, 2013; Dansi *et al*., 2008; Grubben and Denton, 2004; Odhav*et al*., 2007; Steyn *et al*., 2001; Zeghichi*et al*, 2003). Jute leaf (patshak) also contains much more carotene than other native vegetables. The leaf of C. *olitorius* is abundant in essential minerals such as calcium and iron, along with vitamins B1, B2, C, E and folic acid (Adediran *et al*, 2015). Additionally, the leaves contain various compounds with diverse biological effects, including anti-diabetic and antioxidant properties (Abdel *et al*, 2022). *C. olitorius* L. has promising anticancer effects on various types of human cancer cells. Its compounds are potential nutraceutical products that could be used for cancer treatment (Tosoc *et al*., 2021). Jute can serve as an additional source of vegetables during crisis (Tareq *et al.,* 2019). Many people like tossa jute leaf for its sweeter in taste. Still now we do not have a variety of tossa jute vegetable. So we are in dire need to develop vegetable type tossa jute with higher biomass and short lifespan. The objective of screening vegetable tossa jute is to identify and evaluate various genotypes for desirable traits such as higher biomass production, plant height, leaf number, and overall plant performances fulfill the SDG (2.1 and 2.2) for the safe, nutritious and sufficient food all the year round also remove malnutrition from girls, women and older persons. This process aims to select the most promising candidates for further breeding and cultivation, ensuring the development of improved jute cultivars with enhanced agricultural performance and potential for higher yields.

Materials and Methods

Location and timing of the experiment: In 2024, experimental plants were cultivated, and morphological assessments were carried out at the Bangladesh Jute Research Institute (BJRI), located in the Dhaka.

Plant/Seed materials: There are five jute genotypes including accessions, wild variety, pre-released varieties were used in this study to observe their yield and yield attributing traits contributing to higher leaf and twig production followed by identifying superior genotype (s) for further vegetable type tossa jute variety development (Table 1).

Table 1. List of plant materials, type of plants, sources of collection and country of origin

Genotypes	Plant type	Source of collection
C. incisifolias	Wild genotype	Local markets
Acc. 4592	Accession	Breeding division, BJRI
BJRI Deshi pat shak 1	Pre-released variety	Breeding division, BJRI
BJRI Deshi pat shak 2	Pre-released variety	Breeding division, BJRI
BJRI Deshi pat shak 3	Pre-released variety	Breeding division, BJRI

Seeds of two previously selected lines such as Acc. 4592 and *C. incisifolias* (screened out from 30 germplasms in 2023) and three control BJRI Deshi pat shak 1, BJRI Deshi pat shak 2 and BJRI Deshi pat shak 3 of BJRI were grown as planting materials.

Experimental design, seeding and plants growing: The experiment was conducted following randomized complete block design keeping line to line distance was 30 cm with 12 line of each genotype 1m length with three replications. All cultural operations were according to Chowdhury and Hassan (2013).

Plot of *C. incisifolias*

Plot of Acc. 4592

Data collection and data analysis: The morphological data (plant height, number of leaf per plant, green weight with leaf per plant, green leaf weight per plant, edible twig per plant and flowering habit) were collected, compiled carefully using Microsoft Excel program (Windows 10 Pro, MS Office 2016). The analysis of variance, descriptive analyses and Tukey's comparison tests (DMRT) were done using Minitab19 [Minitab 19.1.1.0] statistical analysis software.

Results and Discussion

Analysis of variance shows that plant height, green weight per plant, green twig weight per plant, and dry twig weight per plant are significantly influenced by genetic variation, whereas the number of leaves per plant is not significantly affected by genotype (Table 2). In case of number of leaf per plant, fresh leaf weight and edible twig weight per plant BJRI Deshi pat shak 1 ranks first followed by *C. incisifolias* and Acc. 4592. The highest plant height was found in Acc. 4592(47.8cm) followed by *C. incisifolias* (42.4cm) (Table 3). Green weight per plant was highest in BJRI Deshi pat shak 1(11.8g/plant) followed by *C. incisifolias* (11.4gplant) and Acc. 4592(10.1g/plant) respectively but they have no statistical difference (Table 3).Tareq *et al.* (2019) also found similar result. This suggests that certain varieties can produce more biomass than wild accessions (Choudhary *et al.*, 2013). The wild genotypes could be valuable as donors for introducing traits for taller plants. Flowering was seen only in accession 4592 at 25 days after sowing. The highest green twig weight was found in BJRI Deshi pat shak 1(6.0g/plant) followed by *C. Incisifolias* (5.0g/plant) and Acc. 4592(4.2g/plant) respectively but they have no statistical difference. The edible green twig weight of *C. incisifolias* and Acc. 4592 were 66% and 59.5% higher than control BJRI Deshi pat shak 2 (1.7g/plant) (Table 3). Acc. 4592 stands out for its taller height and flowering habit, although it has slightly lower green and dry twig weights compared to *C. incisifolias* and BJRI Deshi pat shak 1.

BJRI Deshi pat shak 2 and BJRI Deshi pat shak 3 consistently showed lower values in green weight, green twig weight and dry twig weight, indicating they might be less robust in terms of biomass production. *C. incisifolias* and BJRI Deshi pat shak 1 are comparable in many traits with good green and dry weights, and neither exhibited flowering (Figs. 1-7).

Table 2. Analysis of variance (MS) for vegetative yield and yield contributing characters of five tossa jute genotypes

Sources of variation	df	No. of leaf/plant	Plant height (cm)	Green wt/plant (with leaf)	Green twig wt/plant (g)	Dry twig wt/plant (g)
Genotype	4	1.343^{ns}	107.26^{***}	49.71^{***}	10.27^{***}	0.242^{***}
Error	10	1.187	8.024	3.130	0.550	0.017

*, **, and *** indicate significant at ≤5%, ≤1%, and ≤0.1% levels of probability; ns indicate non- significant

Fig 1: Plant of *C. incisifolias*

Fig 2: Twig of *C. incisifolias*

Fig 3: Plant of Acc. 4592

Fig 4: BJRI Deshi pat shak 1

Fig 5: BJRI Deshi pat shak 2

Fig 6: BJRI Deshi pat shak 3

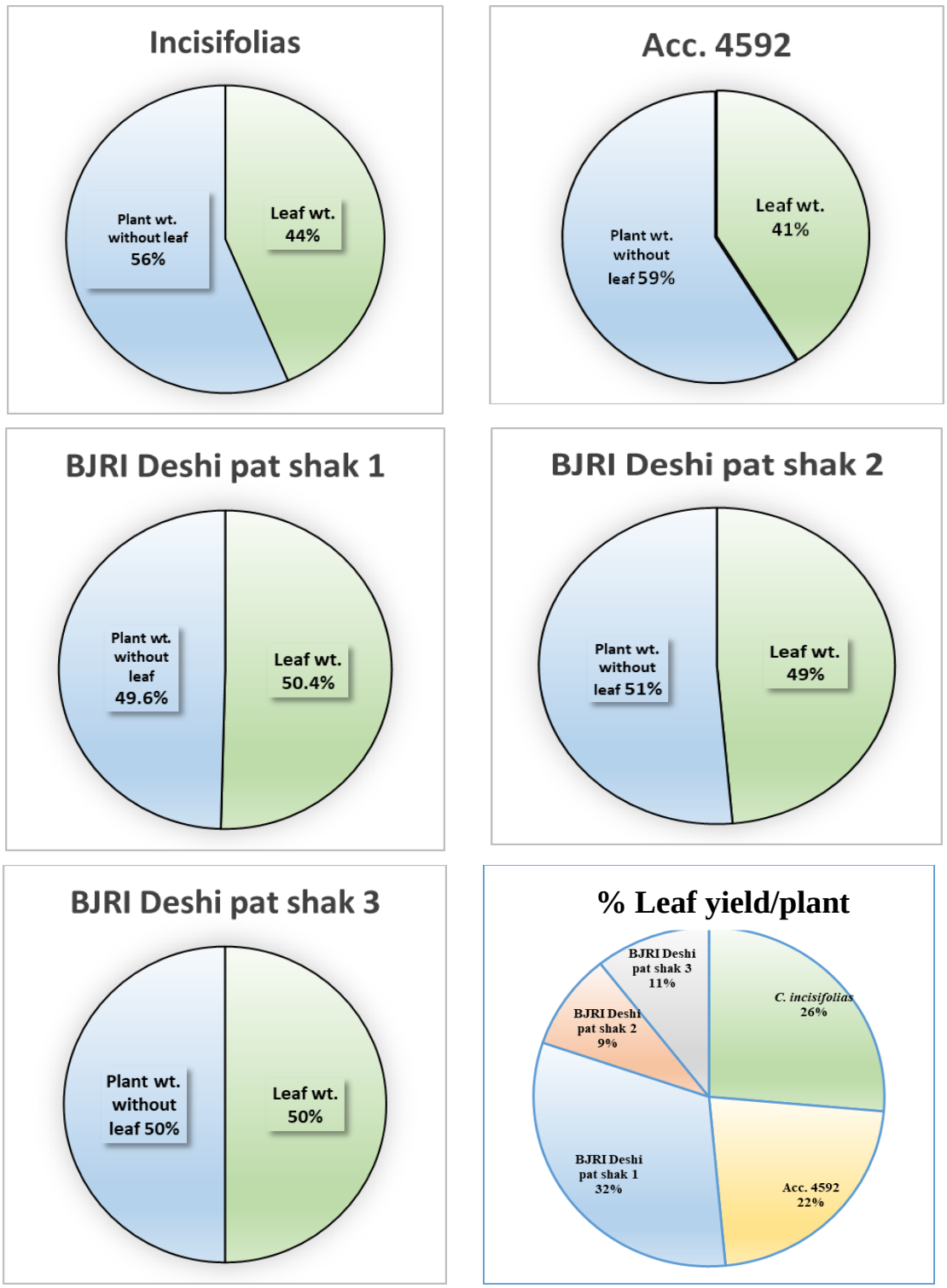

Fig 7: % Leaf content in a single plant of different genotypes

Table 3. Different growth parameters of vegetable type tossa jute (25 DAS)

Genotype	Leaf no/plant	Plant height (cm)	Green wt/plant	Green twig wt/plant (g)	Dry twig wt/plant (g)	Flowering habit
C. incisifolias	12.9 a	42.4 ab	11.4 a	5.0 a	0.92 a	No flower
Acc. 4592	11.9 a	47.8 a	10.1 a	4.2 a	0.71 ab	Flower appeared
BJRI Deshi pat shak 1	13.8 a	34.8 bc	11.8 a	6.0 a	0.87 a	No flower
BJRI Deshi pat shak 2	12.6 a	35.3 bc	3.6 b	1.7 b	0.36 c	No flower
BJRI Deshi pat shak 3	12.7 a	34.2 c	4.0 b	2.0 b	0.31 c	No flower
CV%	9.27	6.79	22.13	19.33	20.33	

Conclusion

Corchorus olitorius L. is a nutritious green leafy plant. BJRI has no vegetable type tossa jute variety. Acc. 4592 and genotype *C. incisifolias* performed better in case of leaf traits, leaf biomass production and flowering habit. Further studies will be done to evaluate their nutritional quality.

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