INFLUENCE OF LEAF POSITION AND PICKING TIMING ON POST HARVEST MOISTURE LOSS IN STORED MULBERRY (*MORUS SPP*) LEAVES

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ABSTRACT

Mulberry (*Morus spp*) cultivation is the basic step in the sericulture industry leading to silk production and is directly related to quality and quantity of mulberry leaf. The quality of the mulberry leaf contributes much for the success of the silkworm rearing for the production of the silk. In the quality attributes, it is the leaf moisture which is highly relevant as it determine palatability of leaf, assimilation of food and its availability in leaves enhances feeding efficiency of silkworm larvae which in turn increases cocoon production. The present study was undertaken to know the effect of plant leaf position and picking timing on postharvest moisture loss in 12 hour stored mulberry leaves under subtropical conditions. The results revealed that average moisture loss was highest in basal leaves (8.2%) followed by middle leaves (8.0%) and least loss in apical leaves (7.9%) and average moisture loss was highest in evening picked leaves (9.1%) followed by morning pickings (8.3%) and lowest was recorded in day picked leaves (6.8%) while as, amongst varieties, average highest moisture loss was observed in BC259 (10.1%) and least loss in Chinese white (6.2%) followed by S41 (6.3%), irrespective of both plant leaf position and picking timing.

Key Words: Mulberry, leaf position, picking timing, moisture loss.

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INTRODUCTION

Mulberry (*Morus* spp.) leaves are used globally as traditional feed for the silk worm (*Bombyx mori*), which derives 25 percent of silk protein from mulberry leaf on which it feeds as reported by Tanaka (1964). A successful silkworm rearing is dependent on environment, quality and quantity of mulberry leaf. The quality of mulberry leaves was determined mainly based on moisture content by Kumar et al., *(1996*). In the quality attributes, moisture is highly relevant as it determine palatability of leaf, assimilation of food and silk producing capacity of silkworm as studied by Parpiev (1968; Narayanprakash et al., (1985); Koul et al., (1994) and as reported by Sastry et al., (1988) that its availability in leaves enhances feeding efficiency of silkworm larvae which in turn increases its growth rate. Mulberry leaf is normally picked at different timings and stored for feeding to the silkworm larvae. Ryser et al., (2008) reported that once a leaf is removed from a plant it begins to lose water and more often the storage period may extend up to 12 hours or more. The leaf is stored at room temperature and tends to lose moisture steadily. Depending upon worm age, moisture plays an important role from feeding point of view.The position of leaves on mulberry shoot has been found to affect the drying characteristics of the leaves. In a study by Rangaswamy et al., (1976) found that the apical leaves are more succulent as compared to middle ones. Basal leaves are hardest with lower water contents. Corresponding to position, apical leaves are young and basal the oldest. It is a well-established fact that, moisture content of mulberry leaves decreased gradually with corresponding increase in leaf growth. On storage, leaves picked at different timings from different positions on the mulberry shoot may have different response to moisture loss? Thus thorough knowledge of water retention capacity of the particular mulberry variety is desired so as to feed the silkworm better. Although the water retention capacity of mulberry leaf is proved to be one of the significant parameter in the assessments of leaf quality, it is believed to differ from genotype to genotype. Hence in this context, an attempt has been made to evaluate the relative moisture loss from 12 hour stored leaves of different mulberry varieties as Influenced by both plant leaf position and leaf picking timings.

MATERIALS AND METHODS

The present study was conducted at Division of Sericulture, SKUAST-J at Udheywalla, Jammu, which is a typical subtropical area. Ten mulberry varieties selected for the study were: BC259, Tr-10, Kanva-2, S799, C763, Berhampur, S-1, Sujanpur, S-41, and Chinese white. Leaves were picked from three different positions on a branch i.e. apical (third leaf from the top), middle (five leaves below apical leaf) and basal (2^{nd} leaf from bottom) and at three different timings: 6am, 2pm, and 6pm, representing morning, day and evening leaf pickings. A known quantity of leaf (50 g) from each position and at specific timing were picked and stored at room temperature for 12 hours. Then these leaves were weighed again to determine the moisture loss. Later the leaves were dried in hot air oven at 80°C for 48 hours till constant weight was attained and dry weight was recorded. Leaf moisture content of apical, middle and basal leaves was calculated separately and expressed in percentage (%). The data were analyzed by a method of Panse and Sukhatme (1984) in Randomized Block Design with three replicates.

RESULTS AND DISCUSSION

Mulberry varieties under study revealed variations in leaf storage (12h) moisture loss as influenced by both leaf position and picking timing (Table). An overall average moisture loss was highest in evening picked leaves (9.1%) followed by morning pickings (8.3%) and lowest was recorded in day picked leaves (6.8%), irrespective of leaf position. While as, average moisture loss was highest in basal leaves (8.2%) followed by middle leaves (8.0%) and least loss in apical leaves (7.9%) irrespective of leaf picking timings. Amongst varieties, average highest moisture loss was observed in BC259 (10.1%) and least loss in Chinese white (6.2%) followed by S41 (6.3%), irrespective of both leaf positions and leaf picking timings.Morning leaf pickings showed average moisture loss of 8.45, 8.36 and 8.29 percent in apical, middle and basal leaves respectively, irrespective of varieties and amongst varieties, Tr-10 lost maximum (10.7%) moisture and least moisture loss (4.5%) was in Chinese white, irrespective of leaf position. From the leaf position point of view, apical leaves lost up to 12 percent moisture with top loser (12.0%) being S799 and least (4.6%) being Chinese white. The middle positioned leaves showed moisture loss range of 11.2 percent in Tr-10 to 4.3 percent in Chinese white. Similarly in basal leaves, top loser was again Tr-10 (10.5%) and least being Chinese white (4.6%). In the day picked leaves, average moisture loss of all varieties irrespective of leaf position was 6.8 percent. Overall average moisture losses in varieties varied from 9.5 percent (Kanva-2) to 4.5 percent (S-41). Comparatively the average moisture losses in apical leaves were low (6.6%) as compared to middle leaves (6.9%) and in basal leaves (7.0%) irrespective of varieties. In apical leaves, Kanva-2 lost maximum moisture (9.9%) and least moisture loss (3.5%) was observed in S-41. While as in middle leaves, BC259 lost the maximum moisture (9.2%) and C763 showed least (4.9%) moisture loss. Basal leaves too exhibited variable moisture loss with maximum being (10.1%) in Kanva-2 and minimum (4.2%) in Chinese white. Evening picked leaves lost 9.1 percent moisture on average irrespective of mulberry variety and leaf position. The maximum average moisture loss (10.5%) was observed in variety BC259 irrespective of leaf position. Similarly least average moisture loss (6.0%) was seen in C763. Leaf position wise, basal leaves lost 9.6 percent moisture on an average while as both apical and middle leaves showed moisture loss of 8.9 percent irrespective of varieties.

In apical leaves, maximum moisture loss (12.0%) was observed in S-41 whereas least loss (4.8%) was in C763. Amongst the middle leaves, maximum moisture loss (14.4%) was seen in BC259 whereas least loss was recorded in S-41 (5.1%). In the basal leaves, maximum moisture loss (11.1%) was observed in BC259 and least loss in C763 (7.4%).The results so obtained reveal some interesting facts. On moisture storage response of the varieties, irrespective of leaf position and picking timings, variety Chinese white, indicates its superiority over most of the improved and conventional varieties studied followed closely by S-41. Paul et al., (1992); Legay (1958) reported that higher moisture content of mulberry leaves is one of the important factors and it has a direct effect on growth and development of silkworm and it enhances the metabolic activity and transportation of the nutrients in the whole silkworm body by Anonymous (1980). From leaf position point of view, the storage losses were least in apical leaves and maximum in basal leaves. Similar results have been reported by Koul et al., (1991) in mulberry variety Sujanpur where moisture loss in basal leaves was higher as compared to apical leaves after harvest on storage for 12 hours. Hamada (1962) observed that with the advancement of age, mulberry leaf tends to accumulate more dry matter thus affecting the moisture contents.

CONCLUSION

On an average, irrespective of leaf position, maximum loss of moisture was observed in evening picked leaves followed by morning and day pickings. This may be due to a larger pool of moisture being available for higher losses. Correspondingly, in the day pickings, water contents are normally low as compared to morning and evening pickings, resulting in less loss on storage. Koul et al., 1991 reported that leaves picked during morning hours tend to retain higher moisture as compared to evening pickings and that in mulberry variety Sujanpur, leaf moisture fell by about four percent from morning to evening in summer. It is evident from the present studies that leaf position and their picking time do affect the moisture retention capacity of leaf on storage. Moisture retention capacity plays an important role because leaves with high moisture remain fresh, acceptable to silkworms for longer time, as the silkworms get their moisture only from the leaves so they must be fresh.

Table: Leaf Storage (12h) moisture loss in different mulberry varieties.

Mulberry Variety	Moisture loss in morning Picked leaves (%)			Moisture loss in day Picked leaves (%)			Moisture loss in evening Picked leaves (%)		
	Apical	Middle	Basal	Apical	Middle	Basal	Apical	Middle	Basal
BC259	10.6	10.4	10.3	9.5	9.2	9.6	6.0	14.4	11.1
Tr-10	10.5	11.2	10.5	8.5	7.2	8.2	9.2	11.5	10.2
Kanva-2	10.0	10.9	10.4	9.9	8.5	10.1	10.4	5.7	9.3
S-799	12.0	9.4	10.2	5.6	7.5	9.0	10.6	9.0	11.0
C-763	7.7	10.3	8.4	6.5	4.9	6.6	4.8	5.9	7.4
Berhampur	5.5	7.3	6.8	6.6	6.1	5.8	10.0	10.7	10.0
S-1	8.3	6.6	7.6	7.0	5.1	5.9	9.9	8.7	8.9
Sujanpur	8.3	8.2	7.6	5.5	8.9	6.2	9.3	7.5	10.0
S-41	7.0	5.0	6.5	3.5	5.0	5.0	12.0	5.1	8.5
Chinese white	4.6	4.3	4.6	3.7	6.6	4.2	7.3	10.9	10.1
CD at 5%	4.1	5.2	NS	3.2	NS	7.6	2.6	3.4	2.7

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