Indian J. Genet., 75(3): 404-407 (2015)
DOI: 10.5958/0975-6906.2015.00066.8

Short Communication

Selection of lines of *Valeriana jatamansi* Jones, a high value medicinal plant in North Eastern Himalayan region

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(Received: July 2014; Revised: May 2015; Accepted: June 2015)

Abstract

***Valeriana jatamansi* Jones, newly introduced endangered medicinal plant in north eastern Himalayan region from North Sikkim (Sangtok 27.25°N 88.31°E) to the hilly region of West Bengal (Kalimpong 27.06°N 88.47°E) was conserved in field gene banks in Kalimpong regional research station for its highly active medicinal properties. Morphological characterization and selection of 9 lines on the basis of leaf margin and time of flowering was done in the field gene banks maintained at Kalimpong. Three types of plant phenotype namely, entire, sinuate and wavy was selected along with morphological traits to find the overall performance of the lines in the plant population.**

Key words: Characterization, endangered medicinal plant, selection, leaf margin

Valeriana jatamansi Jones is considered to be highly endangered medicinal plant found mainly in northern part of Himalayan region. The plant is diocious, tetraploid, polygamous (Prakash 1999). Leaf margin is entire, wavy and sinuate which are not earlier reported (Chakraborty, 2014). It is an endangered plant as declared by IUCN (Kaul and Handa, 2000) and it is grown in Himachal Pradesh, northern part of U.P., Sikkim, Kashmir Himalayan region (Rather et al, 2011). The important chemicals which have effective medicinal properties against leprosy (Kour et al. 2000), snakebite and scorpion bite (Chopra et al. 1956) were found in this plant. The present study was therefore conducted to select lines on the basis of leaf margin characters, duration of flowering time and phenotypic characteristics.

The hill zone of West Bengal, India, comprising of three hilly subdivisions, Darjeeling, Kalimpong (27.06°N 88.47°E), and Kurseong The geographical area of this zone is about 3115 sq km, which is 3.5% of the state area. The elevation of this zone is 3,150 meter above mean sea level.

The selection of lines was done on the basis of leaf morphotypes. Three types of population were categorized each with entire margin (KVJ-1) (Fig. 1) sinuate margin (KVJ-2) (Fig. 2) and wavy margin (KVJ-3) (Fig. 3). Duration of the flowering time was taken for secondary selection as early, medium and late considering one month duration in each of the lines. Early type were considered from 1st week of January to 1st week of February; medium from 2nd week of February to 2nd week of March and Late type were taken from 3rd week of March to 4th week of April. (Anonymous 2013 and 2014).

Phenotypic characterization was done for plant height, number of leaves/plant, leaf length, leaf breadth, petiole length, rhizome length, rhizome width, seed yield per plant in each of the sex type (Tables 1 and 2). Overall 9 types of lines were selected in each sex type of the plant population (Anonymous 2013 and 2014).

Five individuals were selected from the plots of

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Published by the Indian Society of Genetics & Plant Breeding, F2, First Floor, NASC Complex, PB#11312, IARI, New Delhi 110 012
Online management by indianjournals.com

Fig. 1. Plant with entire leaf margin

Fig. 2. Plant with sinuate leaf margin

Fig. 3. Plant with wavy leaf margin

hermaphrodite and female plants in 2011-13 and each character was measured with the help of a measuring scale and a weight machine in a definite line. The statistical analysis was done using Randomized Block Design (RBD) to find the significant levels of the morphological parameters by SPSS software. Critical difference at 5% level of significance, SEM and coefficient of variation (CV) was measured in each of the sex types for critically observing the results in important morphological parameters among and in between the lines.

The results of selection based on quantitative characters are presented in Tables 1 and 2. In female

Table 1. Performance of lines of *Valeriana jatamansi* (female plant)

Morphotypes with sub-category	Plant height (cm)	No. of leaves/ plant	Petiole length (cm)	Leaf length (cm)	Leaf breadth (cm)	Root length/ plant (cm)	Rhizome length/ plant (cm)	Rhizome width/ plant (cm)	Seed weight/ plant (g)
KVJ-1-1	12.3	26	13.4	7.1	6.5	7.5	4.1	1.2	0.37
KVJ-1-2	15.5	30	14.9	6.5	5.6	8.2	3.2	0.4	0.41
KVJ-1-3	13.5	38	12.4	5.5	5.1	6.7	3.5	0.6	0.35
KVJ-2-1	11.4	33	13.7	9.1	7.5	8.3	4.2	0.5	0.45
KVJ-2-2	8.5	25	14.3	7.9	6.5	5.6	3.8	0.4	0.38
KVJ-2-3	15.0	28	9.5	9.5	7.8	8.7	4.3	1.3	0.30
KVJ-3-1	14.6	23	7.3	6.9	5.6	8.3	3.7	0.2	0.37
KVJ-3-2	18.5	29	12.5	5.7	4.5	9.4	5.1	1.2	0.34
KVJ-3-3	11.5	41	11.3	7.2	6.1	6.7	3.2	0.3	0.32
Range	18.5-8.5	23-41	14.9-7.3	9.5-5.5	4.5-7.8	5.6-9.4	3.2-5.1	0.2-1.3	0.30-0.45
SEM±	1.43	2.11	0.84	0.93	0.66	0.78	0.35	0.06	0.13
C.D.(p=0.5)	4.32	6.31	2.11	2.93	1.94	2.31	0.92	0.11	0.09
C.V.	16.22	18.23	15.30	17.31	13.13	19.32	17.02	14.91	11.12

Table 2. Performance of lines of *Valeriana jatamansi* (Hermaphordite plant)

Morphotypes with sub-categorization	Plant height (cm)	No. of leaves/ plant	Petiole length (cm)	Leaf length (cm)	Leaf breadth (cm)	Root length/ plant (cm)	Rhizome length/ plant (cm)	Rhizome width/ plant (cm)	Seed weight/ plant (g)
KVJ-1-1 a	15.5	20	12.6	8.2	6.9	7.8	5.3	0.7	0.27
KVJ-1-2 a	14.4	16	14.5	7.5	7.1	8.6	4.6.	0.5	0.29
KVJ-1-3 a	14.2	24	14.7	6.7	6.1	5.7	3.5	0.4	0.22
KVJ-2-1 b	13.1	22	10.3	5.9	5.3	7.3	5.2	1.3	0.33
KVJ-2-2 b	12.7	28	11.9	6.3	5.9	5.1	3.8	0.5	0.37
KVJ-2-3 b	9.2	19	12.2	8.1	7.4	7.6	4.3	0.8	0.35
KVJ-3-1 c	13.5	24	14.7	6.5	6.1	8.3	5.7	1.0	0.32
KVJ-3-2 c	14.7	25	9.7	7.3	6.2	9.2	6.2	1.2	0.35
KVJ-3-3 c	14.3	32	12.3	7.2	6.3	5.8	4.2	0.3	0.31
Range	9.2-15.5	16-32	9.7-14.7	6.5-8.2	5.3-7.4	5.1-9.2	3.5-6.2	0.3-1.3	0.22-0.37
SEM±	0.71	2.01	0.64	0.93	0.36	0.29	0.13	0.01	0.01
C.D.(p=0.5)	2.14	5.96	1.82	2.33	0.98	2.82	0.78	0.03	0.03
C.V.	13.21	20.32	12.83	15.64	11.91	15.32	9.81	12.12	9.64

plant population, KVJ 1-2, KVJ 2-3, KVJ 3-1(wavy early) lines, the plant height was statistically at par with KVJ 3-2 (wavy mid) (Table 1). In hermaphrodite plant population, KVJ 1-2a (entire mid), KVJ 1-3a (entire late), KVJ 3-1c (wavy early), KVJ 3-2c (wavy mid) and KVJ 3-3c (wavy late) lines were all statistically at par with KVJ 1-1a (entire early) line (Table 2).

Number of leaves/plant in female plant population, KVJ 1-3 (entire early) were found statistically at par with KVJ 3-3(wavy late) line. Number of leaves of all other morphotypes was statistically significant with KVJ 3-3 (wavy late) line found in the female plants. In hermaphrodite plant population, KVJ 2-2b (sinuate mid) line was only statistically at par with the KVJ-3-3c line; all other lines were significantly lower than the KVJ-3.

The Petiole length in female plant population, KVJ-1-1 (entire early) , KVJ-2-1 (sinuate early), KVJ-2-2 (sinuate mid) lines was statistically at par with highest length with KVJ-1-2 (entire mid) line. Also in hermaphrodite plant population, KVJ-1-2a (entire mid) line was statistically at par with KVJ-1-3a (entire late) and KVJ-3-1c (wavy early) lines Similarly, the leaf length in KVJ 1-1 (entire early), KVJ 1-2 (entire mid), KVJ 2-1 (sinuate early), KVJ 2-2 (sinuate mid), KVJ 3-1 (wavy early), KVJ 3-3 (wavy late) was also statistically at par with the KVJ-2-3. Leaf length of all other lines was significantly lower in comparison to highest value KVJ-2-3. In hermaphrodite population besides the highest and lowest lines, rest of the lines produced leaf, which was all significantly lower than KVJ 1-1a (entire early).

The Leaf breadth in KVJ 1-1 (entire early), KVJ 2-1 (sinuate early), KVJ 2-2 (sinuate mid), KVJ 3-3 (wavy late) lines was statistically at par with KVJ-2-3. All other lines were significantly lower with respect to leaf breadth than KVJ-2-3. In hermaphrodite population besides the highest and lowest lines, the results showed significantly lower breadth than the KVJ2-3b.

The root length/plant in female population, KVJ 1-1 (entire early), KVJ 1-2 (entire mid), KVJ 2-1 (sinuate early), KVJ 2-3 (sinuate late) and KVJ 3-1 (wavy early) was statistically at par with KVJ-3-2. It was also at par in hermaphrodite plant population KVJ 1-1a (entire early), KVJ 1-2a (entire mid), KVJ 2-1b (sinuate early), KVJ 2-3b (sinuate late), KVJ 3-1c (wavy early) with KVJ-3-2c.

The rhizome length/plant in female population KVJ 2-1 (sinuate early), KVJ 2-3 (sinuate late) lines were statistically at par with KVJ 3-2 (wavy mid. In hermaphrodite plant population only KVJ 3-1c (wavy early) was found to be statistically at par with the population of KVJ-3-2c. Rest of the morphotypes were all significantly lower than the KVJ-3-2c. In female plant populations KVJ 1-1 (entire early), KVJ 3-2 (wavy mid) the rhizome width/plant was statistically at par with KVJ 2-3 (sinuate late), whereas in hermaphrodite population all the lines were found to have significantly

lower in rhizome width than the KVJ-2-1b population. The seed weight/plant in female plant populations, KVJ 1-1 (entire early), KVJ 1-2 (entire mid), KVJ 2-2 (sinuate mid), KVJ 3-1 (wavy early) lines was statistically at par with the KVJ-2-1 line. Hermaphrodite populations, KVJ 2-3b (sinuate late), KVJ 3-2c (wavy mid) also produced seed with more or less same weight as produced by KVJ 2-2b (sinuate mid) population.

As seed weight is the parameter of fitness of the population in a new region and root has the important chemicals having active medicinal properties found in the plant, both the characters were taken into consideration for selection of better lines. KVJ-1-1 (entire early), KVJ-1-2(entire mid), KVJ 3-1 (wavy early) lines in female plant population and KVJ-2-2b (sinuate mid), KVJ-2-3b (sinuate late), and KVJ 3-2c (wavy mid) in hermaphrodite plant population were found to produce better lines in future generations. Composite varieties can be produced by further selection and mixing of better lines of same sexes in future release of varieties.

Acknowledgement

Authors are grateful to ex-director Prof. Satyabrata Maity and present director Prof. Jitendra Kumar of DMAPR for financial help of the research programme.

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