Morphological Characterizationof Underutilized Legume Sword Bean (*Canavaliagladiata* Jacq.)Genotypes of North-Eastern Hill Region of India Under Foot Hill of Arunachal Pradesh

ABSTRACT

Leguminous crops are important components of Indian agronomy, because of are an important source of nutrition in apredominantly vegetarian diet. To investigate the genetic diversity present in the underutilized legume sword bean (*Canavalia gladiate*) genotypes of theNorth-Eastern hill region of India 20 native sword bean genotypes were collected from different agroclimatic regions of theNorth-Eastern hill region of India. The morphological traits were observed in days to seed germination i.e. (3-6 days), pod length (16.45-32.87 cm), pod width (2.28-4.33 cm), pod weight (17.92-31.93 g), pod girth (7.75-12.64 mm) and seed weight (0.75-2.35 g). Performance of CHF SB-1, CHF SB-18, CHF SB-11, CHF SB-19, CHF SB-15, CHF SB-4,and CHF SB-10 genotypes under test conditions was superior and suggested that breeders might exploit the genome of these genotypes in legumegrowing and breeding activities.

Keywords: Legume Growing and Breeding; Genetic Diversity; Sword Bean(*Canavalia gladiate*)

ABBREVIATIONS

ICAR: Indian Councilof Agricultural Research
CAU: Central Agricultural University
N: North
E: East
Viz.: Namely
cm: Centimeter
mm: Millimeter
g: Gram
I.e.: Thatis

1. INTRODUCTION

India is often referred to as a predominantly vegetarian nation due to a combination of cultural, historical, religious,and economic factors [1]. While it's essential to note that not every individual in India is vegetarian, a significant portion of the population does follow a vegetarian diet. legumes are highly preferred in India for vegetarian diets due to their nutritional value, affordability, cultural significance, versatility, satiety, environmental considerations, and alignment with religious and cultural practices. These factors collectively make legumes an integral part of the Indian vegetarian diet and contribute to their widespread popularity.

20 genotypes of sword bean (*Canavaliagladiata*)were collected from various parts of theNorth-Eastern Hill region of India. Sword bean, scientifically known as *Canavaliagladiata* Jacq., is a tropical and sub-tropical legume plant that is primarily grown for its edible beans and attractive flowers. The most notable feature of the sword bean plant is its long, flat,and somewhat sword-shaped pods [2]. These pods measure about 20 to 40 cm (7.87 to 15.75 inches) in length and are typically green, turning yellow or brown as they mature. Each pod contains several large, flat, and oval-shaped or kidney-shaped seeds or beans [3]. The sword beans, which are the seeds found inside the pods are edible. These are consumed when young and tender, similar to other green beans. The pods become tough and less palatable when

mature. Therefore, it is essential to harvest the pods when young and tender for the best flavor and texture. The beans have amild and nutty flavor thus making them suitable for various culinary preparations. Sword beans can be prepared and cooked similarly to other beans. They can be steamed, stir-fried, boiled, or included in a variety of dishes like salads, stews, and curries. The young, tender beans are preferred for consumption. Sword beans are a good source of plant-based protein [4], making them an excellent choice for vegetarians and vegans. The pod is high in dietary fiber, which aids in digestion and helps maintain bowel regularityand is also agood source of vitamin C, vitamin A,and minerals like potassium and iron. The beans also contain antioxidants that help to protect cells from damage caused by free radicals. Sword beans are a versatile and nutritious addition to the diet and their cultivation can serve both culinary and ornamental purposes [5].

Sword bean is perennial but is often cultivated as anannual crop. The plant requires warm and sunny weather and grows well under organic well-drained soil [6]. The plant is adapted to adverse environmental conditions and can thrive under extreme stress conditions [7].

The genotypes of underutilized vegetables unless collected from different regions are properly evaluated and their attributes become known to breeders, will have little practical use. Sword beans are mostly consumed by rural peoples of the North-Eastern hill region. The diversity in sword beansobserved based on morphological traits in the present study could be of interest to the breeders in thebreeding program. Therefore, the present investigation was undertaken to explorethe lesser-known neglected sword bean grown in the North-Eastern hill region and analysis was done based on 6 morphological traits. The differences in morphological traits among the 20 sword bean genotypes have been enlisted in Table 1.

2. METHODOLOGY

A total of 20 sword bean genotypes were collected from various parts of thenortheasternHill states of India and were used to assess the genetic diversity among the sword bean genotypes. A trial was carried out in open field conditions at avegetable research farm, (Latitude: 28.0632◦ N; Longitude: 95.3239◦ E;) College of Horticulture and Forestry, Central Agricultural University (Imphal), Pasighat, Arunachal Pradesh in2022. The region has asub-tropical climate. The seeds were soaked overnight in distilled water to ensure maximum germination and one seed per hole was directly sown under open field conditions. Fresh pods were harvested from each genotype for recording morphological data. Morphological traits of sword bean were recorded using Indian bean descriptors [8], due to theunavailability of descriptor for sword bean. A total of six morphological traits*viz.,* days to seed germination, seed weight, pod length, pod width, pod weight, and pod girth were measured. The experimental scheme with three replications wasdesigned in randomized block design. The observations were recorded for five plants per genotype per plot for each replication. The data were statistically analyzed for computation of mean performance.

3. RESULTS AND DISCUSSION

A considerable variation among the 20 genotypes of sword bean in six morphological traitswas found. The evaluation of morphological traits showing significant differences among the 20 genotypes for all the characters investigated is given in Table1. Observations recorded for morphological traits revealed awide range of variation, especially in days to seed germination (3-6 days), pod length (16.45-32.87 cm), pod width (2.28-4.33 cm), pod weight (17.92-31.93 g), pod girth (7.75-12.64 mm) and seed weight (0.75-2.35 g)which confirms results of the study[9]. The CHF SB-18 genotype was reported to have the highest pod length (32.87 cm) among the various genotypes investigatedfollowed by CHF SB-19 (31.27 cm) and CHF SB-11 (31.10 cm). All the genotypes showed a low incidence of pests and diseases. Given the variation present among different genotypes based on morphological traits, priority should be given to genotypes having high pod weight, pod length, and pod width for getting higher pod yield thus these parameters could be considered while formulating the selection indices for improvement of sword bean.

Table 1. Morphological traits of different sword bean genotypes

Genotypes	Days to seed germination (days)	Pod length (cm)	Pod width (cm)	Pod weight (g)	Pod girth (mm)	Seed weight (g)
CHF SB-1	3	17.60	2.28	22.15	8.17	0.75
CHF SB-2	4	20.47	2.34	30.78	10.98	1.39
CHF SB-3	5	25.19	2.57	23.01	9.24	1.52
CHF SB-4	5	24.21	2.56	31.93	11.93	1.37
CHF SB-5	4	26.20	2.75	24.50	9.37	1.43
CHF SB-6	4	30.05	2.73	24.51	9.28	1.72
CHF SB-7	5	18.23	2.35	23.26	10.12	2.16
CHF SB-8	5	26.72	2.72	25.10	9.27	1.58
CHF SB-9	4	30.17	2.84	26.01	7.75	1.64
CHF SB-10	5	23.02	2.57	21.82	8.49	1.49
CHF SB-11	4	31.10	2.95	25.20	9.26	1.62
CHF SB-12	3	28.17	2.59	24.60	9.34	1.57
CHF SB-13	4	29.20	2.55	25.10	9.21	2.18
CHF SB-14	6	25.35	2.89	21.78	9.06	2.03
CHF SB-15	5	16.45	4.33	17.92	12.64	1.61
CHF SB-16	4	28.26	2.94	23.20	8.52	2.26
CHF SB-17	6	28.09	3.25	23.63	8.94	1.59
CHF SB-18	4	32.87	2.33	27.41	12.31	1.70
CHF SB-19	5	31.27	2.79	26.02	11.32	2.13
CHF SB-20	4	28.80	2.83	24.60	9.51	2.35

4. CONCLUSION

The wide genetic diversity found in sword bean genotypes collected from theNorth-Eastern Hill region of India based on morphological traits and less incidence of insect pests and diseases gives an insight for the application of these genotypes in abreeding program to develop high-yield building, disease,and insect-pest resistant varieties and also widen the genetic base for their future breeding programs.(=This section has been rather superficial written, immediately it should again as more wider and compare all the data obtained from this experiment and related references'… On the other hand, the answer(s) has/have not been given that why this experiment was established. What is the main reason for this experiment… etc.? How will use observed results of the legume growing and breeding program in India? Please explain it!)

References are very old (the newest one is 2019. And, it is 4 years old! Please find and use the newest one!)

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