



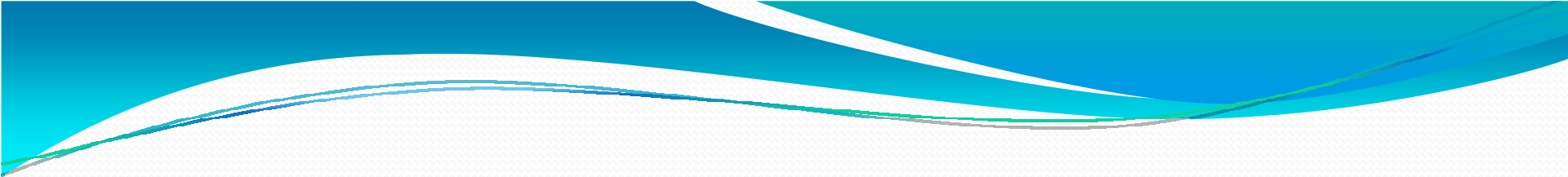
SILKWORM REARING -2



Environmental Conditions for Rearing

The ecological factors, mainly temperature, humidity, light and air during rearing, have a significant influence on the growth of larvae and ultimate cocoon crop quality.

The influence is not the same throughout the rearing period, but varies in different stages of growth.



The conditions ideal for the young age rearing and the principles of how they affect the health and growth of silkworms are discussed below.

Temperature

- Silkworm being a poikilotherm, the body temperature is changeable according to the environmental temperature. The physiology of silkworm viz., metabolic rate, activity of enzymes, nutrients conversion, assimilation *etc.*, is influenced by environmental temperature.
- **Optimum rearing temperature during early instars (I to III) as obvious from many reports, range from 25°C-27°C. The standard rearing temperature recommended for first, second and third instars are 27°C, 27°C and 26°C, respectively (Table).**

Maintenance of optimum temperature

If the rearing room temperature is below the optimum, Electric room heaters or charcoal stove can be used for this purpose.

The temperature, more often, is above the optimum. Proper designing of rearing building, use of thick walls and roof, free circulation of air, Sprinkling of water on the ground, hanging of wet gunny cloth *etc.*, are required.

Humidity

- Humidity plays a vital role in silkworm rearing. For example, the amount of ingestion, digestion and metabolism increased with the rise in relative humidity.
- It is clearly understood that early instar larvae are more resistant to high humidity and it supports better survival rate and maximum growth. Considering the overall effect, humidity ranges of 85 to 90 % in first and second instar and 80% in third instar, are recommended (Table).

Particulars	Instars		
	1	2	3
Temperature	27°C	27°C	26°C
Humidity	85-90%	85-90%	80%

- The humidity requirement during feeding and moulting stage in silkworm is different. Comparatively high humidity is maintained during feeding. Low humidity (10% RH) is preferable during moulting.



Humidity Maintenance during Young Age Silkworm Rearing

Regulation of humidity for young age silkworms is achieved through the use of paraffin paper as cover for the rearing bed and the wet foam or paper pads. It should be understood that rearing humidity above 90% is not at all desirable. In rainy seasons, when the room humidity is high, it is not necessary to use the wet foam pads. Even piling of trays can be avoided, when room humidity is extremely high. Paraffin paper seat or cover also can be dispensed with judiciously when humidity is very high.

Light

Silkworms are fond of dim light of 15 to 30 lux and avoid very strong light and darkness. Light has little influence on the health and survival ability of silkworms, but it influences distribution of larvae in rearing bed. It is more crowded and distributed in several layers in dark condition compared to thin and even distribution in light condition. There is a profound influence of photoperiod on the early instars on the type of eggs produced (hibernating/non- hibernating) by the resulting moth. But, this is of no importance in commercial rearing.

A photoperiod of 16 hours dark and 8 hours light is considered ideal for young age rearing.

Air

In the rearing room, the air is polluted by CO₂ from silkworm rearers, mulberry leaves, formaldehyde gas, ammonia and sulphur dioxide.

The safe limit for silkworm rearing is 1 to 2% of CO₂ formaldehyde gas up to 1 %, 0.02% of sulphur dioxide and 0.1 % ammonia, in the air in rearing room.

Though it is less important to ventilate the room during younger stages, care should be taken to remove paraffin cover and keep the rearing bed open, before each feed, for adequate period.

Feeding

The purpose and key points of feeding of silkworms are as follows:

- (i) To satisfy the appetite of larvae.**
- (ii) To promote eating and digestion of leaves by larvae.**
- (iii) To keep the quality of leaves good during eating.**
- (iv) To keep rearing beds clean.**
- (v) To avoid wastage of leaves and labour.**

Generally the early age silkworms eat leaves from the surface while late age worms from the edges. At the beginning of each age the worms have a great appetite. This appetite falls off very rapidly in the early part of the age and then goes on gradually increasing till close to the end of the age, when it again declines as the worms reach the moulting time.

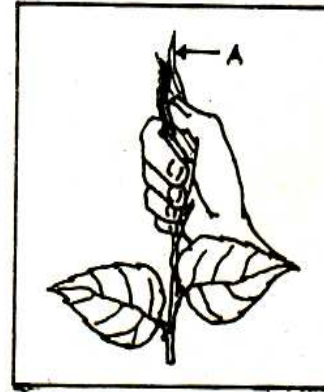
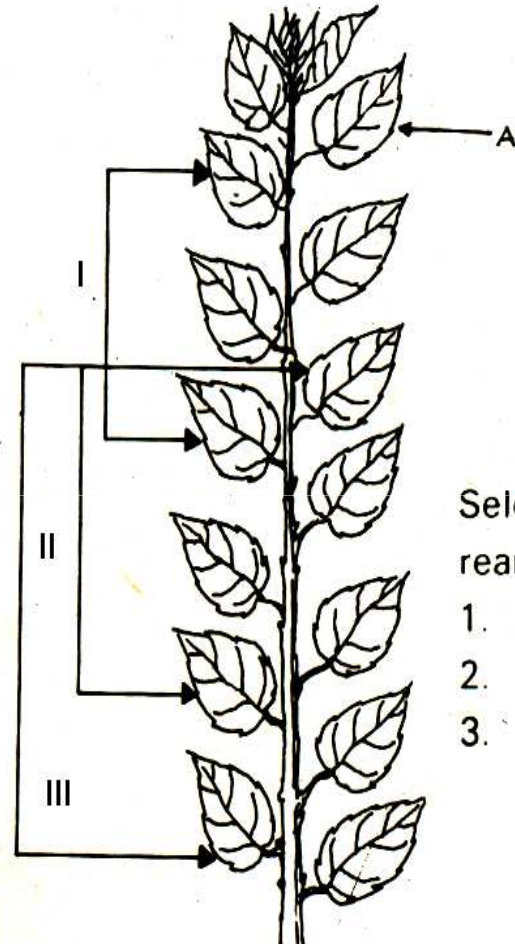
Selection of Mulberry Leaves for Young Age Silkworms

Mulberry leaves for young silkworms must be soft and rich in water content, protein, carbohydrates, *etc.*,.

For plucking the correct leaves for young age rearing, the largest glossy leaf method is adopted. The largest glossy leaf is the one light green and glossy, being the largest among the first few leaves on the top of the shoot. This can be identified in a fully grown shoot, by scooping the top leaves and marking the largest leaf by its tip (Fig.).

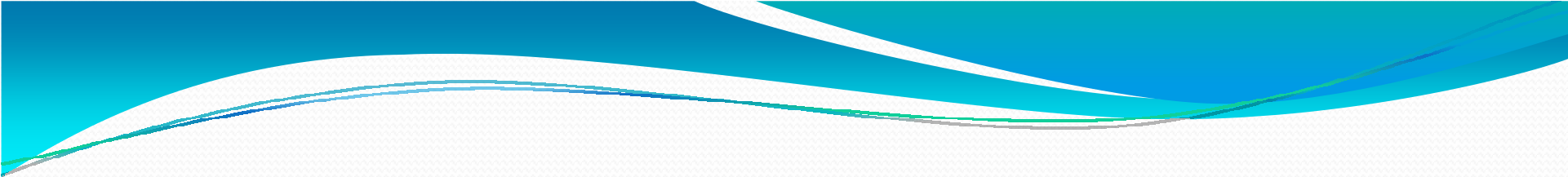
From the one below the largest glossy leaf, 5 or 6 leaves for I instar, 6-7 leaves for II instar and 7-8 leaves for III instar are used in young age silkworm rearing.

A- FIRST Glossy Leaf



Selection of leaf for young age rearing

1. For first instar
2. For second instar
3. For third instar



Mulberry leaves for early age silkworms are to be harvested in the cool time of the day *i.e.*, early morning or in the late evening and should be preserved in the cool and wet condition in order to prevent them withering. Immediately after leaf harvesting, leaves are preserved in suitable containers like leaf bins (Fig.), where the humidity must be maintained close to 100 % RH by repeated sprinkling or spraying of water over the gunny or cloth surface of the container. If containers are not available they should be at least covered with wet cotton cloth or gunny cloth. The cloth used to cover leaves should be clean as far as possible.

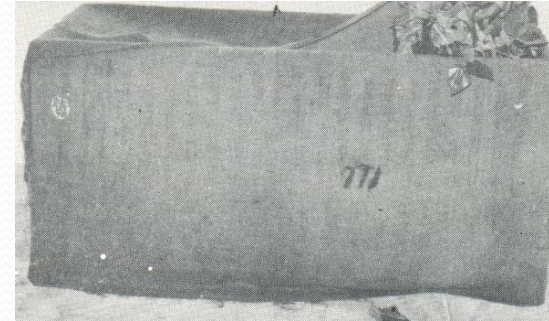
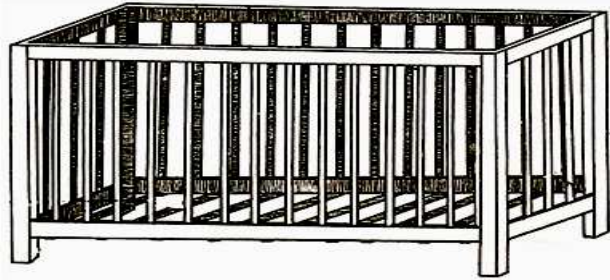


Generally there are two methods are used for leaf harvesting

- **Individual leaf harvesting**
- **Shoot lets harvesting**

In both the methods same type of leaves are selected for feeding the Chawki worms.

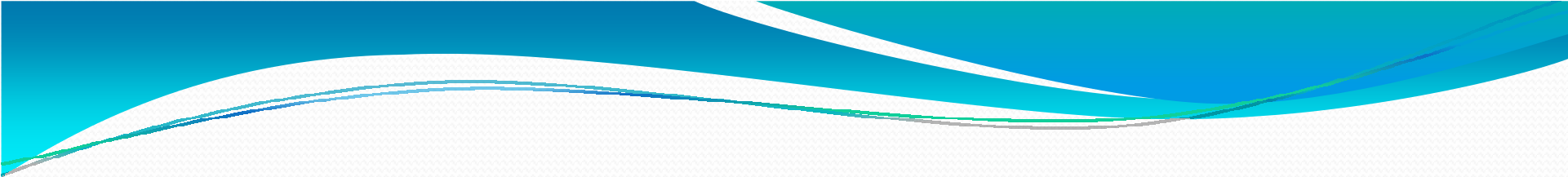
Mulberry Leaf Storage Bins



Mulberry leaves should be chopped in order that they are supplied to silkworms evenly. The size of chopped leaves is variable according to the form of leaves, that is entire leaves or shoot lets.

The following size is an example of leaves supplied to chawki worms.

	Chopped leaves (mm square)	Chopped shoot lets (mm square)
For first instar	6-12	12-18
For second instar	12-18	18-24
For third instar	18-30	24-entire shoot lets

- 
- **Generally the size of chopped leaves and chopped shoot lets is smaller at the earlier age and premoulting stage of each instar, and large at the voracious age of each stadium.**
 - **For example, 0.5 – 1 cm square can be gradually raised to 1.5 to 2 cm squares by the end of first instar. Also, the leaf size started with 2 cm squares and increases to 3-4 cm squares by the end of second instar.**

- Regarding the amount of mulberry leaf to be supplied to silkworms and the times of feeding, they are variable according to the rearing temperature and RH, ventilation of the rearing room, area of rearing bed, form of mulberry leaves (chopped, entire leaves, chopped shoot lets, entire shoot lets).
- In general, in case of paraffin paper rearing or box rearing, the amount of mulberry leaves supplied to silkworms and the times of feeding are as follows (For one egg box *i.e.*, 20,000 eggs).

As mentioned, silkworms are supplied with mulberry leaves 3-4 times per day, but in this case the rearing temperature, humidity and the area of the bed (spacing) must be regulated in the range of standards.

However, in Karnataka state, during wet weather, only 3 feeds need be given at 6am, 1pm and 8pm.

During other seasons including summer months, however 4 feeds may be found necessary, which may be given at 6am, 11am, 3pm and 8 pm.

The leaf requirement for 100 layings (Average 400 eggs per laying)

	Amount of mulberry leaves (g)	Feeding Times per day	Temperature °C	RH %
First Instar	1125-1350	3	27	90
Second Instar	2813-3375	3	27	90
Third Instar	13023-14000	4	26	80

BED CLEANING

Normally a much larger quantity of mulberry leaves has to be fed than is eaten by the worms. It is obvious, therefore, that a sizeable quantity of unconsumed leaves, more or less in a state unfit for food, remains over in the tray at the end of each feed.

In addition to this, there are excreta which the worms are passing, and the whole forms a thick and often damp bed which ought not to be allowed to remain.

The piling of litter makes beds moist and releases processes of fermentation, thus generating injurious gases and favouring multiplication of pathogenic micro-organisms. This imperils the health of the worms.

In order to keep the silkworms healthy, the litter piled on rearing beds together with waste mulberry leaves, *etc.*, should be periodically removed. This process is called "Bed cleaning".

Frequency of Cleaning

Following schedule of cleaning could be adopted profitably:

I age - Once

I age - Twice *i.e.*, once just after the I moult and again before settling for I moult.

III age - Thrice *i.e.*, once after moult, once in the middle of the III age and once just before settling for IV moult.

Methods of Cleaning

There are three methods of cleaning; *viz.*,

- (i) **Cleaning with husk**
- (ii) **Cleaning with net**
- (iii) **Cleaning with husk and net**

Cleaning with Husk

A thin layer of paddy husk is sprinkled evenly over the bed so as to cover the same completely. This is done generally just prior to first feeding in the morning. The worms crawl through the layer of husk to get at the feed of leaves. After a few hours when the second feeding is given the bed is ready for cleaning. The worms are swept together by a brush and transferred to another tray. This method is advantageous in that immediately the husk is applied, the worms begin to crawl through and thus get separated from the old bed.



For these ages, the Husk should be pounded and broken into small pieces before use with the young worms.

Of late, charred paddy husk is being used in place of ordinary husk. When the worms are in the 3rd age, there is no need to pound the husk; when they have passed the 4th age, chopped straw may be used instead of husk with advantage.

- Formalinised charred husk when used for cleaning helps avoid attacks of muscardine disease.

Cleaning with Net

In this a net with mesh suited to the size of the silkworms is spread over the bed just prior to the first feeding in the morning. As in the case of husk method, cleaning is done after the second feeding is given. This method is simple besides requiring very little labour and is quite popular in West Bengal. However, it is not so convenient for purposes of spacing as the size of the bed remains restricted to the size of the net as the worms cannot be easily separated from the net (Fig.).

Generally, the mesh sizes used:

- **First and Second instars -- 0.5 cm^2**
- **Third instar -- 1 cm^2**





Combined Husk and Net method

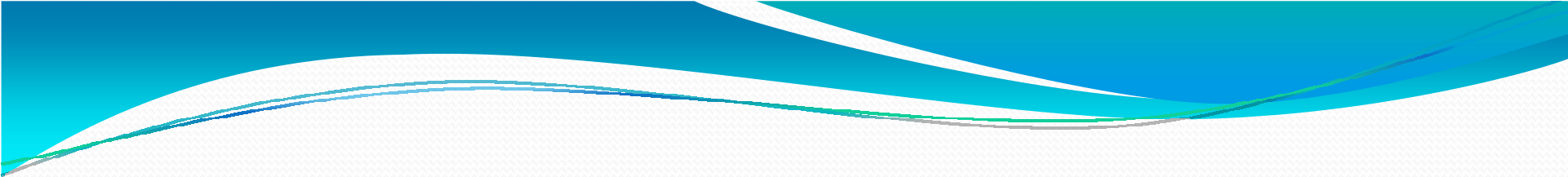
A thin layer of paddy husk is first sprinkled over the bed and a net of suitable mesh is superposed on it. Two successive feedings follow where after the net with the worms on it is transferred to another tray. This method combines the cleanness of the husk method, with the ease of transference of the net method and requires less of skill and care in manipulation than the former; but it is more expensive than either and has some inconvenience in regard to spacing as in the case of net method.

- It is however to be mentioned that the general practice even now is to resort to the old method of cleaning. In this no husk or net is used. The worms, if in earlier stages, up to III moult, are simply swept together with a feather and transferred to another tray. The worms are then spread out using chopsticks or feather, to form a fresh bed. This method is likely to cause injury to the worms and is perhaps one of the main causes for the "missing larvae" in our rearings which depress our cocoon yields.
- It is remembered that, under the traditional system of bed cleaning about 25-30% of worms will loses. Under the improved method of bed cleaning, the loss of worms during chawki rearing is minimum i.e., less than 10%. Again these worms being more robust, the mortality at the later stage is also considerably less and consequently, the total loss of worms is also minimum, which may be of the order of 15-20% only. Thus the ERR (effective rate of rearing) will be 80-85%.

SPACING

Purpose of Spacing

Silkworm is a very fast growing animal and records a 10,000 fold increase in weight and about 7,000 fold increase in size during the short span of 20 to 30 days. The above figures clearly establish the need to extend the rearing beds from time to time in order to avoid overcrowding of the worms and thus to provide for their orderly growth. The purpose of spacing is to achieve this objective.

- 
- **Sparse spacing leads to wastage of mulberry leaves.**
 - **Over Crowding leads to unhealthy conditions.**

Optimum spacing therefore to be accomplished through experience. Normally it would be sufficient if rearing space is doubled or trebled from first instar to third instar.

METHOD OF SPACING

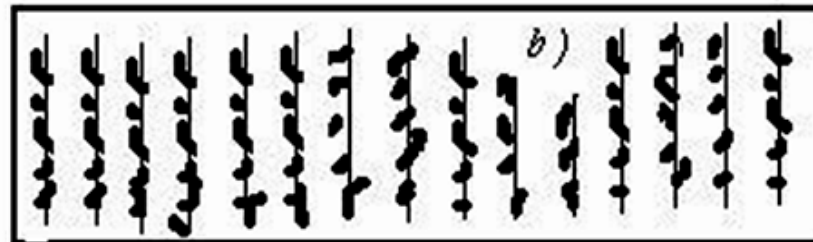
before



a) high density

each mulberry branch and
silkworm move to right

After



b) enough density

The spacing to be provided for silkworms of 50 layings or a box of 20.000 eggs is given below.

Age	At the beginning of each age (Sq.mt)	At the end of each age (Sq.mt)
For Uni and Bivoltines		
First age	0.2	1.0
Second age	1.0	2.0
Third age	2.0	5.0
For MVxBV hybrids		
First age	0.2	0.5
Second age	0.5	1.5
Third age	1.5	3.0

Time and frequency of spacing

As the development of silkworms is most rapid in the first age and therefore, the spacing has to be frequent. The first spacing should be given on the day after the worms are brushed and hence forward spacing should be done every day, till the day when the worms show signs of going into moult. It would of course be advantageous to combine spacing with cleaning as it would help save labour and also ensure more even expansion of rearing space.

In the 2nd to the 5th age, generally spacing is combined with cleaning. It may be found necessary to provide more spacing when the humidity and temperature are higher than optimum. The rearing trays are also kept in alternate shelves of the rearing stand. This enables free circulation of air in the rearing bed and there by ensures reduction in temperature and humidity in the bed.

Methods of spacing

There are two methods of spacing *i.e.* either

- Conducting it independently
- In combination with cleaning.

In the former case, where the object is just to spread out the worms over a more extended bed, a convenient way is to mark out on the tray the limits of the space desired, and to distribute worms on it by picking out worms from the parts of the bed where they are thickest, so that in the end, they are evenly distributed over the whole of the increased space.

Where spacing is combined with cleaning by husk and net, the worms are taken as a whole from the old bed, and distributed evenly over a new bed of the required space. This is most convenient and satisfactory. When cleaning by net alone is done, the process becomes slightly more complicated, as it will be similar to independent spacing.



MOULTING AND CARE AT MOULTING

The silkworm casts off its skin four times during its life of 20 to 30 days to provide for its growth. This is called moulting. This is a very sensitive period in the life of the silkworm, when it does not feed but just tries to wriggle out of the old skin. Unless care is taken to stop the feeds and also to resume the same after the moults in proper time, uniformity in growth of the silkworms cannot be secured.

MOULTING AND CARE AT MOULTING continued

- **At the approach of moulting, the silkworms attain their maximum body growth for the particular instar and as a result the body of the silkworm becomes stout, shiny and amber coloured. In relation to the size of the body, the head of the worm about to moult appears quite small and also somewhat dark. It is desirable that a bed cleaning is given just at this time and the worms are spaced out. Leaves also could be cut to a smaller size for feeds just prior to moulting. As soon as all the worms have settled down for moult, the feeding is stopped. It is also advantageous to sprinkle lime powder after the last feed. This prevents the worms which have come out of moult early from commencing eating of leaves and thus causing uniformity in growth. Further, application of lime helps to keep the bed dry during moulting.**

MOULTING AND CARE AT MOULTING continued

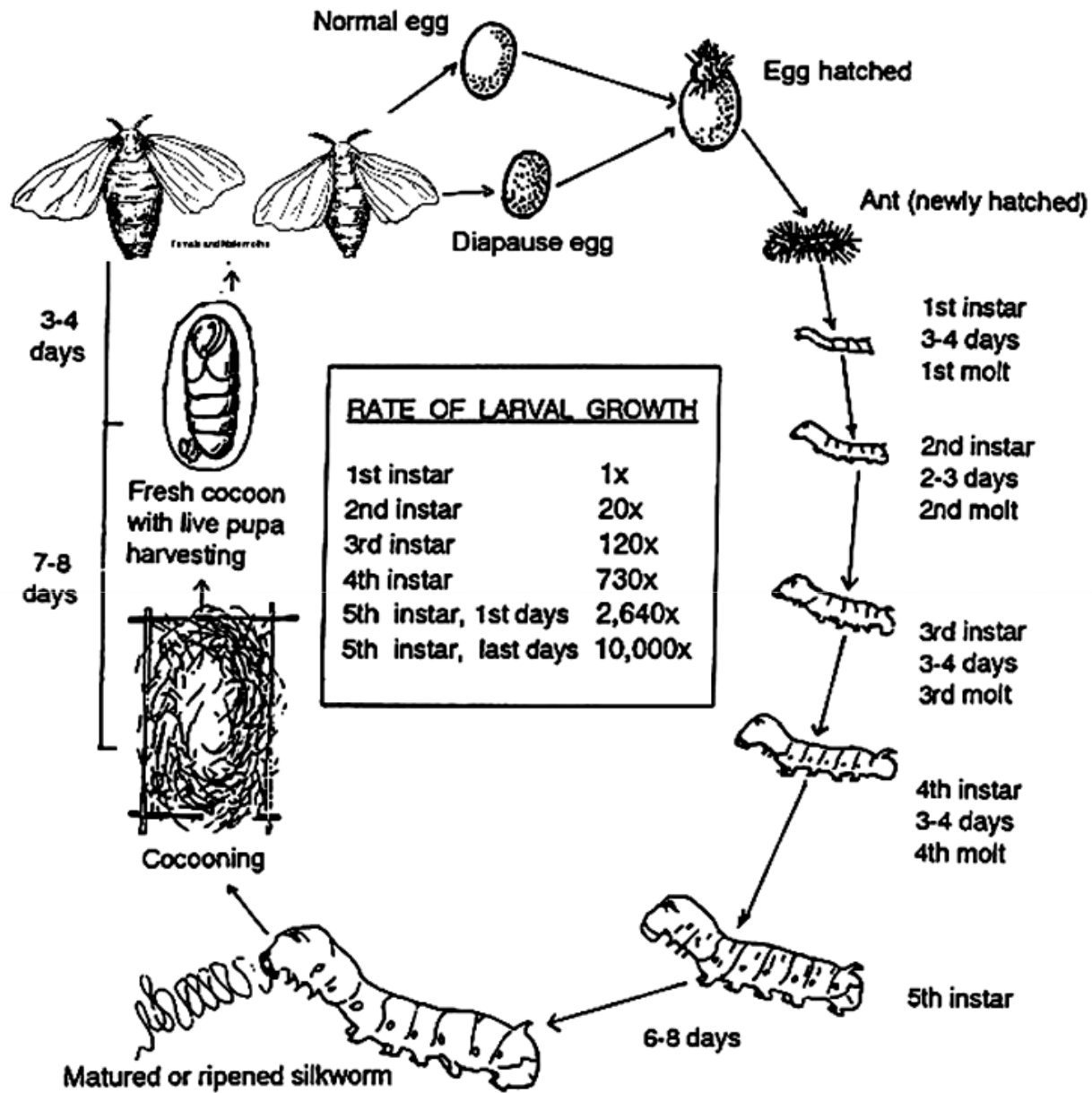
- The larvae normally take 15 to 30 hours to complete moulting during the different instars. Worms out of moult have a rusty colour and the head also appears bigger compared to its size at the time of going for moult. From these, it becomes easy to identify the moulting as also out of moult worms easily.
- The first feeding of the new instar should start only after all the worms have come out of the moult. In localities where muscardine is prevalent, it is desirable to take anti-muscardine precautionary measures by dusting ceresin lime on to the newly moulted worms prior to the first feeding.

CARE AT MOULTING AND MOULTING continued

If any irregularity in settling for moult is observed, the late larvae may be segregated through net feeding and reared as a second batch. It is however of very great importance that the rearing bed should be as dry as possible when the worms are in moult. This enables the silkworm to crawl out of the skin easily thus securing uniformity of moulting. Since the newly formed skin is thin and delicate, under more humid conditions the worms become susceptible to fungal attacks. Therefore, it is very essential that the silkworm beds are kept dry during the moult.



LATE AGE SILKWORM REARING



Silkworms consume about 90-95% of the total feed.

This is necessary because it develop **silk glands & secrete silk and also for **metamorphosis** from the larval to the pupal condition and finally to moth.**

From the 4th age onwards entire leaf/chopped shoots may be fed to the worms. So, the leaves remain fresh for a longer period and therefore, only 3-4 feedings/day. It would however, be advisable to give large feed at night.

Methods

- **Shelf rearing**
- **Floor rearing**
- **Shoot rearing**

Shelf rearing

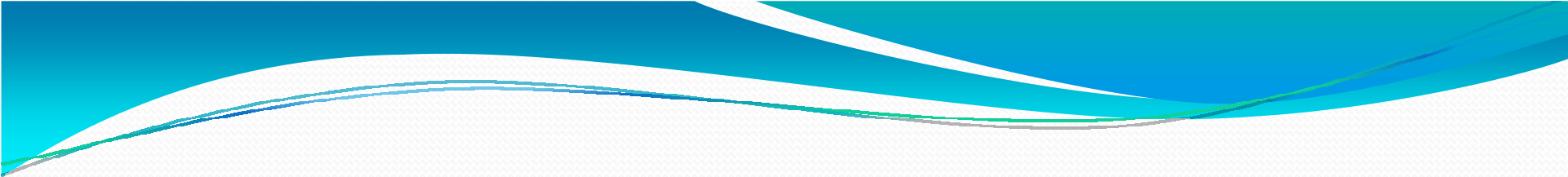
Silkworms are reared in bamboo trays which are arranged one over the other in tiers on rearing stands



Wooden Trays



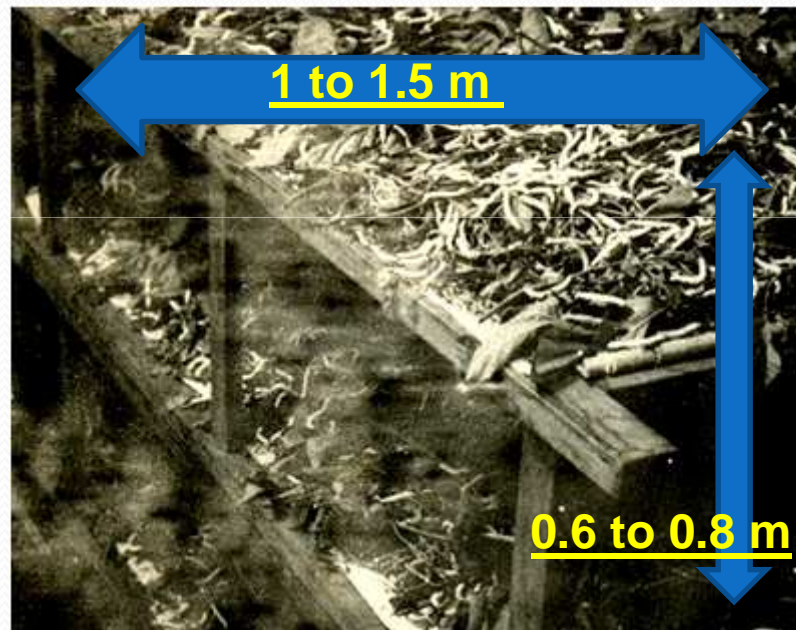
Bamboo Trays are more common in Karnataka and West Bengal
1.2 to 1.4 m Diameter



Advantages	Disadvantages
This methods accommodates more silkworms in a limited area	More labour is required for feeding and cleaning

Floor rearing

This is another method of rearing silkworms on fixed rearing seats .



The rearing seats are arranged in 2-3 tiers for accommodating as large a number of silkworms as possible.

Length 5 to 7 m

Advantages

This method needs less labour as feeding and cleaning processes do not involve the handling of innumerable trays as in case of shelf rearing

Shoot Rearing

Big shoots harvested as such are straightaway fed to the silkworms.
Saves labour requirements by @ 60 % in the IV age and 50 % in the V age.
Saves leaf by @ 25 % in the IV age and 10 % in the V age.



Shoot Rearing

Usually 1 m wide and 20 cm above the ground level;
occasionally 2-3 tiers with a gap of 1 m



Shoot Rearing Stand made of locally available materials

Optimum Environmental Conditions

STAGE OF LARVAE	OPTIMUM TEMPERATURE °C	OPTIMUM HUMIDITY %
4th	24-25	70-75
5th	23-24	65-70

Feeding



4th Age



5th Age

Cleaning

- **With Husk**
- **With nets**
- **With husk & nets**

Cleaning Methods generally followed under Shlef rearing



Cleaning By Hand



Cleaning by net

Cleaning under Floor and Shoot rearing methods



Spacing

STAGE OF LARVAE	AT THE BEGINING	AT THE END
4th	5 Sq. mt	10 Sq. mt
5th	10 Sq. mt	20 Sq. mt

Spacing

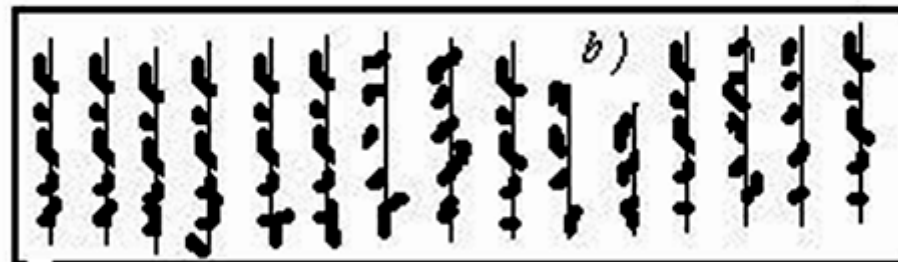
before



a) high density

each mulberry branch and silkworm move to right

After



b) enough density

Requirement for rearing of 2 boxes/40000 eggs/100dfls of MVxBV

Age	Temperature°C	Humidity %	Size of leaf Sq. Cm	Quantity of leaf kg	No. of feeds	No. of cleanings	Spacing Sq. mt	Duration of age		Moulting period	
								Days	Hr	Days	Hr
IV	24-25	70-75	Entire Leaves	70-80	4	daily once	6-18	4	12	1	00
V	23-24	65-70	-do-	600-650	4	-do-	18-36	6	00		

Advantages of Shoot Rearing

1. **Labour saving up to 70%.**
2. **Leaf saving up to 15-20%. So, L:C ratio-less by 2-3 kg.**
3. **Better cocoon characters and ERR.**
4. **Better preservation of leaf quality - storing & on the bed.**
5. **More organic matter (upto 18 tonnes per ha per year).**
6. **Better hygienic conditions.**
7. **Handling of silkworms minimized – No contamination.**
8. **Bed cleaning only once after IV moult.**
9. **Worms and leaves are kept away from the litter - secondary contamination are minimized.**
10. **Labour dependent risk is reduced.**

Disadvantages of Shoot Rearing

- **Required rearing room floor area is more (by 30%)**
- **Bed refusals will not be available as a cattle feed.**
- **Planting materials (cuttings) will not be available.**



SPINNING AND HARVESTING

Mounting & Spinning

Towards the end of the fifth stage, the silkworm stops eating and becomes the so-called mature larva and starts spinning the cocoon.

The object of the worm is spinning the cocoon is to protect itself from external disturbances and natural enemies during the most critical period of its metamorphosis.

Mounting:

Picking the ripe worms and putting them on mountages is called 'mounting' /

Transferring mature fifth instar larvae to mountages is called mounting.

Ripening of Worms

Feeding worm



The silkworm loses appetite & stops eating
Skin becomes translucent in colour
Begins to look in search of a suitable place
worms move towards the periphery of the
rearing trays in search of anchorage



Spinning

After mounting, passes last excreta in semisolid condition, & starts spinning.
First forms Hammock

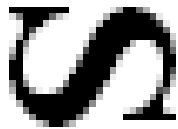


Hammock i.e., FLOSS

The movement of Head during spinning

In Outer Layer

In Middle & Inner Layer



Mounting

Methods of Mounting –

1. **Hand Picking and Mounting**
2. **Straw Cocoonages in Japan**
3. **Revolving Mountages made of Cardboard**



Mountages- Different types of mountages are used in different parts of India.

In addition to support the spinning worms, the mountages should satisfy the requirements like,

It should provide convenient space of suitable dimension for spinning good sized cocoons,

Should not promote formation of double cocoons, malformed cocoons and flimsy cocoons,

Should have provisions for drying up of the last excreta of the worm prior to spinning and prevention of its falling on the cocoons of other worms,

Should be suitable for easy mounting and harvesting.

Types Of Mountages- The common mountages are,

1. Bamboo Mountage: Chandrika which is formed by a bamboo spiral is the most common mountage used in South India and West Bengal. This consist of a bamboo mat of size 1.8 m x 1.2 m supported by split bamboo reapers on all sides. On this bamboo mat, a bamboo tape of 4 to 5 cm width is wound in a spiral manner. The bamboo tape has V-shaped struts supported by three long bamboo strips. About 1000 -1100 worms can be mounted.



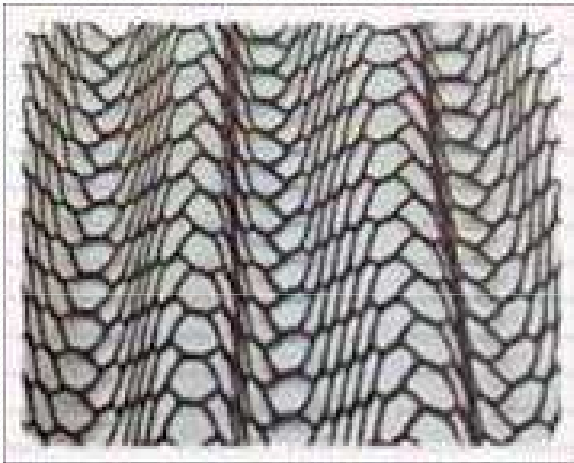
1.8 x 1.2 meters in size

Accommodates 40 to 60 larvae per sq ft

Or 1000-1100 larvae per chandrika

2. Plastic corrugated mountage:

60 x 90 cms in size & accommodates with the regular trays



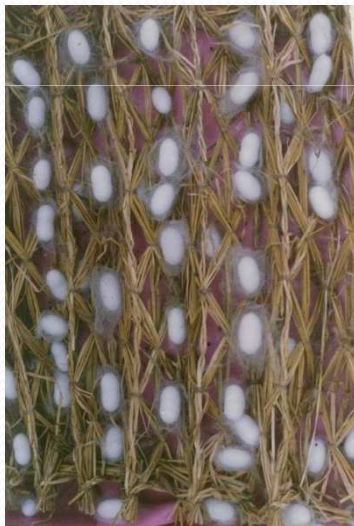
3. Rotary Mountages:



Each mounting frame has 13 rows and 12 columns containing 156 mounting slots. Each slot is 4.5 x 3 x 3 cms in size and the dimension is 55 cms in length, 40 cms in width and 3 cms in depth.

4. Grass- Dried grass and twigs spread in shallow bamboo baskets are used in Assam.

Dried weeds, paddy straw and fresh weeds are used in Jammu and Kashmir. In these two moulting and harvesting is difficult and require more labour. Further, formation of double and deformed cocoons is high.



Paddy Grass Mountage



Mustard Hey



Paddy Grass

5. Bottlebrush Mountages



Bottle brush montage are not only cheap but can be fabricated very quickly and occupies very little space compared to Chandrika.

It consists of a thick coconut or jute fiber-rope into which 6 to 9" sticks (midrib of coconut leaves) are inserted very closely. The silkworms used the sticks as support and spin the cocoons in the space between the sticks.

Population Density on Mountages

- **50 Worms per 30X30 cm Or 2 cm² per worm**
- **Chandrike 1.8 X 1.2 m holds 1000-1100 worms.**
- **Revolving Mountages 1560 worms / unit**

Environmental Conditions

Temperature:

- **Worms during spinning require a slightly higher temperature than rearing.**
- **Too high a temperature will compel the worms to spin in haste and thus waste a lot of silk.**
- **Too low a temperature, causes delay in the spinning and affects the colour, lustre and texture of cocoons. Also, the cocoons will not be so compact.**
- **Too high a temperature make the filament thicker, and too low a temperature, to make it thinner. Violent fluctuation leads to ununiformity.**
- **Around 24°C is quite ideal for spinning.**

Care During Mounting continued....

Environmental Conditions

Relative Humidity:

- **RH at the range of 60 to 70 per cent is ideal.**
- **Too much moisture affects the lusture of the filament.**
- **From the point of view of reeling, drier the air during mounting the better it will be, but too great a dryness debilitates the worms and is to be avoided.**
- **Ventilation is an essential point for attention as a good deal of moisture has to be got rid of and there is also a good deal of excreta-solid, liquid and gaseous.**
- **The practice in Karnataka and West Bengal to place the chandrikes in the open has much in its favor.**

Harvesting

- **MV- Spinning Completes on 3rd to 4th day – harvesting on 5th day**
- **BV- Spinning Completes on 4th to 5th day – harvesting on 6th to 7th day**

Transportation



2. Log Sheet

Race		Bed No.	
Generation No.		Date & time of Brushing	
Laid on		No. of unfertilized eggs	
Incubation Temperature		No. of unhatched eggs	
Season		No. of larvae rejected	
Nature of Rearing		No. of larvae brushed	
Plot allotted		No. of eggs per laying	
Variety of leaves		Percentage of hatching	

LOG SHEET

Sl. No.	Date	Feeding Hours			No. of feedings	No. of worms of 1st instar	Time of spinning	Duration of each age	Moulting period	No. of worms rejected				Temperature in °C	Humidity %
		A.M.	P.M.								Grasserie	Flacherie	Unequal size			Total
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															
28															
29															
30															

Page 1

1. Weight of 10 full grown worms in gms—
2. Date and time of Spinning
3. Total Rearing period
 - (a) Eating period
 - (b) Moulting period
4. Quantity of Cocoons harvested

	No.	Wt. in gms.
(a) Good	.....	.....
(b) Flimsy	.....	.....
(c) Double	.....	.....
(d) Melted	.....	.....
(e) Total	.....	.....
5. Yield per 10,000 larvae brushed
6. No. of Cocoons per Kg.
7. No. of Cocoons per litre
8. Percentage of yield
9. Percentage of loss
10. Percentage of mortality
11. Percentage of missing larvae
12. Type of Moutange used
13. Cocoon Test

	Sex	No.	Pupal Wt. in gms.	Shell Wt. in gms.	Cocoon Wt. in gms.	Percentage of Silk
	(i) Female					
	(ii) Male					
14. Percentage of floss

	Weight of floss in gms.	Percentage of floss with reference to Cocoons Shell
--	-------------------------	---
15. Length of Silk Filament

	Weight	No.
(a) No. of Cocoons reeled	.....	.....
(b) Average non-breakabic Filament	..... meters	.....
(c) Weight of Filament	..... gms.	.....
(d) Average length of filament	..... meters	.....
16. Denier
17. Renditta
18.

	Single Cocoon weight in gms.	Single Shell weight in gms.
Female	.....	.....
Male	.....	.....
Average	.....	.....
19. Special features if any

Page 2



**Acknowledgements
to
INTERNET
FOR
PICTURES and PHOTOGRAPHS**