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Influence of different levels of leaf harvest on quantitative parameters of mulberry under Kashmir conditions

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Abstract
Sericulture in the Valley of Kashmir is mainly restricted to spring crop only which commences from May to ending June every year. Although efforts are on to take up many crops, yet it is not picking up owing to least availability of mulberry under field conditions. Further because of harsh winter mulberry enters into dormancy after senescence sets in. However, autumn crop is practiced with certain limitations as the leaf to be fed to silkworms needs to be plucked individually from mulberry trees which is not a healthy practice. In order to ascertain and assess the damage of leaf harvest, study was taken where mulberry plants were subjected to different levels of leaf harvest and it was observed that least damage during succeeding spring season was found in the torments where no harvest was done, followed by laminar harvest and subsequently by 25%, 50%, 75% and 100% leaf cut. The quantitative parameters of plants which were subject to leaf harvest indicated varied levels of damage depending upon level of harvest. Number of shootlets/plant, leaf area and number of leaves along with leaf yield got impacted by the extent of leaf harvest.

Keywords: Leaf harvest, autumn, mulberry, winter, Kashmir valley

Introduction
Sericulture industry which is highly job oriented has a greater potential for being projected as one of the most promising agro-based forestry systems which can suitably fit into wider reforestation programmes at National and International level. Cultivation of mulberry which is a very hardy plant grown chiefly as a food for silkworm (*Bombyx mori* L.) rearing for eventual production of cocoons is practiced by many farmers in the UT of J and K. However, because of climatic vagaries, the farmers are not able to take up second major crop owing to winter when mulberry leaf is not available. Further the plants which are subjected to leaf plucking show quality deterioration during succeeding season (Mir *et al* 2005) [4] and Aadil, *et al* (2020) [1].

During onset of autumn rearing mulberry leaf is being plucked from the mulberry plants individually leaving part of the petiole intact. This is done with the help of blade and the idea is not to damage the bud of plants. However, farmers do not resort to blade cut which also furthers the damage done to mulberry due to mechanical injury to buds. Irrespective of the way, the leaf is cut from the plants, the natural senescence, an important developmental process highly regulated and genetically controlled (Quirino *et al.*, 2000 and Chandlee, 2001) [6, 2] gets impeded. More so, the nutrient recycling which otherwise is a natural phenomenon taking place prior to normal senescence also gets interrupted through induced leaf cut.

With this background the present studies are proposed to be taken to generate information about the impact of leaf plucking during autumn season on the leaf yield loss and extent of quality degradation of leaf to be used during main cropping season along with the performance of saplings before and after transplantation.

Materials and Methods
The present investigation was carried out at the experimental farm of College of Temperate Sericulture SKUAST-K (Located at 34^0 1.17'N Latitude, 74^0.17'E Longitude and at an altitude of 1585m above MSL.

Established 20 years old mulberry plantation of Gosheoramian exotic variety of mulberry which is the most popular variety of mulberry used for commercial rearing in the region with

uniform growth and vigour was used for the study. The plantation was maintained as dwarf at 6ft x6ft spacing. The experimental design was RBD with six treatments whose details are here under:

Treatments 6
T_1 25% Leaf harvest
T_2 50% Leaf harvest
T_3 75% Leaf harvest
T_4 100% Leaf harvest
T_5 Only Laminar harvest
T_6 No harvest
Replications 4
Plants/treatment/replication 10

Growth and yield parameters

The growth and yield parameters were recorded coinciding with the 5th stage of silkworm rearing during spring (1st week of June). The following data was recorded on the growth parameters of mulberry plants subjected to above treatments in spring season:

Extent of Sprouting (%)

This was calculated as under:

$$\frac{\text{Number of buds sprouted}}{\text{Total number of buds}} x\ 100$$

Damage due to winter frost (%)

This was calculated by taking total height of each shoot individually in cm and subtracted by length of frost affected portion of each shoot. However, frost damage was observed and recorded periodically.

$$\frac{\text{Frost affected portion of each shoot}}{\text{Total height of each shoot in cm}} x\ 100$$

No of Shoot lets/plant

In view of frost damage of apical portion of branches during autumn, the shootlets are developed which bear leaf. These shootlets are borne on main branches of plant. The number of shootlets were counted manually in three plants per replication per treatment.

Longest shootlet length (cm)

Length of longest shoot of three plants/treatment/replication was measured and average taken.

Total shootlet length (cm)

Total number of shoots of three plants/treatment/replication was taken and measured in cm.

Results and Discussions

Significantly highest Sprouting percentage viz 66.19% was recorded in T_5 where no leaf harvest was done. This was followed by T_1 recording a value of 61. 76% which received 25% leaf harvest. The rest of the treatments registered sprouting percentage in the order of $T_6 > T_2 > T_3 > T_4$.

Significantly highest value for frost damage was obtained in T_4 recording a value of 2.58% which was followed by T_3 with a value of 2.33%. However, least damage was recorded by T_6 with a value of 1.48% where only laminar harvest was done.

Significantly highest number of Shootlet, viz 86.00 was recorded in T_5 which was followed by T6 registering value of 81.00 being at par with T_1 with a value of 79.75. The least value viz 68.50 was recorded in T_4 where 100% leaf was harvest.

Significantly Longest Shootlet Length was highest in T_5 with a value of 44.07 cm which was followed by T_6 with a value of 42.07 cm being significant over rest of the treatments. Least value of 32.81cm was recorded in T_4.

Total Shootlet Length was significantly highest in T_5 registering a value of 3534.50 cm. This was followed by T_1 (3437.70 cm) which was however at par with T_6 and T_2 registering values of 3434.50 cm and 3424.50 cm respectively. The least value of 3262.00 cm was recorded in treatment T_4.

Significantly highest Leaf Yield/plant was recorded in T_5 viz 5.00 kg. This was followed by T_6 recording a value of 4.19 kg which was however at par with T_1 having a value of 3.80 kg. In this case also the least value of 2.92 kg leaf yield/ plant was recorded by T_4 receiving 100% leaf harvest. The results are indicated in Table 1.

Table 1: Quantitative parameters of mulberry as influenced by varied levels of leaf harvest

Treatment	Sprouting percentage	Damage due to winter frost	Number of shootlets/plant	Longest shootlet length (cm)	Total shootlet length (cm)	Leaf yield/plant (kg)
T_1	61.76	1.91	79.75	42.21	3437.70	3.80
T_2	57.75	2.00	75.25	39.59	3424.50	3.65
T_3	50.07	2.33	71.00	37.58	3326.20	3.24
T_4	43.83	2.58	68.50	32.81	3262.00	2.92
T_5	66.19	1.48	86.00	44.07	3534.50	5.00
T_6	60.47	1.57	81.00	42.07	3434.50	4.19
Cd 5%	1.14	0.10	1.94	1.35	55.33	0.29

The various growth parameters of mulberry plants which were subjected to different levels of leaf cut during autumn indicated enhanced sprouting in respect of treatments were no leaf harvest was done and the plants were left for natural senescence. The sprouting percentage of buds decreased with the increased percentage of leaf cut which might be due to wounding imposed to the plants through leaf cut which in turn might have resulted in plant stress eliciting physiological response. Similar observations were also reported by Nikolaus Konstantis *et al* (2022) [5] who while working on *Ocimum basilium* (Basil) an annual African herb reported bud damage of plants due to mechanical wounding. It was also observed that damage due to leaf winter frost and quantitative parameters of mulberry including number of shootlets/plant, shootlet length, leaf area and other parameters also got negatively impacted due to induced leaf cut and the extent of influence increased with increase in percentage of leaf cut. The results are also corroborated with the findings of Mir *et al* (2005) [4] Niu M *et al* (2011) [3] who while working on different plants including mulberry (*Morus* spp) and *Rehmania glutinosa* reported similar results.

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