

RESEARCH NOTE

SEED GERMINATION POTENTIALITY OF VETIVER GRASS (*VETIVERIA ZIZANIODES* L. NASH)

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ABSTRACT: The present study was undertaken to observe the potentiality of seed germination of wild vetiver (*Vetiveria zizanioides* L. Nash) over a five-month period (from mid July to mid November 2003) along with other phenological features. The total length (mean \pm SD) of vetiver culms was 206.32 ± 42.43 cm. The root and shoot lengths (mean \pm SD) of 8 weeks old seedlings were 3.93 ± 0.25 cm and 4.79 ± 1.29 cm, respectively. The fitted regression line equation for the root and shoot length was found as $Y = 0.074 + 1.20 X$, where X and Y are root and shoot length, respectively. The calculated value of 't' (41.355) and correlation coefficient, 'r' (0.99) substantiates that there is a highly positively significant relationship between root and shoot length at 0.01% level of significance. The overall percentage of seed germination (mean \pm SD) was 41.48 ± 5.63 . However, further trial with the germinated seedlings is necessary to explore its viable potentiality at the field level.

Key Words: Vetiver Grass; Seed; Germination; Agronomic Characters; Bangladesh.

INTRODUCTION

Vetiver sets fertile seeds that can produce seedlings. The flowering period of vetiver is from June to November (Rahman et al., 1996). An extreme and thorough study was conducted by them to identify the existence of the species, ecotype variation, explore distribution, abundance, different habitats, and to investigate the potential uses in Bangladesh.

Vetiver grass is commonly found all over Bangladesh except littoral forest of Sundarbans, greater Sylhet, Chittagong, and Chittagong Hill Tracts districts as well as under the shades of the shall (*Shorea robusta*) forest of Tangail, Mymensing and Gazipur near the sandy banks of the river Brahmaputra in the district of Mymensing, Jamalpur and Sherpur. In Nawabganj, it is cultivated for use in thatching. In Bangladesh, the grass grows quite well on hillocks and undulating lands, fallow lands, dykes of crop fields, marshy habitats, river sides and low lying areas, whereas it never grows inside forest under shade. If it is introduced inside open forest patches, vetiver can thrive and establish very well.

Vetiveria zizanioides L. Nash is the only species that exists in Bangladesh (Rahman et. al. 1996). On the basis of some morphological variations in the structural length of the culm (i.e., length of the flowering culms), size of the clumps and length and diameter of the roots (i.e., the root extractable by shovel in the field). Rahman et al., 1996 identified three forms (A, B and C) that are apparently adapted to environment (Table 1). They also conducted DNA fingerprint test which revealed that there is no ecotype variation in vetiver plants adapted to various habitat in Bangladesh.

The root of vetiver is widely used in Ayurveda and Unani medicines (Kirtikar and Basu, 1986). The root contains essential oils in the range of 0.15% to 0.29% of dry weight (Aagarwal et al., 1998).

When vetiver spikelets are fertilized, the sessile hermaphrodite spikelet sets seed (ORDPB, 2000). Vetiver seed has a specific period of viability. When the seeds are harvested before the disarticulation and cultured in the laboratory, it germinates @ above 70%. Again, when the seeds are left for 3 days and 7 days, germination de-

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Table 1. Different forms of *Vetiveria zizanioides* L. Nash based on morphological variations

Morphological variations	Arbitrary forms
Culm height 100-200 cm	Form A
Roots 40-60 cm x 3-6 mm	
Clump diameter 80-130 cm	
Very stiff	
Culm height 80-140 cm	Form B
Roots 25-40 cm x 2-5 mm	
Clump diameter 60-120 cm	
Culm height 30-80 cm	Form C
Roots 20-35 cm x 2-4 mm	
Clump diameter 40-100 cm	

creases to 40% and 10%, respectively (ORDPB, 2000). Under natural condition, mature seeds are attached to the inflorescence and gradually fall off. Vetiver seeds are sensitive to environmental factors; thus they easily lost their viability upon exposure to drought, wind and bright sunlight, even for only a short period of time (ORDPB, 2000). However, certain conditions under which seeds are able to germinate seem to be most commonly found in tropical swamps (NRC, 1993).

Bangladesh is highly a flood prone region due to its geographical location. Erosion problems, both on steep and gently sloping lands, and flood control embankments are continuously being damaged by floods affecting natural coastal resources and causing human sufferings almost every year. However, there is a great potential for the use of vetiver grass for protection of coastal and river embankments, as it has a number of singular architectural and anatomical features as stated elsewhere (ORDPB, 2000). There is no detailed study available on the seed germination aspect of vetiver in Bangladesh. Therefore, it is felt that a practical study should be undertaken to make its cost effective propagation.

MATERIALS AND METHODS

The present study was undertaken at Baherchar under Upazila Galachipa, District Patuakhali; Bangladesh from July to

November, 2003. A total of 200 vetiver clumps (wild variety) were selected in mid July, 2003 for preliminary observation from where a total of 25 healthy culms were selected when the inflorescences were found to come out. By the late August, 2003 growth of the inflorescences was at their extremity. Therefore, each of the seed heads was bundled with perforated polythene bag to ensure penetration of light and air and to congregate. The sessile spikelets were collected manually on mid September 2003 when falling of the spikelets was observed. Those were kept in an earthen pot for the subsequent experiment. At the same time, length of peduncle with sheath covered, length of peduncle without sheath covered and the length of seed heads were measured.

Vetiver seeds were sown in earthen pot (15.24 cm height with a radius of 12.7 cm). A total of 80 kg powered loamy soil was taken in a big pre-cleaned container. Dried and powdered cow-dung (20.0 kg), Urea (6.0 kg), TSP (3.0 kg) and MP (3.0 kg) were mixed with the soil. The soil mixture was taken into the earthen pots @ 1.5 kg pot⁻¹.

Seeds were sown on September 13, 2003. A total of 100 seeds from each of the 25 sampled seed heads were sown in each pot. The same experiment was conducted thrice. Regular watering was done.

After 8 weeks of sowing the seeds (on 17 November 2003), a total of 25 seedlings were randomly selected from the total seedlings, uprooted and washed with distilled water. Then the root and shoot lengths were measured separately. Correlation and regression analyses were done to observe the root and shoot lengths relationship following the methods as stated elsewhere (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The length (mean \pm SD) of peduncle with sheath covered, without sheath covered and seed head was 108.20 ± 32.53 cm, 65.68 ± 1.41 cm and 32.44 ± 11.31 cm, respectively. The total length (mean \pm SD) of vetiver culms was found as 206.32 ± 42.43 cm with a range from 162.00 cm to 256.00

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cm. Therefore, it falls in the arbitrary Form A type vetiver as described by Rahman et al. (1996).

Seed germination started from the 12 DAS (i.e., September 25, 2003) and completed within 5 to 6 days. The overall percentage of germination rate (mean \pm SD) was 41.48 ± 5.63 . Hopkinson (2002) studied on the apparently sterile cultivar Monto established vegetatively on road works in Cook Shire. He screened the seed heads for their ability to produce true seeds (caryopses). Samples averaging about 38 seed heads each had been collected for screening from eight sites on two locations in March 2002 when the heads were ripe. In all, about 119000 potentially fertile seed structures (sessile spikelets) were processed. But only 3 caryopses were found with a low level (0.0025%) of fertility. Verma et al. (1995) also found low rate of germination with vetiver seed in water. In the present study, the germination rate of *Vetiveria zizanioides* L. Nash (wild variety) shows higher rate of fertility ($41.48 \pm 5.63\%$).

The total length (mean \pm SD) of vetiver culms was found as 206.32 ± 42.43 cm. Therefore, it falls in the arbitrary Form A type vetiver as described by Rahman et al. (1996). The root and shoot lengths (mean \pm SD) of 8 weeks old seedlings were 3.93 ± 0.25 cm and 4.79 ± 1.29 cm, respectively. The root and shoot lengths were from 2.73 cm to 4.35 cm and from 3.42 cm to 6.85 cm, respectively.

The fitted regression line equation for the root and shoot length of 8 weeks old seedlings was $Y = 0.074 \pm 1.20 X$, where X and Y are root and shoot length, respectively. The calculated value of 't' (41.355) was found higher than the tabulated value of 't' at 0.01% level of significance (Figure 1). Hence, there is a very highly significant relationship between root and shoot length. Again, the value of correlation coefficient, 'r' was found as 0.99 which refers the relationship between root and shoot length is highly positively correlated.

The present study reveals that the seed of wild variety of *Vetiveria zizanioides*

L. Nash is one of the potential methods for its propagation. The present study was conducted at the nursery level. For the large scale propagation at field level, further trial with the germinated seedlings is recommended.

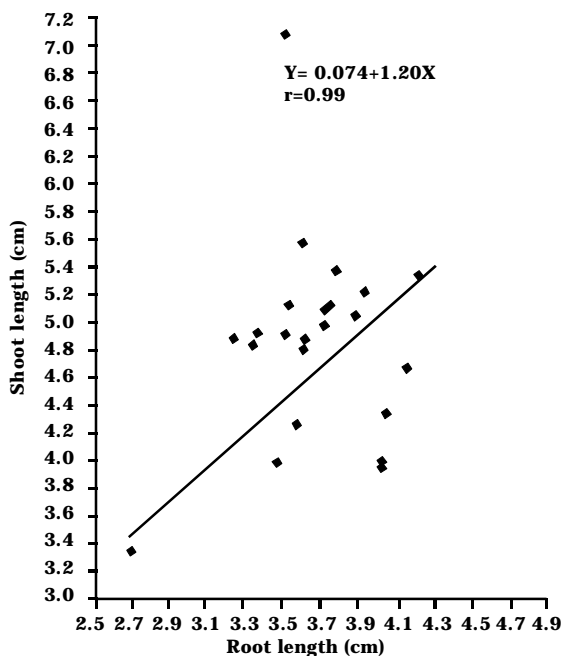


Figure 1. Relationship between Root Shoot Length of 8 Weeks Old Vetiver seedlings

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