

The Changes in Moisture Content (Status) During Leaf Senescence in Sericultural Crop *Morus Alba* Linn.



Botany

KEYWORDS : Moisture content, *Morus alba* Linn.

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ABSTRACT

An attempt has been made to study changes in moisture content during leaf senescence in mulberry cultivars viz. M5 (K2), V1 and S36. It is evident from the figure, maximum moisture content is in the young leaves of all the three cultivars. The moisture percentage is reduced in senescent leaves of all the three mulberry cultivars. The mature leaves shows lower moisture level as compared to young leaves of all the three cultivars. The changes in moisture status are more prominent in the leaves of cultivar V1. The reduced moisture content in the senescence leaves may affects the health, growth and yield of Silkworms cocoon.

Introduction:-

The important agro industry sericulture involves rearing of silkworms for the commercial production of the silk. Mulberry leaves are used as food for rearing monophagous silkworm (*Bombyx mori* L) (Ullal and Narasimhanna, 1981). Mulberry leaf is used as food for rearing of silkworms, larvae growth and development of silkworm and subsequent cocoon production depends mainly on the nutrient composition of mulberry leaves (Krishnaswami *et al.*, 1971; Bhuyian, 1981). Many aspects like health and growth of the larvae, cocoon quality and raw silk quality are also influenced by quality of leaf. In addition to involving verities, different practices have been worked out to raise leaf production including irrigation, pruning and training types, application of fertilizers, etc. (Koul and Bhagat, 1991; Singh and Koul, 1997; Pandit *et al.*, 1999). Ganga (2003) stated that, due to low protein level, declining (i.e. over mature, yellowing) leaves should be discarded. Hence, in order to have further insight in to the above problem, a fate of various nutritional constituents and water contents during leaf senescence in the three cultivars of mulberry (viz.M5 (K2), V1 and S36) has been studied in the present investigation.

Material and method:-

The healthy leaves of the three categories (young, mature and senescent) were collected from the field grown plants. Leaves of each category were randomly sampled. Five gram of leaf material was accurately weighed. Dry weight was obtained by keeping the weighed fresh material in oven at 60°C till constant weight was noticed. The water content was calculated according to Weatherly (1950) as follows

$$WC(\% \text{ of dry weight}) = \frac{\text{A Fresh weight} - \text{Dry weight}}{\text{Dry weight}}$$

Result and Discussion: –

The changes in moisture status (content) during leaf senescence in three mulberry cultivars viz. M.5 (K2), V1 and S36 are depicted in the Fig.1. It is evident from the figure that, maximum moisture content is in the young leaves of all three cultivars. The moisture percentage is slightly reduced in senescent leaves of all the three mulberry cultivars. (Bayles *et al.*, 1937). However, Levitt (1972) suggested that metabolic disturbances which are not severe enough to cause injury by themselves may nevertheless amplify the other effects of the dehydration strain and therefore the injury. Generally, the nutritional status of mulberry leaves which influences the economic characters of silkworm crop depends upon the level of moisture (Anonymous, 1975 and Bongale *et al.*, 1997). High moisture content in the leaves has favorable effect on the palatability and assimilability of nutrients and serves as criteria in estimating the leaf quality (Parpiev, 1968). Talebi Esfandarani *et al.*, (2002) stated that, silkworms do not drink water; they get their moisture from the leaves so they must be fresh. Leaf quality often mainly implies leaf moisture, thereby ignoring other nutritive components (Bongale *et al.*, 1997). Friend

,1958; and Waldbauer; 1968 highlighted the importance of dietary moisture content and reported that phytophagous insects required high water intake for normal development and feeding of larvae with wilted foliage produced adverse effects. Importance of leaf moisture contents in relation to the performance of silkworm has been reported by Narayanaprakash *et al.*, (1985) and Paul *et al.*, (1992), who observed that the decrease in water contents in feed affected different energetic parameters and they also reported that assimilation of food converted into body tissue decreased with decreasing moisture contents. According to Ganga (2003), the water content plays an important role in determining the quality of leaves for silkworm feeding. Many scientists reported favourable effect of high moisture content of leaves on palatability and digestibility by silkworms (Parpiev, 1968; Waldbauer, 1968 and Kasiviswanathan *et al.*, 1973). Paul *et al.*, (1992) observed in their studies that availability of moisture content in the leaves enhances the feeding efficiency of the larvae which in turn increases the growth rate. Dasgupta (1961), reported significant differences in the nutritive value of the leaves for silkworms rearing. Higher moisture content in the leaves is a desirable for the early stage of larval rearing in silkworm *Bombyx mori* L. (Anonymous, 1984). Talebi Esfandarani *et al.*, (2002) observed that the cocoon, shell and pupa weight and eggs productivity increased with increasing leaf moisture content that may be due to increasing consumption, digestibility and absorption of mulberry leaf nutrients. Narayanaprakash *et al.*, (1985) reported that assimilated food conversion into body tissue and conversion efficiency decreased with decreasing dietary moisture content in the mulberry leaves and also shell weight and fibroin content of the cocoons increased with increasing dietary moisture. Paul *et al.* (1992) noticed that absolute consumption and growth rate per day per larva, the quantity of dry matter consumed and digested, the values of efficiency of conversion of ingested and digested food and final larval weight increased with increasing percentage of leaf water and approximate digestibility increased progressively up to 70% leaf moisture but was reduced at control dietary water level (76.6% leaf moisture). Basu *et al.* (1992) reported that the development time and weight gain were significantly higher for larval fed on tender rather than on older leaves and the pupal and adult weights and fecundity were also significantly higher. Chaluvachari and Bongale (1995a) reported that moulting ratio and larval weight were associated with mulberry leaf moisture.

About 70% moisture content has been regarded to be optimum for silkworm rearing (Jolly and Dandin, 1986). A declining trend in the moisture content was observed from tender to mature leaves in all the varieties (S-1635, V1, SV1, MR2, RFS175, JRH and Jatununi) and in all seasons, (Sinha *et al.*, 2003). The same pattern was noticed in the leaves of S1 and K2 mulberry plants (Sinha *et al.*, 1993 b). According to Chaluvachari and Bongale (1995b), the mulberry varieties namely V1, C-1730, C-2016, C-2017, Anantha, RFS-175, Vishala, Thallaghatapura, S1 and S-1635 show this trend. It is evident from the above observation

that the moisture content in the young leaves of M5, V1 and S36 varieties is in the range of the report of CSRTI Mysore as well as reported for other mulberry varieties which will be found beneficial for feeding of silkworm larvae while the mature and senescent leaves also showed moisture percentage above 65% which is in the range of CSRTI reports. Further, there are very minor alterations in the moisture content during senescence in leaves of all the three mulberry varieties and hence this factor may not pose any major problem for the leaf metabolism as well as nutrition of the silkworm.

The values presented in the part –‘Results and Discussion’ represent average of three independent determinations.

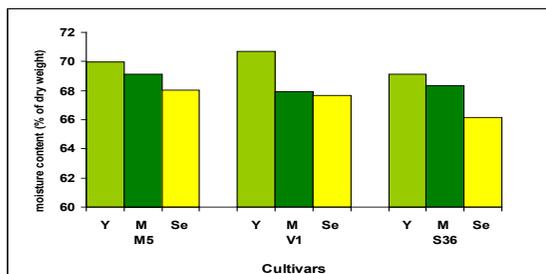


Fig. 1: Changes in moisture content (status) during leaf senescence in sericultural crop *Morus alba* Linn.

(Y = Young, M = Mature and Se = Senescent)

CONCLUSION: -

There are very minor alterations in the moisture content during senescence leaves of all the three mulberry varieties viz. M5

(K-2), V1 and S36 and hence this factor may not pose any major problem for the leaf metabolism as well as nutrition of the silkworm.

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