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# GENETIC RESOURCES OF ASPARAGUS (ASPARAGUS OFFICINALIS L.)

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Thirty-nine introductions of asparagus varieties/strains from the collections of genetic stock were evaluated at Regional Research Laboratory farm Sanat Nagar, Srinagar. Four distinct complexes were recognised on the basis of number of spears/plant and weight of spear/plant. Majority of the introductions were in the complex IV. Marked differences were observed between complex I and complex II. The introductions SL 17, SL 21, SL 29 were among top ranking for weight of spear/plant and spear yield/ha.

#### Key words : Genetic resources, Asparagus officinales L.

The morphological characters offer valuable criteria for the systematic cataloguing of the available germplasm and have the clear understanding of various complex characters. Anderson (1957) proposed that the best way to analyse the complex variation is to reduce the measurements of different characters to a pattern or score and compare the latter. The present paper reports the use of metroglyph analysis suggested by him in analysing the morphological variations in a set of 39 introductions of Asparagus varieties/strains from the collection of the genetic stock.

## MATERIALS AND METHODS

The seed of 39 introductions (11 from U.S.A., 22 from Newzealand and 6 from South Africa) of different varieties were sown in a nursery in May, 1986 at Regional Research Laboratory Farm Sanat Nagar, Srinagar and were transplanted in the main field with row to row and plant to plant distance of  $1.5 \times 0.5$  m respectively in October, 1986. The plot size of each entry consists of two rows and each row consists of twenty plants. The lay out was randomised design with three replications. All the agricultural operations were carried out as discussed by Pandita *et al.* 1987. The spears were harvested after the establishment period. Data were recorded on 15 plants from each replicate on plant height, number of stalks/plant, stalk diameter, number of

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marketable spears/plant, spear diameter and weight of spear/plant each year (1988, 1989, 1990). The data was pooled for all the three years and the statistical analysis were carried out as given in Steel and Torrie (1960). Metroglyph and index score analysis was carried out according to the method suggested by Anderson (1957). The class interval for various morphological and symbols used for different characters is represented in Table 2. The index score were obtained by alloting numerical values 1, 2, 3 of each expression recognised in respect of each character and finally summing up the score obtained by each accession for all characters under study.

# **RESULTS AND DISCUSSION**

Performance of 39 introductions for different characters is presented in Table 1. The weight of spears ranged from 12.53 to 31.36g with a mean value fo 19.49 g, while the weight of spears/plant ranged from 29.05 to 171.44 with a mean value of 87.71 g. SL 21 gave the highest weight of spears/plant followed by SL 29 and SL 17.

The calculated yield for weight of spears/ha was maximum in the Strain SL 21 followed by SL 17 and SL 29 respectively. The number of spears/plant varied from, 2.07-9.40 with an average value of 4.61 spears/plant. The spear diameter ranged from 1.02-1.99 with an average value of 1.39 cm, heighest being in Rutgars Becans (SL3). Though SL 21 gave the maximum yield/ha, the weight of spears was less than the mean. In 'Marry Washington' (SL5) the weight of spears and the spear diameter was above the mean value but the total yield of spears/ha was less which was in confirmation with our earlier findings (Pandita and Bhan, 1984). Also SL16, SL4 and SL11 which gave yield of 2389.48, 2389.24 and 2345.49 kg of spears/ha, having the weight of spears 12.71, 22.54 and 19.71, g, with a spear diameter of 1.13, 1.56, 1.39 cm respectively thrive well in the Kashmir valley.

The results of metroglyph analysis are presented in Fig. 1. Each accession is represented by a semi circle, the co-ordinate of each circle being the number of spears/plant and the Y co-ordinate being the weight of spears/accession. Five other characters have been represented by rays at different positions on the glyph. The scatter diagram shows the following four complexes. Complex-I comprised three entries (SL 33, 37, 39). Its main characteristics were few number of stalks/plant, less spear diameter and least weight of spears/plant.These accessions were without a ray. Complex-II contains two accession (SL 16, 21). The accessions within this complex were characterized by medium plant height, number of stalks/plant, average weight of spears/plant, minimum stalk diameter. The accessions were represented by minimum of three rays.



ight )	Number of stalks/plant	Stalk diameter (cm)	Number of spears/plant	Spear diameter (cm)	Wt. of spear (g)	Wt. of spears/plant (g)	Number of spears/ha.	Wt. of spears/ ha. (kg)	
.83	3.46	1.44	3.87	1.36	15.57	59.76	77400	1205.118	
3.60	5.66	1.23	4.44	1.46	18.65	83.35	88800	1656.120	
2.08	3.46	1.54	2.83	1.99	26.20	74.03	56600	1482.920	
<b>13.46</b>	4.16	1.49	5.30	1.56	22.54	118.56	10600	2389.240	
26.06	2.80	1.60	3.05	1.71	31.36	90.18	61000	1912.960	· P
50.00	5.46	1.44	4.45	1.47	20.33	90.06	89000	1809.370	'ANI
82.00	4.40	1.37	5.15	1.19	15.21	78.74	103000	1566.630	JITA
88.20	3.26	1.28	4.40	1.61	20.95	91.93	88000	18.43.600	. AN
31.73	4.20	1.27	4.40	1.52	22.47	96.39	88000	1977.360	ID B
29.60	3.60	1.62	3.90	1.40	27.34	106.53	78000	2132.520	HAN
96.80	3.40	1.37	5.95	1.39	19.71	116.38	119000	2345.490	•
98.88	4.91	1.40	5.20	1.37	18.59	96.88	104000	1933.360	
193.06	1.86	1.51	3.35	1.45	22.88	76.93	67000	1532.960	
<b>99.4</b> 6	3.26	1.21	5.10	1.29	17.38	87.87	102000	1772.760	
[91.80	3.33	1.32	3.70	1.56	22.48	83.51	74000	1663.520	
02.15	8.28	1.05	9.40	1.13	12.71	118.82	188000	2389.480	v
18.66	5.93	1.18	6.93	1.24	18.41	127.60	138600	2551.626	ol.

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SL 18	208.06	5.46	1.36	6.66	1.24	17.37	115.27	133200	2313.684
SL 19	211.73	6.40	1.20	4.45	1.26	16.93	75.34	00068	1506.770
SL 20	181.11	14.50	1.23	6.57	1.40	16.20	106.22	131400	2128.680
SL 21	191.31	11.50	1.34	9.15	1.37	18.65	171.44	183000	3412.950
SL 22	166.16	4.55	1.26	3.70	1.28	17.96	65.46	74000	1329.040
SL 23	192.73	6.40	1.26	5.95	1.40	15.89	94.96	119000	1890.910
SL 24	184.80	4.06	1.30	3.98	1.14	15.54	61.85	79600	1237.780
SL 25	194.00	5.33	1.06	6.32	1.29	14.18	89.60	126400	1792.352
SL 26	168.06	4.66	1.42	5.17	1.43	19.72	102.62	103400	2039.048
SL 27	212.60	2.86	1.47	3.28	1.64	23.95	77.33	65600	1571.120
SL 28	203.20	4.26	1.24	5.10	1.50	19.75	100.65	102000	2014.500
SL 29	219.81	3.60	1.39	5.38	1.67	23.67	127.97	107600	2546.892
SL 30	188.00	3.83	1.43	3.31	1.17	17.67	58.55	66200	1169.754
SL 31	202.23	4.86	1.23	4.06	1.31	17.64	71.50	81200	1432.368
SL 32	196.93	3.46	1.33	3.67	1.35	23.27	85.14	73400	1708.018
SL 33	177.93	2.66	1.22	2.31	1.05	12.53	29.05	46200	578.886
SL 34	187.40	3.10	1.65	4.15	1.02	18.65	77.35	83000	1547.950
SL 35	212.16	4.53	1.71	3.85	1.57	22.64	89.01	77000	1743.280
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Accession	Plant height (cm)	Number of stalks/plant	Stalk diameter (cm)	Number of spears/plant	Spear diameter (cm)	Wt. of spear (g)	Wt. of spears/plant (g)	Number of spears/ha.	Wt. of spears/ ha. (kg)
SL 36	193.78	2.36	1.48	3.43	1.43	21.13	72.58	68600	1449.518
SL 37	177.76	3.04	1.21	2.92	1.29	15.90	46.98	58400	928.560
SL 38	160.90	2.33	1.26	2.07	1.57	20.53	42.91	41400	849.942
SL 39	163.00	2.76	1.18	2.75	1.24	17.78	49.72	55000	979.900
Mean	198.69	4.56	1.35	4.61	1.39	19.49	87.41		
Range	160.0-243-46 1	1.86-14.50	.05-1.71	2.07-9.40	1.02-1.99	12.53-31.36	29.05-171.44		
CD at 5%	6.630	0.784	0.050	0.530	0.063	1.284	8.761		
Table 2.	Index range an	id symbols u	sed for dif	ferent charac	ters in As	paragus offi	cinalis		
Characters		Range of m	ean Sco	ire I. Index ange (1)	Symbol	Score 11 Index range (2)	Symbol	Score 111 Index range (3	Symbol
Plant heigh	t (cm)	160.90-243.	46 16(	.90-190.90	0	190-91-210-90		210.91	·
Number of	Stalks/Plant	1.86-14.50	0	1.86-5.86		5.87-10.85	Ø	10.87	a
Stalk diame	ter (cm)	1.05-1.71	•	1.05-1.25	. 0	1.26-1.45	ı	1.46	·
Number of	spears/plant	2.07-9.40		2.07-4.67		4.68-7.27	ı	2.28	
Spear diam	eter (cm)	1.02-1.99	_	1.02-1.34	0	1.35-1.66	ı	1.67	ı
Weight of s	pear (gm)	1253-31.3	6 1:	2.53-19.05	0	19.06-25.31	ı	25.32	
Weight of s	pears/plant (gm)	29.05-171.4	44 29	0.05-86.15	0	86.16-143.24		143.25	

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Complex III was represented by a minimum of three rays and contains three accession (SL 3, 5, 10). Their main characteristics were minimum number of stalks/plant, medium height, large spear diameter and maximum stalk diameter with an average weight of spear/plant. The rest of accessions fall into Complex IV. The group was represented by a minimum of two rays and maximum of 5 rays excepting the accession SL 37 and SL 39 which are not represented by any ray. The main features are few number of spears with a average spear diameter medium spear weight/plant and medium plant height. The maximum similarities were between Complex III and II, with a minimum number of stalks/plant, medium height and average weight of spears/plant. The Complex-I was totally different from other complexes as it was not represented by any ray. The complex IV was the intermediate between Complex-III and II. The frequency diagram (Fig. 1) clearly shows that accessions in Complex I come under 0-5, whereas the Complex III come under 10-11 and Complex II and IV come under 7-12. Complex I and complex II differ markedly in having extreme characters. The extreme score of 11 & 12 were obtained by the accession SL 21, SL15, SL 10, SL 29, Sl 35 respectively. These accessions could be selected for further breeding programme for various characters. Their actual worth could, however, be known through subsequent testing.

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#### REFERENCES

- Anderson R. (1957) Semigraphical method for analysis of omplex problem *Proc. Nat. Acad. Sci.* Wash. **43** : 923-927.
- Pandita P.N., M.K. Bhan and Archana Kaul. (1987) Asparagus a cash crop of Kashmir. Indian Fmg. **36**(1) : 3-4.
- Pandita P.N. and M.K. Bhan. (1984). Prospectus of Asparagus cultivation in Kashmir. Asparagus Research News letter, 2(1): 25-29.
- Sttel R.G.D. and J.H. Torri. (1960). Principles and Procedures of Statistics, McGraw Hill, New York.