
UNIT 1 ESTABLISHMENT OF MULBERRY GARDEN

Structure

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1.0 OBJECTIVES

After reading this unit, you will be able to:

- identify suitable soil and climate for mulberry cultivation;
- select suitable methods of preparation of land and plantation;
- recognize different mulberry varieties;
- explain different methods of propagation; and
- demonstrate the method of preparation of nursery.

1.1 INTRODUCTION

The purpose of this unit is to introduce you to the mulberry cultivation. Mulberry is cultivated for its leaf to feed silkworm. Fig. 1.1 & 1.2 show a mulberry bush and the leaf as a feed to silkworm. It is equally important to know that mulberry leaf is the sole food for silkworm and the cocoons produced by the silkworm is the raw material for the silk. Among the different activities involved in the production of cocoon like mulberry cultivation, silkworm rearing practices etc., production of good quality mulberry leaf in large quantity ranks first for the successful production of cocoons.

You may also know that about 60% of the total cost of the production of cocoons goes by way of cost of production of leaf. Thus, it is very important to know about the suitable cultivation practices for mulberry so that you can increase the production of leaf and decrease the cost of cultivation. This is very important as decreased cost of production of leaf can help in making silk cheaper.



Fig. 1.1: Mulberry Bush



Fig. 1.2: Mulberry leaf as feed for silkworm

The initial establishment of mulberry garden is of utmost importance. It is similar to bringing up a child in his/her infancy. As you go along this unit, it will be clear to you how to establish a mulberry garden. You will know about soil and climate suited to mulberry plant, preparation of land, mulberry varieties, types of plantation, planting systems, preparation of nursery and method of propagation. The above aspects once understood clearly can help in establishing a mulberry garden and maintaining it in subsequent years most efficiently for the production of quality leaf.

1.2 SOIL AND CLIMATE

In the previous section, you have learnt about the importance of mulberry leaf. Let us now know about the soil and climate, which suits mulberry. Mulberry is a deep-rooted perennial plant. Therefore, the soil on which mulberry garden is established should be able to supply air, water and nutrients to the plant even from deeper layers. So, it is very easy to understand that preferably soil of mulberry should be *deep* and *fertile* to support the proper growth of plant. Mulberry is a hardy plant and accordingly it can be grown in a wide range of soils. Though, mulberry can be grown in different soils, the clayey loam to loam soils are much preferred. Also, for normal and luxuriant growth of the plant, soil having a pH ranging from 6.2 to 6.8 (slightly acidic) is ideal. You may try to understand that pH gives the acidic and alkaline nature of the soil. However, if a soil is alkaline (more than 7.4 pH) or highly acidic (less than 6 pH), the soil can be reclaimed by the application of gypsum and lime, respectively. In Karnataka, soils are mostly *red loamy* which are poor in organic matter. You may also know that mulberry is grown on alluvial soils. It is important to learn about the land on which the plantation is to be established. For mulberry, the land should be either flat or slightly sloping. If the land is having a steep slope, it can be made into rows and terraces.

After soil and land, now let us try to learn about the climates. Remember that earlier you have learnt that mulberry leaf ranks first in its importance for the success of sericulture. The second most important factor for the success is climate. Climate can be temperate, sub-tropical and tropical. Let us know some important aspects of these three climates.

Temperate: A temperate climate can have very changeable weather. One day, it may be raining, the next it may be sunny. This changeable weather occurs in summer as well as in winter.

Sub-tropical: These areas have very warm to hot summers, but non-tropical winters.

Tropical: Sun is hot all the year.

By now, you have learnt about the climate and now let us try to know about the temperature, which suits mulberry plant. You may imagine how uneasy we feel in hot

and cold climate. Mulberry also is affected by hot and cold temperatures. Temperature ranging from 20°– 30°C suits the growth of mulberry plant. However, temperature below 13°C and above 40°C affects the growth of the plant.

Knowing more about the altitude can help in establishment of a better mulberry garden. So, let us know about the altitude. Altitude of a place refers to the height and climate of that particular place. Mulberry is known to grow between 200 m to 1,200 m altitude above Mean Sea Level (MSL). However, an altitude of around 700 m above mean sea level is suitable for good growth of mulberry.

Mulberry requires a good amount of water for its growth. The optimum rainfall (1,000-1,500 mm) of even distribution is known to help in suitable growth of the plant. It may not be difficult to understand that every plant requires water for its growth, which you may have observed in the agricultural fields in your town/village. So, mulberry also has the requirement of water.

Let us try to imagine which other factor needs attention by a farmer. The other factor is sunshine. Mulberry prefers sunshine, and shade affects the growth of the plant. Sunshine ranging from 9 to 13 hours per day is suitable. Probably, you may be knowing that long hours of sunshine is available in South India due to which mulberry cultivation can be profitable. Also, the advantage in cultivation of mulberry in South India is that it can be grown throughout the year. Thus, you now know that the mulberry can be grown in all three climatic zones. You must be aware that gathering information on various aspects as detailed above can be helpful in establishment of a better mulberry garden.

Activity 1

Visit a mulberry garden, dig the plant and find out if it is a deep-rooted plant. Collect soil samples from various mulberry gardens and examine the type of soil. Look at the temperature chart of your place and find out the range of temperature in various seasons. Also, visit various mulberry gardens and note how mulberry is established in steep slopes. Plant two mulberry saplings at a distance. Irrigate one mulberry plant and leave the other without irrigation. Record the difference in growth.

Check Your Progress 1

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

- 1) Mulberry leaf is the sole food for
- 2) What do silkworms produce when mulberry leaf is fed to them?
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.....
- 3) ranks first in its importance for successful production of cocoons.
- 4) % of the total cost of production of cocoons is by way of cost of leaf.
- 5) Which soil is preferred for mulberry cultivation?
.....
- 6) What is the ideal pH range for growing mulberry?
.....

- 7) type of soil is mostly found in Karnataka.
- 8) What is the advantage of growing mulberry in South India?

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.....

1.3 PREPARATION OF LAND

You must be knowing that preparation of land is the first step in planting a crop, so is with mulberry. Land can be prepared by thoroughly ploughing the land with a tractor (Fig. 1.3) or power tiller or with the help of bullock drawn plough or manually.



Fig. 1.3: Land preparation by tractor

The process of preparation of land includes removal of stones or boulders, if any, from the plantation area and levelling the land if the surface is uneven. Can you imagine that even land can facilitate uniform irrigation after the plantation. Let us recall Block 1, Unit 1, wherein, it was clearly mentioned that mulberry is a deep rooted plant and it is simple to understand that deep ploughing at *30-40 cm depth is essential* as it will help to loosen the soil and make soil powdery. This can help in eliminating the weeds as well. Put a question to yourself and find out how weeds can affect the growth of mulberry. Knowing that weeds hamper the growth of mulberry in the initial stage is important and accordingly has to be given attention. You may know that weeds can be controlled manually as well as by the application of weedicide.

Can you imagine what the next step in the plantation of mulberry is?

A basal dose of well decomposed Farmyard Manure (FYM) is applied at the rate of *20 and 10 M tonnes/hectare/year* in irrigated and rainfed land, respectively. You may take precaution to apply well decomposed farmyard manure. All the above activities can make you feel pleased that steps for preparation of land are completed and plantation can be taken up.

Activity 2
Visit a mulberry garden and observe if weeds are removed while ploughing.

Check Your Progress 2

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

1) What are the various method of ploughing the land?

.....
.....

2) To which depth should land be ploughed?

.....
.....

3) What is the dose of FYM given to irrigated and rainfed mulberry plantation?

.....
.....

4) Weeds..... the growth of the plant.

1.4 MULBERRY VARIETIES

You know that mulberry has a number of popular varieties, which are suitable for different agro-climatic conditions. You have learnt about the climate suitable for mulberry and by now, you are clear about the agro-climates where you intend to plant mulberry. Mulberry varieties vary in their production of leaf. So, it is clear that choice of mulberry varieties has an immense role in boosting the leaf production and improving the production of quality silk. What do you mean by a suitable variety? A suitable mulberry variety can be listed as the one, which has following characters in addition to production of quality leaf:

- Should be a good rooter, early sprouter and fast growing.
- Should respond well to the application of manures and fertilizers.
- Should be tolerant to diseases and pests.
- Should be able to produce palatable leaf for silkworm rearing.
- Should be rich in nutrient contents.

Table 1.1: Popular Mulberry varieties of South India

Variety	Rooting (%)	Yield potential (MT/ha/year)	Recommended for
Kanva-2	80	32-35	Traditional variety of Karnataka state.
S-36	48	38-45	Karnataka and other Southern states especially for young age silkworm rearing.
V-1	>90	45-60	Southern states of India with assured irrigation.
S-13	>80	12-15 under rainfed 38-45 under irrigated	Andhra Pradesh, Maharashtra and hotter region of Karnataka.
S-34	>75	12-15 under rainfed 38-45 under irrigated	North Karnataka region and parts of Tamil Nadu having black cotton soil.
MR-2	>80	35-40 in plains	Plains of Tamil Nadu

Table 1.1 shows the list of mulberry varieties suited to different climatic conditions. Also, it can be seen that developing high yielding mulberry varieties have a significant role to play in the success of mulberry cultivation. You can compare the very poor

mulberry leaf yield during 1960's (approximately *15 MT/ha/year* under irrigated and *3 MT/ha/year* under rainfed conditions) with that of the present scenario with the high yielding varieties capable of producing leaf yield ranging from *30-60 MT/ha/year* under irrigated and *10-15 MT/ha/year* under rainfed conditions. Earlier, mulberry variety Kanva-2 was predominantly used for establishing a mulberry garden in South India. You can find out this by asking a mulberry grower which mulberry variety he had been growing earlier. He would tell you that he had been cultivating mulberry variety Kanva-2, which yielded *32-35 MT of leaf/ha/year* under irrigated conditions. You will also learn from the farmers that this variety has been partially replaced by high yielding varieties like S-36 and later by Victory-1 (V-1), which has spread in over 33,000 hectares in South India. Variety V-1 is also gaining popularity in other states of India. Fig. 1.4 & 1.5 shows V-1 mulberry plant and mulberry plantation under V-1 variety, respectively.



Fig. 1.4: V-1 mulberry variety



Fig. 1.5: Large scale mulberry plantation

Activity 3

Visit a few mulberry gardens and find out the various mulberry varieties used. Record the difference in the varieties. Do you know that there are a number of mulberry varieties available in South India? Find out which variety is suitable for raising mulberry garden in your place.

Check Your Progress 3

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

1) Why choosing of mulberry varieties is important in cultivation of mulberry?

.....

2) What do you mean by rainfed mulberry cultivation?

.....

3) Which mulberry variety is used predominately in establishing a mulberry garden in South India?

.....

4) Name one improved mulberry variety.

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1.5 TYPES OF PLANTATION AND PLANTING SYSTEMS

So far, you have not learnt about the types of mulberry plantation. In this chapter, we introduce you to how the plant can be shaped to get higher leaf yield for many years. Briefly, it can be said that desired shape of the plant is an important aspect of mulberry cultivation as mulberry is a woody plant and produces number of branches. Therefore, it needs training to keep the plant in good shape. In fact, the training of the plant is done to suit the management practices. Classification of the types of plantation is based on the height at which the plant is pruned or cut. Moreover, once the plant is cut, a crown develops on the plant from where shoots (branches) develop. Fig. 1.6 shows the formation of a *crown*. Formation of the crown is an essential aspect in the establishment of a garden. It has a significant role to play for the shape of the plant and leaf yield. On the basis of the stump height from which the crown is developed, plantations can be classified as:

1. Low cut (bush) : Crown height - 20-25 cm
2. Medium cut (dwarf) : Crown height - 60-70 cm.
3. High cut (tree) : Crown height - 150-175 cm.

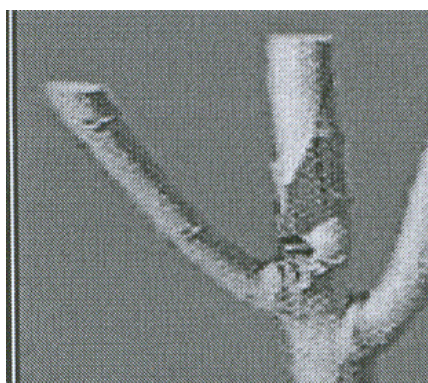


Fig. 1.6: Crown formation



Fig. 1.7: A view of bush type of plantation

You may have a look at Fig. 1.7, which shows the bush plantation, and similarly Fig. 1.8 and Fig. 1.9 shows the dwarf and tree plantation, respectively. In low cut (mostly referred to as bush), one main stump is allowed to develop and 3-4 well-developed shoots per plant are allowed to grow and the remaining shoots are removed for the development of proper crown. Three to four shoots are allowed to develop from each main shoot. It takes a year for the development of good stump after plantation. For the proper development of plants, leaf is not harvested for six months after plantation. Similarly, you may note that medium and high cut mulberry is also trained similarly except that the crown height is maintained as mentioned above. You may find it interesting to note that in South India, mostly *bush type* of plantation is being followed. Bush type of plantation yields significantly more leaf than dwarf and tree type of plantation.



Fig. 1.8: A view of dwarf plant

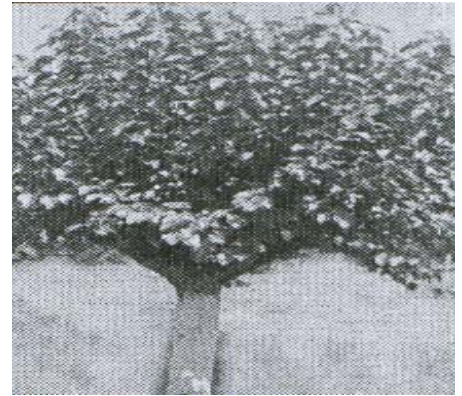


Fig. 1.9: A view of tree type of mulberry plant

By now, you know the types of plantation and also know that in South India, mostly bush type of plantation is being practised. Therefore, it is easy to understand that you shall be concentrating on bush type of plantation. You may know in the first instance that mulberry is being cultivated both under *irrigated* and *rainfed* conditions. Let us make it clear that under irrigated conditions, supplementary irrigation is provided when there is insufficient rainfall. Under rainfed condition, it is entirely dependent on rainfall. You may know that two systems namely *pit system* and *row system* of plantation are being followed in South India. Under irrigated conditions, mulberry is planted either in “pit system” with wider spacing or in “row system” in very close spacing. Under rainfed condition, only pit system of plantation is followed.

- a) **Pit/Trench System:** In pit system, under irrigated conditions, pits of 30x30x30 cm size or trenches of 25-30 cm depth are prepared along the rows. After the pits/trenches are dug, saplings of mulberry are planted at a distance of 90 cm from each other. In this system of plantation, it is possible to accommodate a total of 12,345 plants per hectare of land.

Now-a-days, planting mulberry in paired rows following $(150\text{cm} + 90\text{cm}) \times 60\text{cm}$ spacing is becoming more popular as it facilitates adoption of mechanization for inter-cultivation operations by using tractor/power tiller. You may find it interesting to know that it accommodates more number of plants than 90 x 90 cm spacing. In this system, it is possible to accommodate 13,888 plants per hectare of land. Fig. 1.10 and Fig. 1.11 give a sketch of how saplings are planted in paired row system and a view of garden raised in Paired row system. Under rainfed conditions, mulberry is planted in pits of 35 x 35 x 35 cm size at spacing of 90 x 90 cm. Before planting, the pits are filled with FYM or well decomposed compost and sand in a ratio of 2:1.

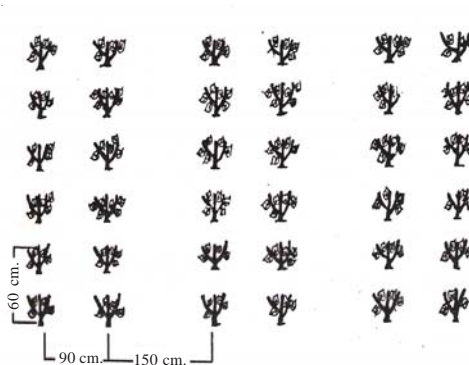


Fig. 1.10: Paired row system



Fig. 1.11: Garden raised in Paired row system

While planting, some precautions are required to be taken. Saplings should be planted in upright position. Possibly you can yourself imagine that keeping the plants in upright position will help the establishment of plantation vertically straight and in proper manner. Once the saplings are planted, the trenches/pits are filled with soil to cover the root system properly (Fig. 1.12).

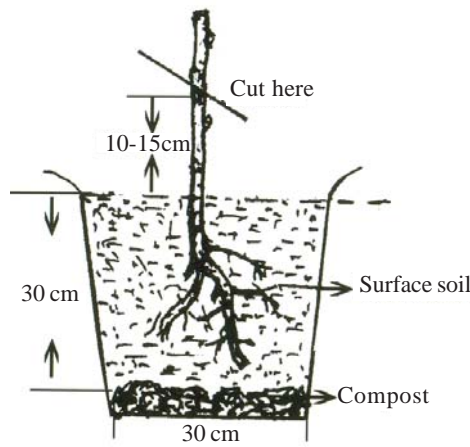


Fig. 1.12: Correct way of planting

You may also note that pressing of the soil firmly around the sapling will help in proper establishment of the plant. While preparing the trenches, it is simple to keep top and bottom soil separate at the time of digging out trenches. While planting, topsoil can be placed near the root zone. Topsoil is rich in nutrients and placing it near the root zone will help the better growth of the plant. This technique is simple to execute while planting. For proper survival of the plant, irrigation should be given immediately. Subsequently, irrigation can be given as and when required. You may be aware that planting during rainy season can be helpful.

- b) **Row System:** This is an age-old practice of mulberry plantation in South India under irrigated condition. In this system of plantation, the ploughed land is thrown into ridges (rows) and furrows alternatively at a distance of around 60 cm apart from each other and cuttings are planted at a distance of around 20 cm at the edge of the ridge. It may now look simple since all other procedures of planting for establishment are same as followed in pit/trench methods. The row system accommodates 83,000 plants per hectare. You have already learnt the fact that sufficient *sunlight* and *space are* required for the proper growth of the plants. Hence, it is easier to interpret that wider spacing in between the plants is beneficial.

Check Your Progress 4

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

- 1) How to keep the mulberry plant in good shape?

.....

- 2) How many types of mulberry plantation are there? What are they?

.....

3) Which system of mulberry plantation is practiced in South India?

.....
.....

4) What are the two conditions of cultivation of mulberry in South India?

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.....

1.6 METHODS OF PROPAGATION AND PREPARATION OF NURSERY

You have spent time in knowing about the planting systems. Now, let us understand that propagation of any plant is necessary to raise a new plantation, so is with mulberry. Mulberry is propagated by asexual methods. Among the asexual methods, vegetative propagation is easy and mostly used in South India. Let us now learn the various procedures for vegetative propagation through stem cuttings, grafting and layering.

1.6.1 Stem Cutting

You have already learnt that the ideal mulberry variety is the one which has high rooting ability. Therefore, it is easier to multiply these varieties through stem cuttings. The process starts with harvesting of shoots from a mature mulberry garden. Precautions are taken to keep the garden free from disease and pests. You must keep in mind that stem cuttings should be selected from at least 6 months old shoots. Cuttings of 15-18 cm length and 10-15 mm diameter with 3-4 healthy buds are prepared using sharp billhook or secateur without any damage to the bark. If you look at Fig. 1.13, you can easily see how a sharp and slanting cut has been given at the base of the cutting. While preparing the cuttings, upper immature and lower thick portion of the shoots are rejected. Fig. 1.13 also gives a picture of an ideal cutting. In Block-1, Unit 4, you are going to study about the cutting machine developed at CSR & TI, Mysore that can make the job of preparation of cuttings easier and economic. You may also take precautions to see that drying of the cuttings can be avoided by putting the cuttings in shade covered with wet gunny cloth. Can you imagine what will happen if cuttings dry?

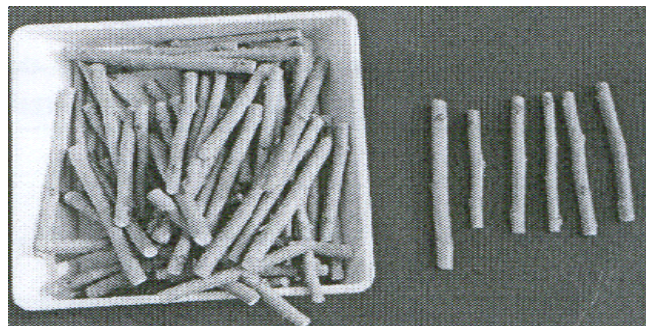


Fig. 1.13: Ideal stem cuttings

They will not develop roots. Before planting cuttings in the nursery, the cuttings are treated with 0.1% Dithane M-45 solution for 20-30 minutes for avoiding fungal disease. Then, the cuttings are planted immediately. You must also keep yourselves informed that suitable temperature can help in multiplication. Hence, temperature of 20-25°C is considered ideal for cutting propagation. Soil temperature is also important. High humidity can be an added advantage in the process of multiplication.

Perhaps, it is simple to understand that high humidity will help in avoiding driage of cuttings in nursery. Now, you shall try to learn how the cuttings are planted in the nursery beds in a slanting position exposing only one bud above the soil. You must also know the space that is to be maintained while planting cuttings. The distance between rows should be 20 cm and between cuttings 10 cm. Soil should be pressed around the cuttings firmly to ensure contact of cuttings with the soil to develop roots. Fig. 1.14 shows how the cuttings can be planted at a spacing of 10 / 20 cm. During the process of development of roots, the cutting should not be disturbed. Weeds also hamper the growth of cuttings. So, weeds can be removed 45 days after planting cuttings with the help of a sharp weeding sickle without disturbing the cuttings. After one month of planting, urea at the rate of 10 g /sq meter is applied to the nursery and irrigated immediately. Subsequently, the irrigation is done once in every 4 days to get uniform size saplings with good vigour. The saplings are transplanted after 4 months. Fig. 1.15 shows how uniform saplings can be obtained by following the above practices as against non-uniform saplings produced when above practices are not used.

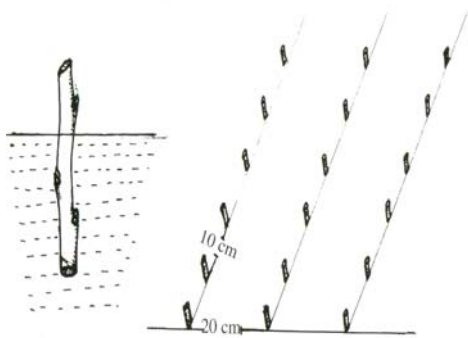


Fig. 1.14: Plantation of cuttings in nursery

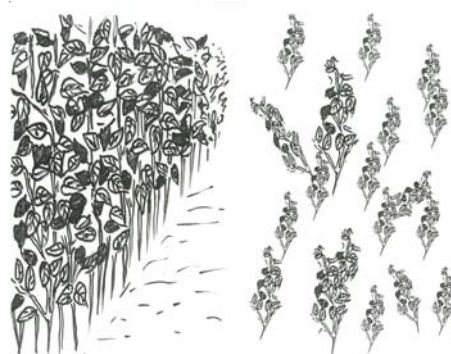


Fig. 1.15: A comparative view of uniform & un-uniform saplings raised in nursery

1.6.2 Grafting & Budding

Depending upon the part used as the stock, the grafting can be classified into root, shoot and bud grafting.

- a) **Root Grafting:** As mentioned earlier, there are various methods of vegetative propagation. Root grafting is one of the methods. It is practised with mulberry varieties, which cannot be propagated through stem cuttings. The procedure is usually adopted with temperate mulberry varieties. The procedure involves inserting a small branch of a plant into a rooted plant (Fig. 1.16). The branch that is inserted is called as scion and that into which the scion is inserted is known as stock. It is important to choose the right variety of mulberry as scion. The stocks can be raised by sowing the seeds uniformly in a nursery bed. The seeds should be covered with soil to avoid drying. The seeds are sown and allowed to grow with 3 cm distance in between. This can be done by thinning the seedlings. Besides this, water is sprinkled to help in germination. The seedlings are used for grafting. However, it can be indicated here that root grafting is expensive but unavoidable in mulberry propagation, where response for multiplication through stem cuttings is poor.

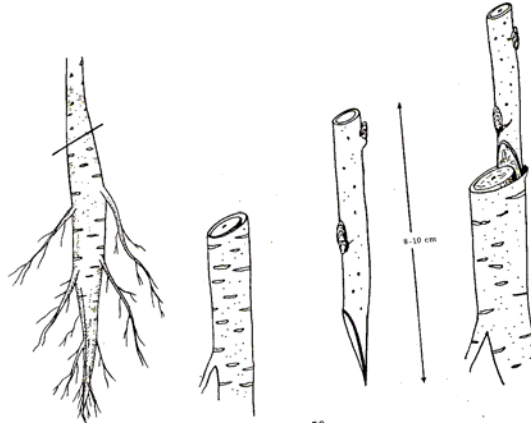


Fig. 1.16: Process of Root grafting

- b) **Bud Grafting:** Bud grafting involves removal of only one bud and bark and grafting it on the other plant. Following types of bud grafting can be used.
- Patch Budding:** A portion of the bark with an active bud is removed from the stem as scion and correspondingly a portion of the bark along with bud is removed from another stem (stock) to which bud grafting is to be made. To this required portion of stock, a bud of the scion is inserted and properly tied using polythene tape.
 - T-Budding:** A “T” shaped insertion is made on the barks of the stock at the nodal region and a slit is formed by opening the cut ends. A “T” shaped bud from the selected plant as scion is inserted in this (stock) slit and properly bandaged.
- c) **Shoot Grafting:** It is followed to renovate the old plants.
- Wedge Grafting:** This is similar to root grafting except that in this case “V” cut is given on a shoot (stock). Prior to this, the plant is pruned at a required height and the scion is inserted later.
 - Crown Grafting:** This is similar to the above, except that more than one scion is inserted into the stock.

1.6.3 Layering

If the layering is done with the shoots, it is known as air layering. In this case, roots are allowed to develop at the nodes of the stem while it is attached to the parent plant. There are two types of layering viz. air layering and trench or ground layering.

- Air Layering:** In this method, the bark and some portion of wood is removed from all around a shoot. Besides this, mosses (a kind of a small plant) are wrapped around the shoot at the point of cut. Subsequently, a polythene sheet is wrapped around the shoot. The two cut ends of the polythene are closed with a tag. It is to be kept in mind that shoots on which layering have been done should not be disturbed for 4-6 weeks. The rooted shoots are then removed from the parent plant and planted in nursery beds. Fig. 1.17 gives a view of air layering and after seeing the figure it may be easy to do layering.
- Ground or Trench Layering:** In this method, the branches of a plant are placed horizontally in the base of the trench and covered along with its entire length filled with manure and soil. New shoots which develop from the buds along with the stem grow upwards through the soil. The shoots along with the roots are then planted as new plants.

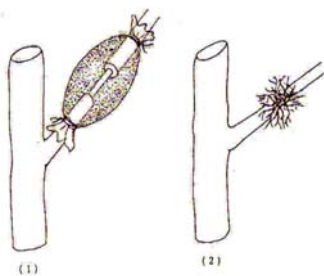


Fig. 1.17: Air layering

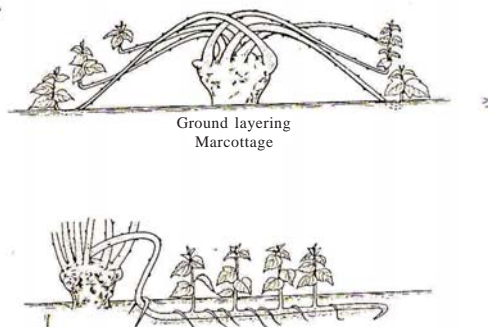


Fig. 1.18: Trench or Ground layering

A comparison of this method with propagation through stem cutting shows that this method is expensive and cumbersome. However, this method has been identified for those varieties, which don't respond to rooting through stem cutting. A close look at the above methods shows that in practice, propagation through stem cuttings or saplings is a popular method and extensively used in South India.

1.6.4 Preparation of Nursery

Let us now learn how to prepare a nursery. Nursery is a piece of well ploughed and manured land where mulberry cuttings are planted in a proper space to get well developed young rooted plants called saplings. It is made with an intention of establishing mulberry plantation by using saplings to get a uniform plantation with less mortality. Since, direct plantation of mulberry with the cuttings have a high rate of mortality, especially in a place with lack of irrigation facility, the use of mulberry saplings is encouraged. Hence, raising a nursery before taking up a plantation has a very significant meaning.

To raise a nursery, it is highly essential to prepare the land with a lot of care. The land must be ploughed deep (> 30cm) with tractor drawn mould board plough two times depending upon the soil texture. Farmyard manure should be applied at the rate of 10 MT/acre and mixed well with the soil by ploughing. In case of black soil, application of sand @ 10-20 MT/acre is essential. Raised beds of convenient size, preferably of 3m x 1m x 10 cm breadth, length, and height, respectively, with irrigation channel all-round the bed is more suitable. The beds should be made free from weeds by digging. In one acre of land, 1,065 nursery beds of 3m x 1m can be prepared.

As soon as the nursery beds are made ready, the cuttings prepared should be planted in the nursery beds. To prevent fungal diseases and pest infestation, 0.1% Bavistin and 0.1% DDVP spraying after 30-40 days of planting is suggested. Appropriate measures must be taken to control any incidence of diseases and pests. After 4 months of planting, the saplings will attain about 90 to 100 cm height and will be ready for transplantation. Saplings should be uprooted carefully without damaging the roots. For easy uprooting of saplings, the beds should be irrigated two days before uprooting. The saplings should be planted as quickly as possible to get high rate of survival. If the saplings are not planted in the main field immediately after uprooting due to some unavoidable reasons, then saplings should be preserved by covering with wet gunny cloth. Transportation of saplings for longer distance should be avoided or preferably done during cooler hours. Before taking up the plantation, the saplings should be checked for root-borne diseases and root rot and the infected saplings, if any, should be discarded by burning. By following standard nursery technique as described above, it is possible to plant about 1.60 lakh cuttings in one acre and about 1.28 lakh good saplings @ 80% survival can be obtained. Production of each sapling will cost about Rs.0.48. Thus, a net profit of approximately Rs. 34,250/ acre may be obtained.

Activity 4

Do you know that the ideal stem cutting is one which is:

- i) 6 months old.
- ii) 15-18 cm long.
- iii) 10-15 mm in diameter.
- iv) having 3-4 health buds.

Measure a piece of land 3 m x 1m x 10 cm size. Dig land 30 -40 cm deep. Apply FYM @ 10 MT/acre and plant cuttings at 10 x 20cm spacing. Irrigate the nursery bed and observed the cuttings till root develops. Plant a few diseased cuttings and cuttings free from disease and find out the difference between the two in growth.

Check Your Progress 5

Note: a) Use the spaces given below for your answers.

b) Check your answer with those given at the end of the unit.

- 1) What is the common method of propagation of mulberry in South India?
.....
.....
.....
- 2) What spacing should be followed in planting cuttings?
.....
.....
.....
- 3) Why soil should be pressed around the cutting while planting?
.....
.....
.....
- 4) What is the rate of FYM to be applied to nursery?
.....
.....
.....
- 5) State the age of saplings at which transplanting can be done.
.....
.....
.....

1.7 LET US SUM UP

Mulberry is cultivated for its leaf which is the feed for silkworm. Mulberry is a hardy, perennial, deep-rooted plant and can be grown in all climatic zones i.e., Tropical, Sub-tropical and Temperate. Mulberry grows luxuriously in ideal conditions like altitude of around 700 meters above mean sea level, temperature range of 20-30°C, an even distribution of about 1,000-1,500 mm rainfall with sunshine ranging from 9 to 13 hours/day. As mulberry is a perennial crop, initial establishment of

mulberry garden plays a major role in maintaining high yield level for many years to come. In South India, mulberry is cultivated mostly as bush under irrigated and rainfed conditions and leaf yield can be obtained throughout the year. There are two systems of plantation namely pit system with wider spacing or row system in close spacing. The choice of mulberry varieties has an immense role in boosting the leaf production. A number of high yielding varieties are available suitable to different conditions. Quality of leaf has an important role to play in the success of sericulture, and therefore, it should be clear that quality of leaf can be produced only by strictly adhering to the recommended methods of mulberry cultivation. In South India, stem cuttings are used for establishing a mulberry garden either by planting cuttings directly in the field or by raising the saplings. Though mulberry can also be multiplied by grafting and layering techniques, you may note that multiplication through stem cuttings is easy and less expensive.

1.8 GLOSSARY

Acidic Soil	: pH less than 7
Alkaline Soil	: pH more than 7
Alluvial Soil	: These soils were made by sediments deposited by the rivers. They are coarse to medium textured.
Clay	: Soil with 0-50% sand, 0-50% silt and 30-100% clay
Clay Loam	: Soil with 20-50% sand, 20-50% silt and 20-30% clay
Gypsum	: A soft mineral used for correction/reclamation of alkaline soil (Hydrated Calcium Sulphate).
High Cut	: Plant pruned at 150-175 cm height for the development of crown.
Loam Soil	: Soil with 30-50% sand, 0-30% silt and 0-20% clay
Low Cut Mulberry	: Bush type of mulberry shaped by cutting the plants at 20-25 cm height.
Medium Cut	: Plants pruned at 60-70 cm height for the development of crown.
Moisture Retention Capacity of Leaf	: Amount of moisture retained in a leaf from harvesting time to the feeding time.
pH of Soil	: A unit for measuring the alkalinity and acidity of soils.
Pit System	: Method of plantation in pits.
Propagation	: Multiplying the plant.
Reclamation of Soils	: Soils to be made suitable by altering their pH by addition of some external agents.
Row System	: Method of plantation by making rows and furrows.

Sandy Clay Loam Soil	: Soil with 50-80% sand, 0-30% silt and 0-20% clay
Sandy Loam Soil	: Soil with 50-80% sand, 0-50% silt and 0-20% clay
Secateur	: An implement to prune the plant.
Spacing	: Distance between plants or rows.
Weeds	: Unwanted plants in a crop.

1.9 SUGGESTED FURTHER READING

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Rangaswamy, S. and Jolly, M.S. 1976. *Sericulture Manual 1 - Mulberry Cultivation*, FAO Publication.

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Kawakami, K. and Yanagawa. 2003. *Illustrated Working Process of New Mulberry Cultivation Technology* (English – Kannada). JICA, India Project for Strengthening Extension System for Bivoltine Sericulture in India. pp. 1-78.

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1.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Silkworm
- 2) Silkworm spins cocoons
- 3) Mulberry leaf
- 4) 60%
- 5) Mulberry prefers clayey loam-to-loam soil
- 6) Ideal pH range for growing mulberry is 6.2 to 6.8
- 7) Red loamy
- 8) Mulberry can be grown in South India throughout the year.

Check Your Progress 2

- 1) Land can be ploughed with a tractor power tiller or with the help of a bullock drawn by plough or manually.

- 2) Land should be ploughed to a depth of 30-40cm.
- 3) A basal dose of 20 and 10 *MT/ha/year* for irrigated and rainfed mulberry, respectively.
- 4) Hamper

Check Your Progress 3

- 1) The choice of mulberry varieties boosts up the leaf production.
- 2) Cultivation is entirely dependent on rainfall.
- 3) *Kanva-2*: mulberry variety was predominantly used to establish a mulberry garden.
- 4) Mulberry variety *V-1* is an improved variety.

Check Your Progress 4

- 1) We can keep the mulberry plant in good shape by training.
- 2) Three types of plantation are bush, dwarf and tree plantation.
- 3) Mostly bush type of mulberry is practised in South India.
- 4) Mulberry is cultivated under irrigated and rainfed conditions in South India.

Check Your Progress 5

- 1) Vegetative propagation.
- 2) 10×20cm.
- 3) To ensure contact of the cutting with the soil.
- 4) 10 MT/acre.
- 5) Four months.