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Role of Chawki Mulberry Garden in Improving Early-Age Silkworm Rearing

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Chawki or early-age silkworm rearing is a crucial stage in the sericulture industry. The production of healthy and robust silkworm larvae ultimately results in the formation of high-quality cocoons. Successful chawki rearing requires certain basic facilities, including a well-designed rearing house equipped with necessary appliances, a properly maintained irrigated mulberry garden, and skilled manpower.

Among the various factors influencing successful chawki rearing, the quality of mulberry leaves plays a major role. The nutritional requirements of young-age silkworms differ significantly from those of late-age larvae. Therefore, the leaves provided to chawki larvae should be tender, soft, succulent, and nutritionally rich. Ideally, these leaves should contain about 29% protein, 14% carbohydrates, and at least 80% moisture.

In general, mulberry gardens, the leaves available often do not meet these requirements, as they usually contain lower moisture levels (below 70%) and inadequate nutritional composition. Due to this limitation, establishing a separate mulberry garden dedicated to the production of high-quality leaves for chawki rearing becomes essential. Consequently, a cost-effective package of practices has been developed specifically for the maintenance and management of chawki mulberry gardens.

Technology

Soil: Mulberry plantations should preferably be established on flat or levelled land with fertile and well-drained soil. Sandy loam soil with good drainage is considered suitable. The soil should have a pH between 6.5 and 7.5, with an organic carbon content above 0.65% for optimum growth.

Area: An area of two acres is recommended, divided into four blocks of half an acre each. This arrangement allows the maintenance of 32 crops per year, with eight crops harvested from each half-acre plot.

Varieties: High-yielding mulberry varieties such as S36, V1, or G2 (newly developed varieties) are recommended for chawki leaf production.

Spacing: The Indo-Japanese system of plantation (paired row system) is commonly recommended for chawki gardens. Spacing of $(5' + 3') \times 2'$ or $(4' + 3') \times 2'$ is suitable for mechanized cultivation. Since the plants are harvested within 45 days, the spacing of $(4' + 3') \times 2'$, accommodating approximately 6300 plants per acre, is considered ideal.

Pruning and Training

After an establishment period of about 8–10 months, mulberry plants should be pruned at a crown height of approximately 20 cm above ground level, preferably at the beginning of the monsoon season. Following bottom pruning, leaf harvesting begins after about 35 days and continues for nearly seven days to feed silkworm larvae up to the second moult. Around 10 days after the initial harvest, the terminal bud at the top of the plant should be clipped.

Approximately 25–30 days after top clipping, the second harvest is carried out in the form of shoot-lets, which are suitable for feeding chawki worms up to the second moult. After this harvest, the plants are again pruned at the same crown height. This pruning is generally done 80–90 days after the first pruning, depending on the season and plant growth. The same sequence of operations is repeated four times in a year, enabling the production of eight leaf crops annually. Accordingly, crown pruning should be carried out four times a year, after the 2nd, 4th, 6th, and 8th crops, in accordance with the training schedule. However, pruning operations may be postponed during the winter months (November to January) due to slower plant growth.

Manures and Fertilizers

The requirement of organic inputs in a chawki mulberry garden is higher than that of a regular mulberry plantation. Farmyard manure (FYM) should be applied at the rate of 50 MT per hectare per year, preferably in two split applications. For a two-acre chawki garden, about 40 MT of FYM is required annually. This should be distributed as 10 MT per half-acre block, with 5 MT applied during May–June and another 5 MT during October–November. In addition to FYM, other organic inputs such as VAM (Vesicular Arbuscular Mycorrhiza), biofertilizers, and vermicompost may also be applied in suitable quantities to maintain soil fertility and enhance the production of high-quality mulberry leaves.

Chemical Fertilizers

The recommended annual dose of chemical fertilizers for chawki mulberry gardens is 260:140:140 kg NPK per hectare. These nutrients should be applied in eight equal split doses, corresponding to each crop cycle. Thus, 32.5:17.5:17.5 kg NPK per hectare per crop should be applied after every leaf harvest. The fertilizers are preferably supplied through ammonium sulphate, single super phosphate, and muriate of potash. For each half-acre block per crop, approximately 32 kg ammonium sulphate, 22 kg single super phosphate, and 6 kg muriate of potash should be applied. This should be followed by irrigation at an interval of 4–5 days.

Irrigation

Among all cultivation practices, irrigation has a strong influence on both yield and quality of mulberry leaves. Approximately 3.75 cm (one and a half acre-inch) of irrigation water, equivalent to about 85,000 gallons per hectare, should be supplied once every 4–5 days using the ridge and furrow (channel) method. Accordingly, around 68,000 gallons of water per irrigation is required for a two-acre garden, which means about 17,000 gallons for each half-acre plot. Although the quantity of water required per irrigation in a chawki garden is similar to that of a regular mulberry garden, the frequency of irrigation per crop may differ depending on the growth stage and seasonal conditions.

Leaf Harvesting

For chawki rearing, the method of leaf harvest varies depending on the crop stage. Individual leaf plucking is recommended for the 1st, 3rd, 5th, and 7th crops, as these crops produce tender leaves suitable for young larvae. In contrast, shoot-let harvesting is practiced during the 2nd, 4th, 6th, and 8th crops, which provide adequate foliage required for feeding chawki worms. This harvesting pattern helps maintain a continuous supply of tender and nutritious leaves throughout the year.

Pest and Disease Management

Regular monitoring and management of pests and diseases are essential for maintaining a healthy chawki mulberry garden. It is advisable to adopt mechanical and biological control methods wherever possible. The use of chemical pesticides should be minimized or avoided because residues may adversely affect silkworm health, especially since leaves are harvested frequently in the eight-crop schedule.

Advantages of the Technology

The adoption of this technology significantly improves both leaf yield and quality. Using this method, an annual yield of 32–36 tonnes of chawki-quality leaves per hectare can be obtained. In contrast, general mulberry gardens usually produce only 8–10 tonnes per hectare per year of chawki-suitable leaves through selective harvesting. Additionally, almost 100% of the leaves produced under this system are suitable for chawki rearing, ensuring efficient utilization. The leaves produced under this technology are also nutritionally superior. They contain approximately 80% moisture, 25% protein, and 13% sugars, whereas leaves obtained from general gardens contain around 70% moisture, 21% protein, and 11% sugars. Feeding trials conducted in chawki rearing have confirmed that these nutritionally enriched leaves support better larval growth and development. By following this package of practices, it is possible to rear approximately 1,80,000 to 2,00,000 disease-free layings (DFLs) per hectare annually up to the chawki stage. This can be achieved under a 32–36 crop schedule per year (about three crops per month with brushing once every 10 days), with an estimated requirement of 20 kg of chawki leaves for every 100 DFLs.

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