Plant Archives Vol. 22, No. 2, 2022 pp. 376-379 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2022.v22.no2.064

ANALYSIS OF QUANTITATIVE PARAMETERS OF MULBERRY PLANT IN VARIOUS ZONES OF KASHMIR VALLEY, INDIA

Naina Majid[1*] and Tajamul Islam[2]
[1]Govt. Degree College Sopore, Kashmir India
[2]College of Temperate Sericulture, Mirgund, SKUAST-K, Kashmir, India
*Corresponding author E-mail: nainaqadri@gmail.com
(Date of Receiving : 23-07-2022; Date of Acceptance : 15-10-2022)

ABSTRACT

The success of sericulture industry is mainly based on leaf quality and the appropriate environmental conditions for silkworm rearing. This study was aimed to assess the quantitative characters of mulberry plants in spring and autumn season, among three zones of Kashmir Valley. Mulberry plants of same variety (Goshoerami) and same age were selected in various mulberry farms in three zones (North, central and south) of the Kashmir valley. Samples were analysed by using standard procedures. The total branch length, longest branch length, average branch length per plant, leaf yield per plant and leaf area during spring and autumn were found highest in north followed by south and least in the central zone. The fresh weight of 100 leaves too was found highest in north but was followed by central and least in the south zone during the spring season while as during the autumn it was highest too in north zone but last in the central zone. Amongst the zones higher values were recorded for North zone followed by south and the least in the central zone. Quantitative values of mulberry are higher in autumn than the spring season.

Keywords: Mulberry, silkworm, seasons, zone, yield

Introduction

Sericulture is an agro-based rural industry which involves rearing of silkworms for the production of raw silk and cultivation of mulberry plants for production of leaf. This Silk is woven into fabrics of different designs and is used by the people throughout the world. The major activities of sericulture industry include cultivation of mulberry plants for production of leaf which is the sole food material for silkworms. This leaf is fed to silkworms in order to get cocoon which are used for the production of raw silk. The quality of mulberry leaves and also its fortification with egg albumen has been found to play an important role in the silkworm nutrition of silkworm, *Bombyx mori* L. which resulted in quality cocoon and silk production (Islam *et al.,* 2020a, 2020b, 2022). This leaf quality depends on various factors among which factors like quantity of fertilizer, time of application and method of application of balanced fertilizers are of prime importance. Although micronutrients are required in minute quantities but these have same agronomic importance as macronutrients and play vital role in the growth of plants. Micronutrients also increase plant productivity, leaf and grain yield. It has been observed that the soil fertility level to a very greater extent interferes with growth and development of mulberry plants (Basit and Ashfaq, 1999). The leaf yield and quality of mulberry depends on the soil type, plant variety, and availability of plant nutrients and agro-ecological conditions (Miyashita, 1986). Also Radha *et al.* (1988) reported that deficiency of phosphorus in nutrient solution reduced shoot length, root length, shoot weight, root weight and ultimately reduced the total leaf yield, confirming the importance of phosphorus. Das and Vijayaraghavan (1990) have reported that seasonal changes had profound effect on the growth and quality of mulberry leaves.

Material Methods

The current research study was conducted at College of Temperate Sericulture, Skuast, Kashmir in spring and autumn seasons and samples were taken in first week of June and October corresponding to the spring and autumn silkworm rearing respectively. In each farm 10 plants were labeled and studied for the following parameters.

Leaf area: The leaf area was calculated by taking small, medium and large leaves of the selected plants for calculations. Length and breadth of the leaves were calculated to take the average leaf length and breadth for determining the leaf area. The leaf area was calculated by using the following formula.

$$\text{Leaf area} = (L - B) - 2.12 + 0.68$$

Leaf yield: The leaf yield was recorded at each location to estimate productivity/plant. In each farm leaf yield was recorded by selecting 10 plants of mulberry variety (Goshoerami) of almost same age, type and Spacing to evaluate the leaf yield. The total leaves of selected plants were harvested individually and weight was taken in kgs.

No. of shoots/plant: The number of branches was calculated by counting total number of branches/plant. The result was recorded in numbers.

Length of branches: The length of branches was calculated by using the measuring tape. The result was recorded in cm. From these calculations the total shoot length and average shoot length and longest branch length was calculated.

Fresh weight of 100 leaves: 100 leaves of labeled plants were harvested in morning and fresh weight of leaves was recorded immediately

Data Analysis: The data obtained was pooled and analysed. The result was calculated by 95% confidence Interval.

Results and Discussion

Leaf area (cm^2) and Leaf yield (kg): During spring season leaf area was found in the range of 263.34 to 290.81. Amongst the regions the highest (287.53) leaf area was found in north followed by 269.85 in central and the least (261.70) in south zone. During the autumn season it ranged from 293.3 to 311.9. Similar trend was observed in autumn the highest (311.8) leaf area was found in north zone followed by 299.4 in central and the least (289.7) in south zone (Table 1). The size of mulberry leaf was also found 11% bigger in autumn than spring season. The higher leaf area during autumn could be due to exposure of longer photoperiod, higher temperature and proper arrangement of leaves as the same as arranged on the main branches as against the spring crop. The results are in agreement with findings of Kasiviswanathan and Iyengar (1969) and Mir *et al.* (2003). While as the leaf yield per plant recorded during the study was found in the range of 3.38 to 4.29 in spring and 4.00 to 4.61 during autumn. Amongst the regions the highest (4.16) value for leaf yield during spring was found in north followed by south (4.11) and least (3.22) in central. Similarly during the autumn it was highest (4.57) in north followed by 4.15 in south to the least (4.12) in central zone. Leaf yield was found 15% more in autumn than spring season (Table 1).The variation in leaf yield among regions can be attributed to higher soil nutrient availability to plants. The higher leaf yield during autumn could be due to longer photoperiods, higher temperature and proper arrangement of leaves as the same as arranged on the main branches as against the spring crop, where the leaves are born by shootlets hence don't get proper exposure (Mir *et al.,* 2003) (Table 1).

Number of shoots per plant, length of longest branch per plant: During spring the leaf was present on the secondary shoot lets whereas in autumn leaf was on the main branches. The number of shoots/ branches per plant during the study was found in the range of 77.20 to 84.38 in spring and 23.21 to 27.90 in autumn. The number of shoot lets was maximum (83.93) in north followed by 77.56 in south and the least (74.36) in central zone during spring. Similar trend was observed in the number of branches per plant during autumn season with the highest (27.86) number of branches in north followed by 23.76 in south to the least (21.40) in central zone (Table 2). The length of longest branch per plant was found more in autumn season than in spring season. Amongst regions it was registered maximum in north zone followed by south to the least in central zone (Table 2). The maximum value during autumn could be attributed to less number of branches per plant as compared to spring season which in turn might have resulted in more assimilation of available nutrients by the plants thus contributing to branch height. Results of the current study are in conformity with the earlier findings of Sabitha *et al.* (2011).

Total branch length and Average branch length: The total branch length per plant during spring season was found in the range of 3083.3 to 3340.5. Amongst the regions the maximum i.e. 3337.1 was recorded in north zone followed by 3131.6 in south zone and least (3021.3) in central zone. Similarly during autumn season it ranged from 2140.4 to 2452.0. The highest of 2438.1 was found in north zone followed by 2193.9 in south zone and least of 2079.3 in central zone. The total branch length per plant was found more in spring season than in autumn season (Table 3). The average branch length per plant was found in the range of 39.25 to 40.97 and 88.19 to 97.40 during spring and autumn season respectively. The average branch length per plant during spring season was maximum i.e. 40.81 in north zone followed by 39.66 in south zone and the lowest of 38.40 in central zone. Similar trend was observed during autumn season with the maximum value of 96.66 in north zone followed by 90.13 in south zone and the least i.e. 84.50 in central zone. The average branch length per plant was recorded more in autumn season than in spring season (Table 3). The maximum value of total branch length in spring season and in north zone could be due to the more number of branches per plant which might have been due to availability of more auxins/growth promoting substances whose excessive availability might have been triggered by enhanced nutrient balance (Bose *et al.,* 1994). While as the higher value of average branch length during autumn could be due to longer length of individual branches due to exposure of longer photoperiod as reported by Mir *et al.* (2003).

Fresh wt. of 100 leaves (g): The fresh weight of 100 leaves ranged from 315.43 to 349.64 in spring season. Amongst the regions the maximum (346.70) value for fresh weight was found in central followed by 344.36 in north to the least (322.06) in south zone. During autumn season the fresh weight was found in the range of 438.26 to 472.62. It was highest (472.20) in north followed by 463.00 in central to the least (451.13) in south zone. In general, fresh weight was found 38 % more in autumn than spring season (Table 4). This could be due to the exposure of leaf to longer photoperiod which in turn might have resulted in maximum leaf area during autumn season. The results are in conformity with the findings of Fotadar *et al.* (2006) and Shabir *et al.* (2014).

Table 1: Quantitative parameters of mulberry of study area

Region	Leaf area (cm^2)				Leaf yield (kg/plant)			
	Spring		Autumn		Spring	Autumn	Spring	Autumn
	Mean	95% C. I	Mean	95% C. I	Mean	95% C. I	Mean	95% C. I
North Zone	287.50	215.8-359.1	311.8	265.5-358.0	4.16	2.77-5.56	4.57	3.24-5.90
Central Zone	261.70	202.2-312.2	289.7	208.0-371.3	3.22	2.99-3.44	4.12	2.54-5.74
South Zone	269.85	203.1-336.5	299.4	220.6-378.1	4.11	1.79-5.35	4.15	2.54-576
Overall	**277.0**	**263.34-290.81**	**302.6**	**293.3-311.9**	**3.69**	**3.38-4.29**	**4.28**	**4.00-4.61**

Table 2: Quantitative parameters of mulberry of study area

Region	No. of branches/plant		Longest branch length per plant (cm)			
	Spring		Spring		Autumn	
	Mean	95% C. I	Mean	95% C. I	Mean	95% C. I
North Zone	83.93	75.763-92.10	182	177-187	245	240-250
Central Zone	74.36	66.64-82.08	147	142-152	207	202-212
South Zone	77.56	64.94-90.19	161	156-166	229	224-24
Overall	**80.79**	**77.20-84.38**	**163**	**145-181**	**227**	**207-247**

Table 3: Quantitative parameters of mulberry of study area

Region	Total branch length / plant (cm)				Average branch length / plant (cm)			
	Spring		Autumn		Spring		Autumn	
	Mean	95% C. I	Mean	95% C. I	Mean	95% C. I	Mean	95% C. I
North Zone	3337.1	2838.7-3835.5	2438.1	1780.6-3095.7	40.81	**95% C. I**	96.66	74.92-118.4
Central Zone	3021.3	2960.3-3082.4	2079.3	1911.5-2247.1	38.40	34.77-46.85	84.50	75.8-92.23
South Zone	3131.6	2536.0-3737.1	2193.9	1421.1-2276.2	39.66	12.98-63.81	90.13	82.09-98.16
Overall	**3211.9**	**3083.3-3340.5**	**2282.7**	**2140.4-2452.0**	**40.11**	38.79-40.53	**92.80**	**88.19-97.40**

Table 4: Quantitative parameters of mulberry of study area

Region	Fresh wt. of 100 leaves (gm)			
	Spring		Autumn	
	Mean	95% C. I	Mean	95% C. I
North Zone	346.70	126.88-566.51	472.20	448.25-496.14
Central Zone	344.60	330.13-358.59	463.00	347.57-578.82
South Zone	322.06	312.71-331.41	451.13	446.15-456.10
Overall	**332.54**	**315.43-349.64**	**455.44**	**438.26-472.62**

Conclusion

Among the growth and yield attributing parameters fresh weight of 100 leaves, leaf area and leaf yield was found higher in autumn than spring season. The fresh weight was 38% higher in autumn. Leaf area and yield was 11% and 15% respectively higher in autumn. During spring season all parameters were found highest in north and least in central in zone. The other growth and yield attributing parameters like the number of shoots/ branches per plant, and the total shoot length per plant was more in spring and was found highest in north region. But average shoot let/ branch length per plant was more in autumn and amongst the regions it was also found highest in north zone during spring.

References

Islam, T.; Bhat, S.A.; Malik F.A.; Khan, F.A.; Mir, S.A.; Nazir, N. and Wani, S.A. (2022). Evaluation of some mulberry varieties for nutritional consumption parameters of silkworm, bombyx mori l. Under temperate conditions of Kashmir, India. *Plant Archives,* 22(2): 136-139.

Islam, T.; Khan, I.L.; Ganie, N.A.; Sahaf, K.A.; Jan, N. and Gora, M.M. (2020a). Impact of egg albumen (egg white) fortified mulberry leaf on rearing and some cocoon parameters of silkworm, *Bombyx mori* L. (CSR6 × CSR26) × (CSR2 × CSR27) double hybrid. *International Journal of Chemical Studies* 8(4): 267-271.

Islam, T.; Khan, I.L.; Gora, M.M.; Khan, M.Y.; Bhat, T.A. and Jan, N. (2020b). Influence of egg albumen supplemented mulberry leaf on some reeling parameters of Silkworm, *Bombyx mori* L. *The Pharma Innovation Journal,* 9(11): 19-22.

Basit, M.A. and Ashfaq, M. (1999). Collaborative effect of optimum dosage of N, P, K, Ca, P and Mn on the larval development and silk yield of *Bombyx mori* L. *Pakistan Journal of Biological Sciences,* 2: 1002-1005.

Bose, P.C.; Singhvi, N.R. and Dutta, R.K. (1994). Effect of micronutrients on yield and yield attributes of mulberry (*Morus alba*). *Indian J. Agron.* 39(1): 97- 99.

Fotadar, R.K.; Dhar, A.; Sengupta, D. and Khan, M.A. (2006). Yield variability in mulberry. *Perspectives in Cytology and Genetics,* 12: 205-210.

Radha, N.V.; Nagarajan, P. and Jayaraj, S. (1988). Mineral deficiency in mulberry plants (*Morus alba* L.) and its effect on economic characters of silkworm, *Bombyxmori L. Mad. Agric., J* 75: 384-390.

Ramachandra, Y.L.S.; Padamalathya, S.R.; Sudeep, H.V.; Ganapathy, H.V.; and Krishnamurthy, N.B. (2008).

Evaluation of soil fertility and mulberry leaf quality on silkworm rearing and cocoon characteristics. *Asian Journal of Bio Science,* 3(2): 295-300.

Das, P.K. and Vijayaraghavan, K. 1990). Studies on the effect of different mulberry varieties and seasons on the larval development and cocoon characters of silkworm *Bombyx mori* (L). *Indian Journal of Sericulture,* 29(1): 44-53.

Miyashita, Y. (1986). A report on mulberry cultivation and training methods suitable to bivoltine rearing in Karnataka, p. 1-7.

Mir, M.R.; Baksh, S.; Darzi, G.M.; Isa, M. and Khan, M.A. (2003). Evaluation of different mulberry genotypes under rainfed conditions in Kashmir Province of J&K State. *Bulletin of Indian Academy of Sericulture*, 7(2): 28-34.

ZhiyiYe. (2011). Number and length of branches and shoots. *Factors influencing mulberry leaf yield.* College of Animal Sciences Zhejiang University Hangzhou, Zhejiang, China pp 1-13.

Majumder, S.K.; Bose, P.C.; Kar, R.; Banerjee, N.D. and Ghosh, J.K. (2003). Studies on the seasonal variation of NPK uptake by mulberry (*Morus alba* L.). *Indian Journal of Sericulture.,* 42(1): 1-3.

Fotadar, R.K.; Dhar, A.; Sengupta, D. and Khan, M.A. (2006). Yield variability in mulberry. *Perspectives in Cytology and Genetics,* 12: 205-210.

Kasiviswanathan, K. and Iyengar, M. (1969). A note on the variation in some characters of indigenous mulberry of Mysore. *Silkworm Information Bulletin,* 1: 36-38.

Singh, B.; Sharma, K.N.; Rana, D.S.; Sodhi, G.S. and Kapur, M.I. (1983). Available P and K and soil organic matter content as influenced by long term application of fertilizers and FYM to wheat, maize rotation. *Journal of Indian Society of Soil Science,* 3: 491-499.

Shabir A.W, Bhat, M.A.; Kamili, A.S.; Wani, N.; Akhter, S. and Majid, N. (2014). Genetic diversity of mulberry (*Morus spp*.) genotypes using RAPD markers. *Research Journal of Biotechnology*, 9(6): 41-47.

Sabitha, M.G.; Munirathnam R.; Mala, V.; Rajan. and Qadri, S.M.H. (2011). Effect of foliar application of multinutrient to mulberry on the quality and mulberry leaf yield. Paper presented In: Nation. Conf. Seric. Innov. Before and Beyond, CSR&TI.; Mysore, January, 28-29, pp.25.