Importance of Pruning and Training in Mulberry Cultivation

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ABSTRACT
Mulberry (Morus spp.) is a fast growing deciduous woody perennial plant, normally cultivated as bush or dwarf tree by repeated pruning. It is the primary food plant of silkworm (Bombyx mori L.); hence, availability of good quality leaf has great impact on the sustainability and profitability of sericulture industry. Pruning is important for ensuring a good yield of quality leaves. Systematic pruning to give a specific shape to a mulberry tree is called ‘training’. Training of a young tree is done mainly to develop strong framework of scaffold branches. Training is done to allow more sunlight and air to the centre of the tree and to expose maximum leaf surface to the sunlight and to direct the growth of the tree so that various cultural operations. Pruning and training are important for increasing quality leaves and productivity of mulberry plantation.

INTRODUCTION
Sericulture is an agro-based rural industry having tremendous employment potential and foreign exchange earnings. Sericulture is remarkable for its low investment and quick and high returns which make it an ideal industry or enterprise and fits well into the socio-economic fabric of India. Sericulture industry provides employment to approximately 8 million persons in rural and semi-urban areas in India. Silkworm, Bombyx mori L. is a monophagous insect, feeds exclusively on the mulberry leaves (Morus spp.). Mulberry leaf is the sole food of silkworm Bombyx mori L. due to the presence of morin, β-sitosterol and swallowing factors. It is a fast-growing deciduous woody perennial plant, normally cultivated as bush or dwarf tree by repeated pruning. The growth and development of larvae, and subsequent cocoons production, are greatly influenced by the
nutritional quality of mulberry leaves (Magadum et al., 2019).

**Pruning**

Periodically some branches of mulberry are methodically cut off and this operation is called pruning and is as important as fertilizing or tilling for ensuring a good yield of quality leaves. Removal of the branches will not devitalize the plant but, on the other hand, invigorate and rejuvenate it as the available energy is directed to fewer branches and fresh, young shoots sprout from the axillary buds. Pruning is not deviating process rather it invigorates the plants into production phases leading to luxuriant growth and better leaf yield.

In temperate countries like Japan and Russia where cool climate conditions are prevailing, mulberry sprouts during spring (early April). It grows up to autumn (October) when leaf shedding starts. In winter (December-February) mulberry plant remains dormant. Pruning the mulberry plants is useful in adjusting the production period to synchronize with the leaf requirement for silkworm rearing. Pruning also helps in diverting the energies of plant for optimum production of foliage. Irregular branching of plant and many of the branches in adverse position may not get required nutrition and sunlight; thereby leading to wastage of foliage energy. Overcrowding of branches on the top of plant persists. Only when pruning is carried out in excess or the cut wounds do not heal and leads to infecting and diseases. Pruning is also a technical process and carried out very carefully (Online learning portal, Govt. degree college Udhampur).

**Main Objectives of Pruning:**

- To maintain proper shape and size of plant.
- To make cultural operation easier.
- To provide proper aeration and sunlight.
- To maintain convenient height for harvest.
- To induce higher foliage.
- To synchronize the leaf production and silkworm rearing.
- To maintain dead and defunct wood.
- To expose plant to better sunlight

Methods of pruning varies from place to place, according to climate, geographic location, method of silkworm rearing, type of training, whether plant is raised as a rain-fed or irrigated crop etc. Pruning is closely coordinated with harvesting and the type of pruning is associated with type of training. As said earlier the pruning schedules vary from place to place. In temperate regions of Jammu and Kashmir the silkworms are reared in 2 seasons of the year. Accordingly the pruning schedules are practiced. Spring pruning is practiced for harvesting the crop in spring or autumn, summer pruning is for harvesting in autumn and spring.

**Types of Pruning:**

1. **Low Cut or Bottom pruning**
2. **Medium cut or Middle pruning**
3. **High cut or Top pruning**

**i. Low Cut or Bottom pruning:**

In low cut form the length of the main stem is maintained below 50 cm from the ground level. In tropical climate of India where mulberry sprouts throughout the year, their pruning season depends on two factors viz., the rate of rainfall and methods of leaf harvest. Under rain-fed dry farming conditions, the plants are pruned once a year (during July-August) at a height of 10-15 cm from ground level. This is called “bottom pruning”. In Karnataka two bottom pruning is suggested, once in June and 2nd in November. This will help to harvest 5-6 crops in a year.

**ii. Mid Cut or Middle Pruning:**

In this type of pruning the length of the main stem is maintained one meter from the ground level. Middle pruning is a method of cutting the
branches of bush at a height of 45-60 cm from
ground level during December- January.
Middle pruning is practiced to induce sprouting
flower buds on the stem during winter months.

iii. High Cut or Top Pruning:

Here, if it is above one meter above the ground
level. The maintenance of height varies from
place to place.

Adoption of Forms of Pruning:

- Low cut pruning is recommended for the
  warm regions and where the soil is shallow
  and the underground water is rich.
- Medium cut pruning is desirable in the
  regions where there are frequent floods
  and heavy rains.
- High cut pruning is recommended in cold
  regions where there are chances of snow
  damages and is also better to adopt where
  frequent floods and heavy rains and where
  there is underground water is poor.

Training:

Without pruning, mulberry grows into tree.
Systematic pruning to give a specific shape to a
mulberry tree is called ‘training’. If there is no
pruning to a mulberry tree, the tree grows
naturally and the leaves cannot match to the
stage of silkworms under rearing. Silkworm
need a specific age leaves during different
instar stages. Hence, it is difficult to harvest
quality leaves suitable for different stages of
silkworms from the naturally grown mulberry
tree.

At the time of planting, the seedlings are cut to
a height of 15 cm above ground level. From this
plant 3-4 branches chosen and are pruned so as
to have 5-10 cm length above the ground level.
These branches are termed as primary branches.
Middle pruning is practiced to induce sprouting
of lower buds on the stem during winter
months.

On these primary branches three secondary
branches are retained. During the second year
each plant have 9 branches. In the 3rd year
during the spring rearing season all the
branches are pruned at a length of 3cm from the
fist. During the spring rearing season of the 4th
year, the branches are harvested leaving a
shorter length 1 to 2 cm from the fist. A similar
harvesting process is repeated, and in a few
years a “fist shape” appearance eventually gives
place to the growth of 10-15cm long stout
branches. This form of training is designed for
harvesting of mulberry leaf for spring rearing
(Online learning portal, Govt. degree college
Udhampur).

After the leaf harvest for spring rearing the
branches are pruned in May-June, when the
plants grow fast and the pruning is called
“Summer Pruning”. From summer pruned
plants, ‘leaves are harvested for autumn and
spring rearing. The branches are pruned in
March, before spring sprouting of buds and this
is known as “Spring Pruning”.

The various objectives of training is to get a
suitable form to mulberry plants to get
maximum leaf yield. This is achieved by
adopting suitable pruning schedule.

Types of Training:

a. Fist form
b. Non-first form

Fist Form:

In view of cutting mulberry plant each year at
one place of the main stem. The top part of
trunk gradually increases in diameter without
any increase in height. This part becomes thick
and takes the shape of a closed fist after a few
years. Hence it is called fist form. The latent
buds at the base of fist sprouts into shoots.
Depending upon the number of fists that are
allowed to develop, we have single fist, double
fist, triple fist and so on. In this method it is easy
to control the mulberry disease and pests. This
is disadvantageous because new buds will not
form their leaf yield will be less. Hence it is not followed by the farmers.

Non-fist Form:

In this type of training, branches are cut at a level higher than the branching point every year. Thereby the branching point of the shoot increases in its height every year. It does not resemble a fist. Hence, it is called non-fist form. This method is advantageous and popular among the farmers.

For both fist and non-fist forms of training, low, middle and high-cut pruning can be followed.

CONCLUSION:

Pruning and training are very essential cultural operations for maintaining a high yielding and quality leaf producing mulberry plantation. Pruning invigorates the plants into production phases leading to luxuriant growth and better leaf yield. Pruning also helps in diverting the energies of plant for optimum production of foliage. Training of a young tree is done mainly to develop strong framework of scaffold branches. Training is done to allow more sunlight and air to the centre of the tree and to expose maximum leaf surface to the sunlight and to direct the growth of the tree so that various cultural operations. Therefore, pruning and training are important for increasing productivity and quality leaves of mulberry plantation.

REFERENCES:
