Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-7: 435-439

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-7 pp. 435-439**
Journal homepage: http://www.ijcmas.com

Original Research Article

Resource use Efficiency in Water: Effect of Differential Irrigation Regimes on Leaf Quality Parameters in High Yielding Mulberry Varieties

N. Aruna[1*], P. Rajeswari[1] and K. Ramamoorthy[2]

[1]Department of Sericulture, Forest College and Research Institute, Mettupalayam, Tamilnadu, India
[2]Department of Agronomy, Horticulture research station, Ooty, Tamilnadu, India
**Corresponding author*

Keywords

Mulberry, High yielding varieties (HYV's), irrigation

A B S T R A C T

A field study was conducted with C-2038, G-4, suvarna-2, vishala and victory (V1) high yielding mulberry varieties under different irrigation regimes. Observation on leaf quality parameters of mulberry showed that frequent irrigation improved the leaf quality. Among the five varieties grown, high leaf quality was recorded in C-2038 with irrigation @ 5cm depth at 1.20 IW/CPE ratio followed by Variety G-4 with irrigation @ 5cm depth at 1.20 IW/CPE ratio.

Introduction

Mulberry is a deep rooted perennial deciduous herb belonging to the family Moraceae and high biomass producing foliage plant. It can be grown in a wide range of soil and climate both in tropical and temperate conditions. Mulberry varieties, environmental conditions, nature of soil, fertilizers, irrigation, maintaince of optimum plant population, suitable schedule of pruning and proper harvesting methods are some of the important factors that contribute to the higher leaf yield with good quality in mulberry leaf production.

Water has been a vital resource for plant and animal life. This resource is being fast depleted by inefficient utilization, which necessitates over exploitation. Over extraction causes salt water intrusion leading to deterioration in water quality. Mulberry (*Morus* spp) is an important food plant of the silkworm, *Bombyx mori* L. (Krishnaswami *et al.,* 1970). Irrigation plays a pivotal role in enhancing the productivity and quality of mulberry leaves. Since mulberry is a heavy feeder of water and nutrients which inturn directly influenced the leaf quality and quantity.

Quality mulberry leaves is one of the most important factors governing the production of good cocoon crop was also reported by Ravikumar (1988). Proper management of mulberry garden to get good quality foliage, irrigation is highly imperative. Hence, this study was conducted to evaluate the high

yielding mulberry genotypes to different irrigation regimes on mulberry leaf quality parameters.

Materials and Methods

The experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during 2014-2015.

The treatments in main plot were High yielding mulberry genotypes *viz.*, C-2038, G-4, Suvarna-2, Vishala, Victory-1 (V1) and subplot irrigation regimes at 5 cm depth at 0.60, 1.20, 1.80 IW/CPE ratio and compared with no irrigation (Rainfed) in a Strip plot Design with three replication.

Observations on leaf quality parameters were recorded during the study period with a break of 20 days after pruning and subsequent regeneration. Samples taken were weighed fresh and carotenoid, moisture, moisture retention capacity and dry matter production were estimated.

Carotenoid content was estimated at the wave length of 480 and 510 nm using spectrophotometer and expressed in mg g-1 fresh weight (Arnon, 1949).

Moisture regimes (Irrigation)

In present study, the crop was given with common irrigation through good quality well water for sprouting and establishment. Thereafter, irrigation was given based on the IW/CPE (Irrigation Water/Cumulative Pan Evaporation) ratio as per the treatment schedule by adopting climatological approach of scheduling irrigation using daily evaporation (mm) and rainfall (mm). The irrigation was scheduled when the cumulative pan evaporation readings reaches 83.3, 41.6 and 27.7 mm for 0.6, 1.20 and 1.80 IW/CPE ratios, respectively.

Carotenoid content

Carotenoid content of mulberry was estimated using the formula and expressed as mg g^{-1} fresh weight.

Carotenoid content = $(7.6 \times OD_{480}) - (1.49 \times OD_{510}) \times V/1000 \times W$

Crude protein

The amount of crude protein in the leaf samples were calculated by multiplying per cent of nitrogen content with factor 6.25 (Lowry *et al.*, 1951).

Moisture content

Moisture content of the leaves was calculated using fresh weight and dry weight of the leaves and expressed in per cent.

$$\text{Moisture content} = \frac{\text{Fresh weight of leaf} - \text{dry weight of leaf}}{\text{Fresh weight of leaf}} \times 100$$

Moisture retention capacity

Moisture retention capacity of the leaves was calculated using fresh weight, leaf weight after 6 hours and dry weight of the leaves and expressed in per cent.

$$\text{Leaf moisture} = \frac{\text{Weight of leaf after 6 hours} - \text{Dry weight of leaf}}{\text{Fresh weight of leaf} - \text{dry weight of leaf}} \times 100$$

Results and Discussion

Among the different irrigation regimes, irrigation @ 5cm depth at 1.20 IW/CPE ratio (I_2) recorded higher carotenoid content (0.80 mg/g), crude protein content (28.2 per cent) Table 2, moisture content (67.4 per cent) and moisture retention capacity (78.2

per cent) Table 3. Among the mulberry varieties, C.2038 (V_1) recorded significantly higher carotenoid content (0.82 mg/g), crude protein content (26.8 per cent), higher leaf moisture content (68.8 per cent) and moisture retention capacity (73.4 per cent) followed by variety G-4.

The interaction effect between the differential irrigation regimes and high yielding varieties at harvest showed that irrigation @ 5cm depth at 1.20 IW/CPE ratio- (V_1I_2) of 0.91 mg/g (Table 1), 32.6 per cent, 67.4 per cent (Fig 1) and 83.7 per cent resulted in higher carotenoid content, crude protein content, moisture content and moisture retention capacity in C-2038. The enhanced quality parameters of mulberry varieties which might be due to better water management at optimum level, which in turn resulted in increased vigour and vitality of the mulberry varieties resulting in improved metabolic activities of the plants and all these factors might have contributed for the enhanced quality parameters of the leaves as opined by Doss *et al.,* (2007) who evaluated 25 on mulberry varieties under optimum irrigation for quality parameters.

Effect of HYV's and irrigation regimes had significantly higher quality characteristics which out yielded the local with higher irrigation frequency as reported earlier by Miah (1989) and Mukherjee *et al.,* (1972) and they opined that fortnightly irrigation in mulberry gave higher leaf yield with good quality as compared to monthly irrigation frequency while the leaf yield and quality were least in the non-irrigated situation (rainfed treatment).

Table.1 Effect of treatments on carotenoid (mg g^{-1}) content of mulberry at the time of harvest

Variety/ Irrigation regimes	**C2038 V_1**	**G-4 V_2**	**Suvarna -2 V_3**	**Vishala V_4**	**V1 (Check) V_5**	**MEAN**
I_1	0.86	0.81	0.60	0.74	0.69	0.74
I_2	0.91	0.88	0.69	0.80	0.76	0.80
I_3	0.79	0.77	0.55	0.67	0.61	0.61
I_4	0.72	0.70	0.51	0.61	0.57	0.57
MEAN	0.82	0.79	0.58	0.70	0.65	
	SEd					**CD (P=0.5%)**
V	0.004					0.009
I	0.005					0.010
V at I	0.011					0.023
I at V	0.012					0.024

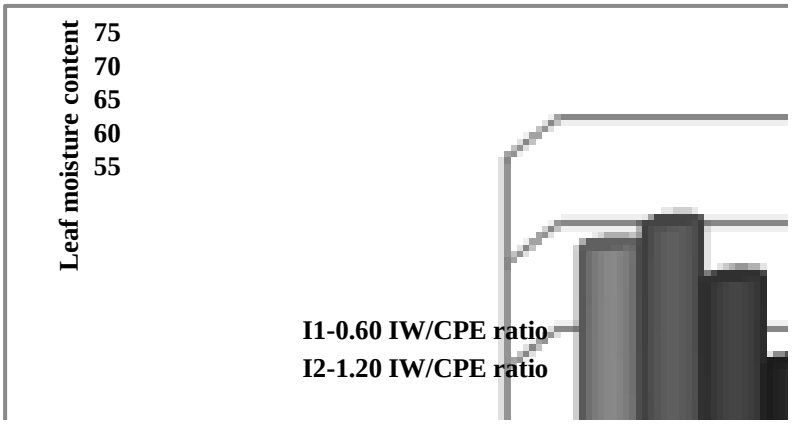
Table.2 Effect of treatments on crude protein (per cent) of mulberry at the time of harvest

Variety/ Irrigation regimes	**C2038 V_1**	**G-4 V_2**	**Suvarna -2 V_3**	**Vishala V_4**	**V1 (Check) V_5**	**MEAN**
I_1	28.5	26.5	22.7	25.3	24.5	25.5
I_2	32.6	28.9	25.7	27.4	26.2	28.2
I_3	24.9	23.7	17.6	22.8	21.2	22.0
I_4	21.2	20.0	16.6	19.8	18.7	19.3
MEAN	26.8	24.7	20.7	23.9	22.7	
	SEd					**CD (P=0.5%)**
V	0.27					0.60
I	0.13					0.26
V at I	0.37					0.79
I at V	0.29					0.59

Table.3 Effect of treatments on moisture retention capacity (per cent) of mulberry at the time of harvest

Variety/ Irrigation regimes	C2038 V_1	G-4 V_2	Suvarna -2 V_3	Vishala V_4	V1 (Check) V_5	MEAN
I_1	76.8	69.2	65.9	69.7	67.5	69.8
I_2	83.7	79.8	75.4	74.7	77.4	78.2
I_3	70.5	69.0	65.6	66.4	67.1	67.8
I_4	62.6	63.4	59.5	62.7	61.8	62.0
MEAN	73.4	70.4	66.8	68.4	68.2	
	SEd					CD (P=0.5%)
V	0.66					1.50
I	0.35					0.70
V at I	0.95					1.91
I at V	0.79					1.64

Fig.1 Leaf moisture content of mulberry as influenced by high yielding varieties and different irrigation regimes



It is evident from the present studies that, growing of HYV C.2038 or G4 with irrigation level of 5cm depth at 1.20 IW/CPE ratio and 1.80 IW/CPE ratio were performed better than other treatmental combinations.

Mulberry leaf quality parameters like carotenoid content, crude protein content, moisture content, moisture retention capacity is significantly high due to better water management at optimum level.

References

Arnon, D.I. 1949. Copper enzymes in isolated chloroplasts, Poly phenol oxidaze in Beta Vulgaris. Plant physiology, 24(1): 15.

Krishnaswami S, Naomani M.K.R, Ahsan M.M. 1970. Studies on the quality of mulberry leaves and silkworm cocoon crop production. Part 1: Quality differences due to varieties. Indian J Seri, 9: 1-10.

Lowry, O.H., H.J. Rose brough, A.C. Farm and R.J. Randhall. 1951. Protein measurement with the folin phenol reagent. J. Biol. Chem., 193: 265-275.

Miah, M. A. B. 1989. Studies on the growth and yield of mulberry (*Morus alba* L.). Ph.D. Thesis. University of Rajshahi, Bangladesh.

Mukherjee. S.K, Ray. D and Pain A.K. 1972. Influence of different levels of irrigation on the Yield of Bush Mulberry Raised under Bengal and Mysore systems of plantation. Indian J. seri, 11(1).

Ravikumar, C. 1988 Western ghats as a bivoltine region prospects, challenges and strategies for its Improving the quality of leaf. Agron. J., 79-81.