



Feasibility of Intercropping in Mulberry in Kashmir

(M. R. Mir, *A. R. Rafiqui, A. H. Ganie, O. B. Ayoub, I. L. Khan and M. F. Baqual)

College of Temperate Sericulture, Mirgund, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Jammu and Kashmir (India)

*Corresponding Author's email: aroos.rafiqui@gmail.com

Mulberry (*Morus spp.*), a fast growing, deciduous, woody perennial angiosperm has an ability to grow as bush, dwarf and tree under varied agro climatic conditions. It produces leaf which is the only food to silkworm (*Bombyx mori* L.) reared to produce silk, the "Queen of textiles". The plant has a great regeneration capacity and produces two flushes of leaf per year as against all other tree species of this region. The plant has a wider adaptability and can be grown under varied agro climatic conditions either under irrigated or rainfed conditions. Despite this, the plantation in the region does not increase the way other tree species do probably because sericulture, the rearing of silkworm for the production of silk, has never been taken as a full-fledged occupation in the whole region even it has been a traditional agro-industry in the union territory. This might be because mulberry as a monoculture does not seem to attract the farmers who feel reluctant to devote their land exclusively to mulberry cultivation as only one crop is taken at farmers level that too for a period of less than a month during May-June. The farmers also unknowingly believe that nothing grows beneath a mulberry plant, thus giving preference to the cultivation of other crops either as sole or mixed cropping.

Horizontal expansion rather than vertical expansion hold great promise provided sericulture is practised in an integrative manner to enable the farmer to increase farm output. Mulberry has certain amazing features that make it an ideal plant as far as its intercropping with other crops, particularly the herbaceous ones, under Kashmir climatic condition is concerned. The feasibility of intercropping of mutualistic vegetables in mulberry will not only help in utilizing space available in between the rows of mulberry garden but will also improve soil health and maintain fertility of the soil. Intercropping can give full play to mutualistic action among organisms and bring out the best and eventually increase farm profitability and equitable utilization of resources. The farmers will get round the year employment and ensure cash flow as even if one crop (silkworm rearing) fails, the other crop (intercrop) holds to fetch profit. A diagrammatic representation of the various activities in mulberry based intercropping module is depicted in **Figure 1**.

In order to make sericulture more lucrative and attractive in Jammu and Kashmir, intercropping of mulberry with other crops can prove beneficial. The features that give it an edge over other tree species and make it the best choice for intercropping include:-

Wider adaptability coupled with flexible cultivation forms: Wide distribution of mulberry across the globe under diverse conditions indicates its better adaptability to varied environmental conditions, soils and altitudes ranging from sea level to 4000 m above mean sea level. It can be grown in varied forms of land like hilly, plains and valleys under irrigated and rainfed conditions with an annual rainfall range of 600-2500 mm.

For cultivation purposes, an elevation of 305 to 910 m above MSL, temperature range of 23-27°C and relative humidity of 64 to 81 per cent, sunshine duration of 5 to 12 hours per day is considered ideal for mulberry. Loamy, clayey-loamy or sandy-loamy soils with pH ranging from 6.2 to 6.8 are considered to be the best.

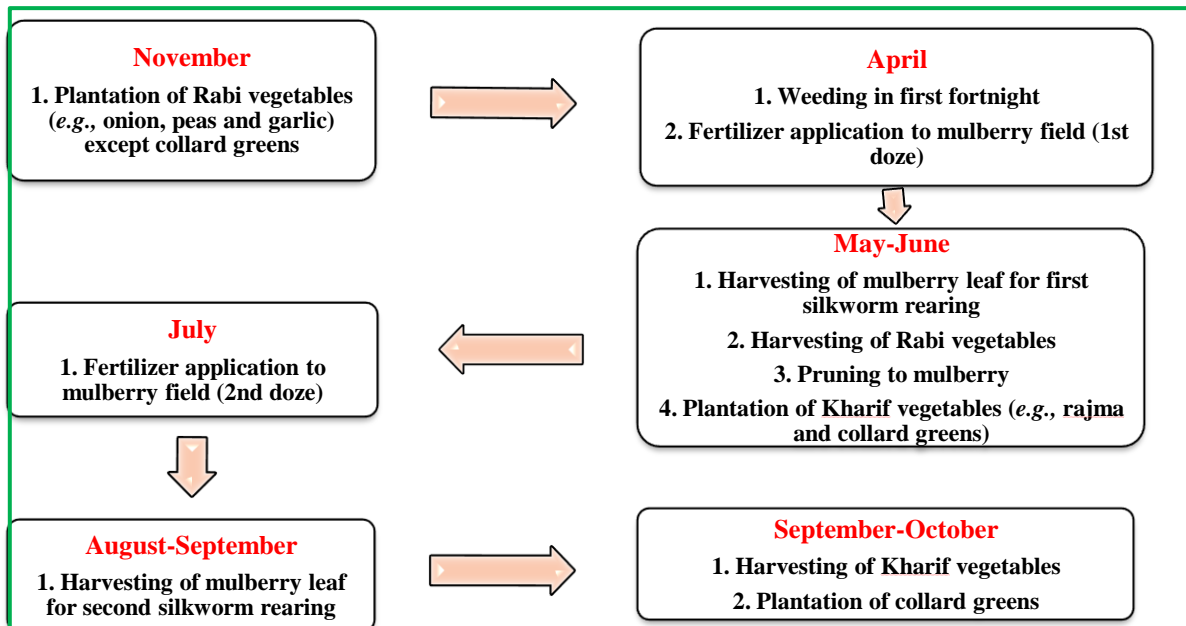


Figure 1: Calendar of activities

Various cultivation forms can also be adopted for mulberry as per the requirement and facilities available with a farmer. It can be trained as bush, dwarf or tree. As tree, it has canopy, height and spacing sufficient enough to allow sunlight to percolate down to help other crops growing beneath it luxuriantly. Thus, mulberry as a tree coupled with favorable climatic conditions of Kashmir provide ample opportunity to exploit its intercropping potential with vegetables.

Production of two flushes of leaf under Kashmir conditions: Majority of the plant species including the ones growing as trees show sprouting of dormant winter buds during the first fortnight of April, grow gradually and start shedding their leaf from and thereby having a period of almost 6-7 months to grow during a year. These plants thus produce a single crop, be it leaf, fruits or seeds. However, mulberry having a very good regeneration capacity has the distinction of producing two flushes (crops) of leaf, one ready for harvest in the first fortnight of June for rearing the spring worms and the second during August-September to be utilized for either taking another cocoon crop and the feeding the left-over unutilized leaf to livestock animals as such or preserving it for the winter days when there is usually shortage of fodder.

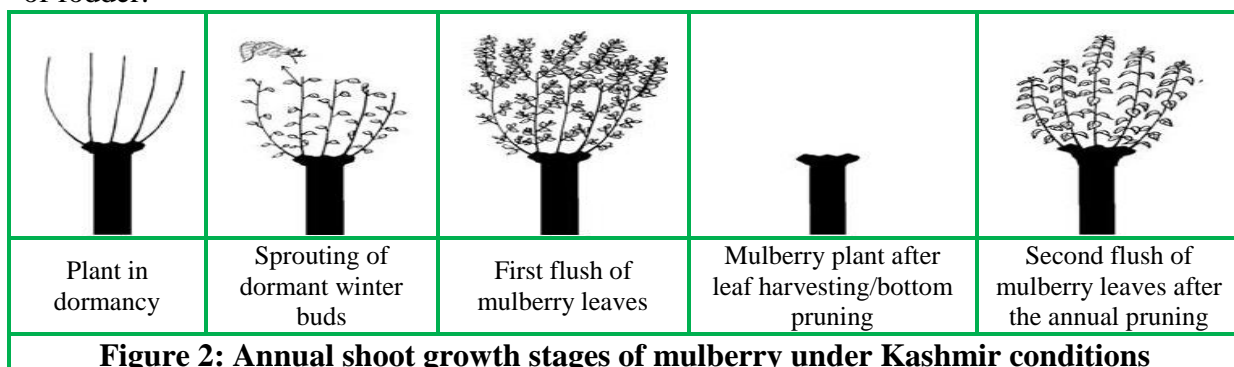


Figure 2: Annual shoot growth stages of mulberry under Kashmir conditions

Remains bereft of leaf /branches for a major portion of the year: Unlike other tree species of the region, mulberry remains bereft of leaf almost for seven months during the year, hence providing ample choice to grow other crops beneath. The plant sheds its leaf during November 1st week, starts sprouting of winter buds during 1st week of April. It is resorted to annual bottom pruning during the first fortnight of June leaving it again without leaf/branches up to August. Thus the plant due to its physiological aspects coupled with the cultural operations especially the annual pruning followed in the region has a remarkable quality of being with no/low leaf during more than 07 months in a year and thus causing least interception of solar light. This therefore encourages growing intercrops under mulberry plantation.

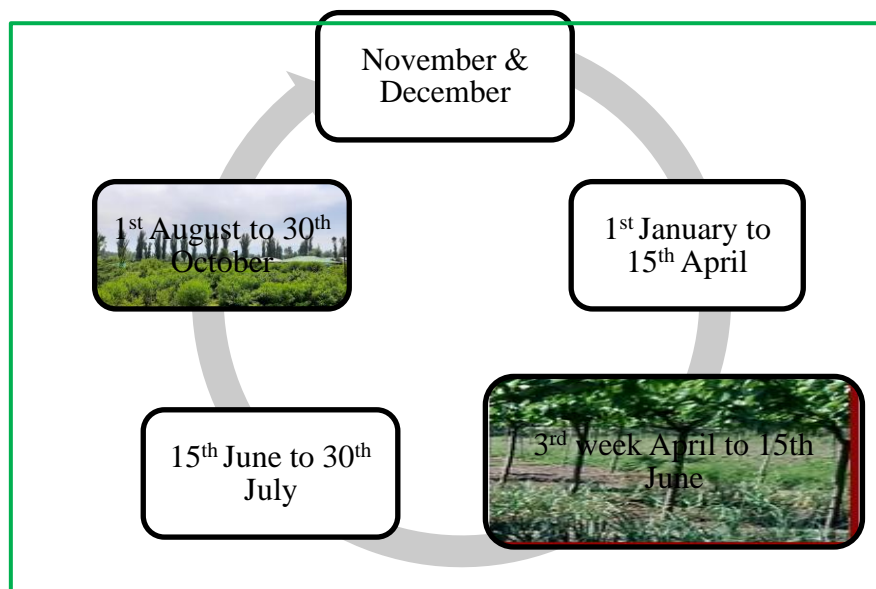


Figure 3: Periods showing mulberry plant with leaf and without leaf

Deep profuse root system: The plant when grown as tree has a profuse root system that penetrates deep into the soil leaving the nutrients and water in the upper layers for the companion crops. Vegetables with shallow root system such as onion, garlic, peas, collard greens, beans, etc can be successfully grown as intercrops between the rows of mulberry.

Least use of agrochemicals: Except the chemical fertilizers (NPK) in the form of Urea, DAP and MOP, the cultivation of mulberry involves no use of fungicides and other pesticides. The plants do not have any foliar disease during the spring crop which is the main crop at farmers' level. Though leaf spot and powdery mildew diseases appear at a stage when the rearings are over as a result there is no need of chemical sprays to control the diseases and pests. This saves the crops growing beneath from the exposure to chemicals thereby leaving no chances for the crops grown as intercrops to have the residues of these chemicals leading to healthy and chemical free produce.

Multipurpose tree species: Mulberry has been known for its different uses though the main being its use as feed to silkworm. Its wood has a great calorific value and is a much liked fuel in Kashmir, especially for the harsh winter. Its fruit possessing various nutrients makes its use in food and pharmaceutical industries. Surplus leaf can be used as such to feed livestock animals or processed into nutritive food cakes and preserved for the days of fodder shortage. Having a profuse root system and a great carbon sequestering capacity, it can be used in various social forestry and environment amelioration programme.

Summary

Despite mulberry's adaptability and unique attributes, its plantation growth lags behind other tree species in the region potentially due to the seasonal nature of sericulture. A novel approach by integrating agricultural crops with mulberry presents a viable solution for its horizontal expansion. This will not only maximize land use but also enhance soil health ensuring year-round employment and income for farmers. With its deep root system, minimal agrochemical usage and multipurpose applications, mulberry emerges as an ideal candidate for intercropping.