TESTING AND ADAPTATION STUDY ON THE EXOTIC MULBERRY VARIETIES FOR FOLIAGE YIELD

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Introduction

Rearing of silkworm is an ancient industry which is very productive, requires low investment, offers high potential return and thus saves foreign exchange spent on the import of silk yarn. The actual income obtained from this industry not only depends on the quality of good silk seed but also on the quality and quantity of mulberry leaves obtained per unit area. All managed plantation of one hectare dwarf mulberry can yield enough leaves to provide 750 kg of green silk cocoons or 93 kg raw silk (Zafarud-Din et al, 1983). Dwarf multicut varieties of mulberry with plant height less than 10 feet are generally cultivated for sericulture in many countries like Japan, China, and Korea while in Pakistan major source of mulberry leaves for silk worm rearing is the high trunk mulberry varieties; which are low yielding and deciduous in nature. There is, therefore, scarcity of mulberry leaves in the country and exists a great demand for introduction of dwarf, high yielding and nutritive mulberry varieties for the upkeep of sericulture industry in Pakistan. The present study was conducted to evaluate and select some promising high foliage varieties of mulberry from exotic sources.

Materials and Methods

Nine accessions of mulberry including eight exotic obtained from Sind Forest Department, Hyderabad and one local type, were planted at National Agricultural Research Centre, Islamabad during 1983. The species included in the study were; *Morus latifolia*, ichehie, Husung, Shin Ichinose, *Morus indica*, Gumji, Japanese late Japanese early and *Morus alba* as a local check. The experiment was laid out in a randomized complete block design having four replications. The plot size was kept 20 m^2 and each plot accommodated 20 plants. The plant to plant and row to row distance was kept as 1 metre. Eleven irrigations, each in every month were provided to the crop during the entire growth period through flood irrigation system.

To assess the performance of accessions regarding number of shoots, number of leaves, plant height and leaf area, data were recorded on five randomly selected plants from each plot and subjected to analysis of variance (Fisher, 1958), as presented in Table-1. Planimeter was used to calculate the leaf area by placing the planimeter along the sides of the leaf (Johnson, 1967).

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Genotypic and phenotypic variances, co-efficient of variability and heritability were also computed for each parameter under the study using the formulae (Sing et al, 1979). As given in Table-2.

Results and Discussion

Analysis of variance (Table-1) reveals that varieties significantly differed from each other for all the characters except weight of leaves. Almost parallel results were obtained for these characters during both the years i.e., 1983 and 1984. Accession PI 2407, PI 2408, and PI 2409 were significantly different from others regarding plant height. However, results of both the years were not identical as plant height was comparatively higher in 1984 than in 1983 which may be due to increased vegetative growth with the passage of time. Number of leaves per plant in both the years, for PI 2407 was the highest (2450 & 2477) whereas the lowest figure for this character was recorded in local check (188 & 189). Highest weight of leaves per plant was recorded in PI 2413. While the lowest was recorded in case of PI 2408, PI 2409 and PI 2414. Highest leaf area was observed in PI 2408 and the lowest was recorded in case of PI 2407. PI 2415 did not sproute. The highest genotypic and phenotypic variance (Table-2) in both the years was found in number of leaves per plant followed by leaf area. The other characters which showed the higher values for genotypic and phenotypic variance was plant height whereas highest genotypic and phenotypic co-efficient of variability for both the years was recorded in number of leaves per plant (89, 90, 87.20 and 85.00) followed by leave weight per plant (65.9, 61.80 and 61.13 gms). The highest heritability was recordd in leaf area (99.18, 99.13 cm^2) which is followed by number of leaves per plant (94.0, 93.95) and number of shoots per plant (93.90, 89.60). Heritability (broad sense) in all the characters ranged from 43.52 to 31.93 for plant height and 99.18 xto 99.13 for leaf area. However heritability estimates alone are inadequate measures of the genetic progress resulting from selecting individual plant for leaves. Genetic co-efficient of variation only indicates the relative genetic variability present in various characters but does not give an idea of the importance of environmental variability in relation to genetic variability. High genotypic and phenotypic variances associated with high genotypic and phenotypic co-efficient of variability which in turn associated with higher value of heritability were recorded in No. of leaves and leaf area;. Hence the phenotypic selection based on these characteristics would significantly boost up the productivity of leaves to a considerable level. The similar type of studies have been reported by Waqar, 1985 and Sheikh, M.I. 1977. The results obtained in the present study also seem to be in accordance with those of Mehatra et al, 1985.

Conclusion

On the basis of these studies it is recommended that Accessions PI 2407 PI 2408 and PI 2409 be propagated for meeting the demands of mulberry leaves particularly in the sub-tropical sub-humid climatic zone. Further Agronomic trials like fertilizer application, planting time and irrigation should be carried out to standardize the production technology to boost up mulberry leaves production.

REFERENCES

1. Johnson, R.E., (1967).Comparison of methods for estimating cotton leaf areas. Agron.J., 59, PP: 493-494.

2. Mehatre, M; Bapat, VA; Rao, P.S., (1985). Regeneration of plants from the culture of leaves and axillary buds in mulberry (*Morus indica*). Plant cell report 4(2) 78-80.

3. Sheikh, M.I., (1977). Comparison of six poplar clones for growth and survival. Pak. Jour. of Forestry, 1977 PP:101-108.

4. Fisher, R.A., 1958. Statistical methods for research workers. Oliver and Boyd, London. 13th ed: 248—298.

5. Azfauddin and Amin, A; (1983). Sericulture — a profitable rural cottage industry. "Progressive Farming". Vol. 3 No. 6 PP: 5—8.

6. Singh, R.K., and B.D. Chaudhry, (197). Biometrical methods in quantitative genetic analysis. Kalyani Publishers Ludhiana PP: 40—69.

Table 1

Average Performance of Nine Mulberry (Accessions) for Five Growth Parameters

Acession	Name of Variety	No. of Shoot per plant		Plant Height (cm)		No. of leaves per plant		Weight of leaves per plant (gms)		Leaf Arfa (cm^2)	
		1983	1984	1983	1984	1983	1984	1983	1984	1983	1984
PI 2407	*Morus latifolia*	15	15	225	234	2450	2477	2	2	98	97
PI 2408	Ichihie	15	15	253	264	1659	1688	1	1	105	105
PI 2409	Husung	11	10	245	263	639	903	1	1	86	85
PI 2410	Shin ichinose	7	7	105	192	545	561	2	2	78	78
PI 2411	*Morus indica*	6	6	196	203	369	389	3	3	48	47
PI 2412	Gumji	6	5.5	233	234	630	633	3	3	78	77
PI 2413	Japanese late	5	5	241	250	266	304	5	5	77	77
PI 2414	Japanese early	5	5	254	258	666	692	1	1	45	44
PI 2415	*Morus alba* (local)	5	5	162	260	188	189	2	2	39	45
	L.S.D. %	2.6	2.0	45.1	46.2	270	272	2	3	4	3
	1 %	2.8	3.0	61.29	64.68	273	372	3	2	5	4

Table 2

Genetic Parameters of various Growth Characteristics for Mulberry Varieties

Plant characteristics		GV	PV	GCV%	PCV	(h^2)% age
No. of shoots per plant	1983	17,14	19.14	49.9	53.10	89.60
	1984	17.85	10.01	51.5	53.20	93.90
Height of plant	1983	449.7	1408.6	10.0	17.6	31.93
	1984	822.7	1890.5	12.0	18.1	43.52
No. of leaves per plant	1983	544135.3	578604.7	87.22	89.90	94.40
	1984	547792.8	583046.4	85.00	87.70	93.95
Weight of leaves per plant	1983	1.81	2.1	61.00	65.9	86.19
	1984	1.85	2.1	61.80	65.9	86.19
Leaf area	1983	558.6	563.5	32.5	32.7	99.13
	1984	557.1	561.7	32.4	32.6	99.18

GV = Genotypic variance
PV = Phenotypic variance.
GCV = Genotypic co-efficient of variability.
PDV = Phenotypic co-efficient of variability.
h^2 = Heritability.