

MOST FREQUENTLY ASKED QUESTIONS (FAQ) BY THE SERICULTURE FARMERS, INDUSTRY, ENTREPRENEURS AND END USERS

MULBERRY BREEDING & GENETICS

Q1. Which variety will be supplied during plantation time?

Ans. During plantation time high yielding variety S-1635 will be supplied.

Q2. When cutting will be supplied?

Ans. Cuttings will be supplied during middle of Sept. to middle of October

Q3. What will be the production of S-1635 variety?

Ans. The leaf production of S-1635 variety will be 40-45mt/hectare/year.

Q4. What will be the age of the plant used for cuttings?

Ans. Age of the plant for use as cutting for plantation will be 6-8 months.

Q5. Where the cuttings of improved varieties will be available?

Ans. The cuttings of improved varieties will be available at CSB/DoS farms.

Q6. What will be the actual spacing used for plantation?

Ans. The actual spacing used for plantation will be 60 cm x 60 cm.

Q7. What will be the cost of cuttings?

Ans. Sometimes, cuttings will be supplied free of cost or sometimes, DoS/DoT, fixed its rate for sapling, cuttings etc.

Q8. What varieties will be cultivated under acidic soils, irrigated, rainfed areas and flood prone areas?

Ans. The variety cultivated under acidic soils is Tr₂₃. The variety generally cultivated under irrigated condition is S-1. However, the variety S-1635 also performs well under rainfed condition. Recommended variety for drought prone areas is C-1730 and for flood / waterlogged areas is C-2028.

SOIL SCIENCE & CHEMISTRY

Q1. What are the soils suitable for mulberry cultivation?

Ans. Deep, well-drained, friable, porous loamy soils of high fertility with good water holding capacity are suitable for mulberry cultivation.

Q2. How to do soil sampling ?

Ans. For collection of a composite soil sample, the entire field is to be traversed in a 'zig-zag' fashion. At least 20-spots / acre may be selected on the traversed route for collection of soil sample. 'V' shaped hole up to plough depth is dug in each spot and

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soil is collected from the holes by scrapping down the depth. All the collected soil masses are mixed, spread in disc like shape followed by 'quartering' of the same. Any two opposite quarters are discarded while remaining quarters are again mixed and repeatedly processed as above till the composite sample is reduced to 500 g approximately.

Q3. What is the ideal soil for mulberry cultivation ?

Ans. Slightly acidic soil with a pH value around 6.8 and free from injurious salts is ideal for mulberry cultivation.

Q4. What should be the frequency of soil analysis ?

Ans. Once in two years.

Q5. What are the parameters of soil to be analyzed to find out the suitability for mulberry cultivation ?

Ans. pH, electrical conductivity, organic carbon content, available nitrogen, phosphate and potash contents.

Q6. Which material has to be applied to reclaim the acid soil ?

Ans. Lime

Q7. Which material has to be applied to reclaim the alkali soil ?

Ans. Gypsum.

Q8. How the soil is categorized as low, medium and high in respect of available nitrogen content?

Ans. Low: < 250 kg / ha, Medium: 250-500 kg /ha and high: > 500 kg / ha.

Q9. How the soil is categorized as low, medium and high in respect of available phosphate content ?

Ans. Low: < 25 kg / ha, Medium: 25-50 kg /ha and high: > 50 kg / ha.

Q10. How the soil is categorized as low, medium and high in respect of available potash content ?

Ans. Low: < 125 kg / ha, Medium: 125-250 kg /ha and high: > 250 kg / ha.

Q11. What is the recommended fertilizer dose under irrigated condition?

Ans. 336, 180 and 112 kg/ ha/ year N, P₂O₅ and K₂O respectively.

Q12. What is the recommended fertilizer dose under rainfed condition ?

Ans. 100, 50 and 50 kg/ ha/ year N, P₂O₅ and K₂O respectively.

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Q13. What is the recommended dose of FYM under irrigated condition ?

Ans. 20 mt/ ha/ year.

Q14. What is the recommended dose of FYM under rainfed condition?

Ans. 10 mt/ ha/ year.

AGRONOMY

Q1. What are the planting methods of mulberry under irrigated and rainfed conditions?

Ans. Under irrigated condition, one sapling or two cuttings of mulberry should be planted on ridges in row system at 60 cm x 60 cm distance from plant to plant and row to row. In rainfed condition, one sapling or three cuttings should be planted in a pit at 90 cm x 90 cm spacing.

Q2. What is the ideal season for plantation under irrigated and rainfed conditions?

Ans. The ideal season for mulberry plantation is Sept. – Oct. for irrigated and June – July for rainfed conditions.

Q3. What are the application schedule of organic manure and chemical fertilizer in mulberry garden under irrigated and rainfed conditions?

Ans. Irrigated condition:

- Organic manure i.e. well decomposed cowdung / vermicompost @ 20 mt/ha/yr. in two equal split doses.
- Inorganic fertilizer i.e. nitrogen (N), phosphorus (p) and potassium (K) @ 168 kg (N), 30 - 40 kg (P) and 112 kg (K) /ha /yr. in 5 equal split doses.
- Biofertilizer i.e. N-based *Azotobacter* bio-fertilizer @ 20kg/ha/yr in 5 equal split doses and P-based *AMF*-bio-fertilizer @ 75 kg/ ha /4yrs.

Rainfed condition:

- Organic manure i.e. well decomposed cowdung / vermicompost @ 10 mt/ ha /yr. in June-July.
- Inorganic fertilizer i.e. nitrogen (N), phosphorus (p) and potassium (K) @ 75kg (N), 15 – 18 kg (P) and 50 kg (K) /ha /yr. during June-July; only N in 2 equal splits (pre- & post monsoon seasons).
- Biofertilizer i.e. N-based *Azotobacter* bio-fertilizer @ 10 kg/ha/yr in 2 equal splits and P-based *AMF* bio-fertilizer @ 40 kg/ ha /4 yrs.

Q 4. How to use biofertilizer?

- Ans.**
- i. Biofertilizer should be used before application of chemical fertilizers over a gap of at least 10-15 days.
 - ii. Before use, biofertilizer should be mixed thoroughly with dry powdered FYM/field

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soil and applied in between the rows of mulberry making furrows at root zone.

iii. Furrows should be covered by soil followed by irrigation immediately.

Q5. What are the advantages of biofertilizer application?

- Ans.**
- i. Eco-friendly and reduces ill-effect of chemical fertilizer on soil health.
 - ii. Slow releasing, long lasting effect and sustainability
 - iii. Reduces the cost by 50% or more by the application of reduced doses of chemical nitrogen and phosphatic fertilizers.

Q6. What are the advantages of vermicompost?

- Ans.**
- i. It is also eco-friendly, slow releasing of macro, micro & secondary nutrients.
 - ii. Can be obtained by recycling the organic biodegradable wastes, specially mulberry farm and rearing wastes within a very short period (45-50 days) in the form of black granular cast (faecal matter) with the help of suitable earthworms.
 - iii. It is rich with useful microorganisms and essential plant nutrients in many folds including micronutrients.

FARM MANAGEMENT

Q1. How the mulberry garden is effectively utilized during its establishment?

- Ans.** An additional income can be generated little more in 90 cm x 90 cm spacing than 60 cm x 60 cm spacing through intercropping of season specific leguminous and vegetable crops without affecting the mulberry plants.

Q2. When the first pruning should be done after plantation of mulberry under irrigated condition ?

- Ans.:** After completion of 6 months of establishment period of sapling plantation, mulberry plants should be pruned 10-15 cm above the ground level.

Q3. What is the efficient method of weed control in mulberry garden ?

- Ans.:** Immediately after pruning of mulberry plants, spraying of 0.71% glycel can be done as quick control measures for weeds.

Q4. What irrigation schedule is followed in mulberry garden?

- Ans.:** Channel irrigation at two rows interval can be given fortnightly in mulberry garden during November to May. It saves excessive loss of ground water.

Q5. How much quantity of mulberry saplings are required for one hectare of land?

- Ans.:** A total of 28,000 and 12,400 saplings are required for plantation of one hectare land in 60 cm x 60 cm (irrigated) and 90 cm x 90 cm (rainfed) spacing respectively.

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Q6. How the cost of cultivation of mulberry garden can be reduced ?

Ans.: Cost of cultivation in mulberry garden can be reduced through mechanization i. e. ploughing by power tiller or bullock drawn plough, weed management through power weeder, applications of vermicompost (50% reduced dose of organic manure), biofertilizers, reduced dose of N & P and channel (every 2 rows interval / alternate furrow) irrigation etc.

MULBERRY PATHOLOGY

Q1. What are the major diseases of mulberry and its impact on sericulture?

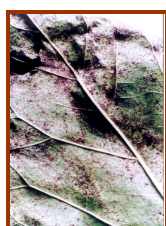
Ans Bacterial leaf spot, Fungal leaf spot, Powdery mildew, Leaf rust and Root knot are major diseases in the Eastern and North eastern India. Diseases of mulberry not only reduce leaf productivity (10-20%) but also affect quality.

Q2. What are the symptoms of mulberry diseases?

Ans Each disease is having its own characteristic symptoms. Symptoms of the major diseases of Eastern and North Eastern region of India are presented below.



Powdery mildew



Leaf rust



Brown leaf spot



Black leaf spot



Bacterial leaf spot



Root knot

Q3. What are the management practices of Powdery mildew ?

Ans

- Simultaneous pruning of all adjacent mulberry fields.
- Collection and burning of unused diseased leaves after pruning.
- Foliar spray of 0.1% carbendazim / 0.2% wettable sulfur on 3rd week of October and 2nd week of January in Malda district of West Bengal effectively prevents/controls the disease. Safe period of carbendazim and wettable sulfur is 7 & 10 days respectively.

Q4. What are the management practices of Leaf rust?

Ans

- Simultaneous pruning of all adjacent mulberry fields.
- Collection and burning of unused diseased leaves after pruning.
- Foliar spray of 0.2 % Copper oxychloride or 0.02% Tridiamefon on 3 week of January in Malda district of West Bengal. Leaves should be fed to silkworm 15 days after last spray.

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Q5 What are the management practices of fungal leaf spot diseases ?

- Ans** ➤ Collection and burning disease leaves.
- Foliar spray of 0.1 % Carbendazim on 3rd week of January in Malda district of West Bengal. Spray may be repeated after 10 days, if required. Leaves should be utilized for rearing 7 days after last spray.

Q6 What are the management practices of Bacterial leaf spot?

- Ans** ➤ Collection and burning of unused diseased leaves after pruning.
- Foliar spray of 0.01% Plantomycin / Pusamycin during first week of June and 3rd week of August in Murshidabad and Birbhum districts of West Bengal. Spray may be repeated after 10 days, if required. Safe period-7 days.

Q7. How to control root knot disease in mulberry?

- Ans** ➤ Plantation of disease free sapling
- Deep digging and sun drying of the soil during summer months.
 - Avoid plantation of nematode susceptible plants like Maize, Turmeric, Tomato, Ginger, etc.
 - Soil application of Neem oil cake @1 mt/ha/yr in four/five equal split doses.
Soil application of Carbofuran (Furadon) @ 30Kg/ha/yr in four split doses. Leaves should be fed to silkworm 40-50 days after application.

Q9 What is the best timing of spray of fungicides for disease control?

- Ans** Spraying of fungicides during cool hours of the day, i.e, early morning or afternoon is suitable to get maximum efficacy.

MULBERRY PHYSIOLOGY

Q1. Which variety is most suitable in waterlogged condition and how much leaf yield can be obtained from this variety?

- Ans.** C -2028 has been found as most suitable mulberry variety for waterlogged condition and about 31 mt ha⁻¹ year⁻¹ leaf yield can be obtained

Q2. How to increase mulberry leaf yield during winter season

- Ans.** During Oct-Nov (Autumn) and Dec-Jan (Spring) months due to fluctuation of temperature, humidity with dewfall, foggy weather and low moisture content in soil, mulberry leaf yield and quality deteriorate as the axillary buds cease to sprout due to severe low temperature even though the seasons are most congenial for silkworm rearing. Foliar spraying of 0.1% Morizyme –B (a plant growth regulator), which is a combination of micronutrients and Naphthylacetic acid (NAA), on mulberry during winter season increases the leaf yield by 25-30% qualitatively and quantitatively.

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Q3. What is the application schedule of Morizyme – B?

Ans. Method of application (For 1 hectare land) - First foliar spray should be given after 15 – 20 days of pruning on new flush of leaves. 0.1% concentration of Morizyme-B i.e. 337 ml. of Morizyme-B should be mixed thoroughly with 337 litres of clean water and sprayed, so that the foliage is fully drenched. Second foliar spray should be done after 20 days of 1st spray. 675 ml. of Morizyme-B should be mixed thoroughly with 675 litres of clean water.

Q4. Which is the best variety for chawki rearing in Gangetic plain of West Bengal?

Ans. S-1635 variety is best suited for chawki rearing in Gangetic plain of West Bengal.

Q5. Which variety is found most suitable as drought tolerant variety for red laterite soil?

Ans. Variety C-1730 has been identified as drought tolerant variety for red laterite soil.

SILKWORM BREEDING & GENETICS

Q1. What are the productive F1 hybrids of Silkworm for commercial rearing?

Ans. Due to wide variations in climatic conditions prevailing in West Bengal, it is difficult to rear Bivoltine dfls through out the year. As such, Multi x Multi are generally supplied during adverse climatic condition (May to September) and Multi x Bi dfls during favorable condition (October to April). At present popular Multi x Multi hybrids are N x M12(W), N x M.Con4, M.Con1x M.Con4 and Multi x Bi hybrids are N x NB4D2, N x (SK6 x SK7) and M6DP(C) x (SK6 x SK7) etc.

Q2. What are the new Silkworm breeds for better yield?

Ans.: A number of new silkworm breeds are in the pipe line i.e., in the process of Silkworm Race Authorization Trial. After the said trial recommended breeds will be introduced in the field.

Q3. Why the silkworm breeds are not performing as per expectation?

Ans.: The silkworm hybrids are released in the field after observing their higher productivity both in quality and quantity. The less production in cocoon yield at farmers' level is due to poor infrastructural set up of the farmers, lack of separate rearing house and non-disinfection of rearing houses as well as non-acceptance of rearing technology especially during chawki period.

Q4. When the sex limited silkworm breeds will be supplied in the field?

Ans.: The developed sex-limited silk worm breeds are now at trial stage. After completion of trial and based on the performance the same will be released to the field for farmers use.

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Q5. Whether any action is taken by the Institute for supply of P1 bivoltine cocoons for Agrahayani commercial grainage (October) which is the main sericulture crop of the year?

Ans.: A large number of bivoltine cocoons are being transported every year from Bangalore to West Bengal during Sept.-Oct. to meet the requirement of West Bengal grainages. To overcome this constraint, bivoltine foundation cross (FC) SK6 x SK7 is now being tested at farm level in collaboration with DoT (Seri), West Bengal and NSSO, Malda. In view of it's encouraging performance in terms of pupation rate which is more than the control (NB4D2), this FC is most likely to be introduced in near future to meet the requirement of P1 seed cocoons of West Bengal.

Q6. What are the reasons for occurrence of trimoulters ?

Ans.:

- Generally, trimoulters occur due to:
- Rearing of 1st and 2nd instars larvae at high temperature (> 30°C).
- Incubation in low temperature and longer period of darkness.
- Preservation of silkworm eggs at 5°C for more than 5 days during pin head stage.
- Low temperature (20°C) or high humidity before the stage of reversal of embryo.
- Feeding the third instar larvae with tender mulberry leaf.

Q7. How to assess the quality of the eggs?

Ans.: Quality of the eggs can be assessed on the basis of the following:

- Eggs should be free from pathogens (mainly pebrine).
- Number of eggs should be more than 400.
- Should give uniform hatching of above 95%.
- There should not be unfertilized and dead eggs.

Q8. Why more care has to be taken for seed crop rearing than commercial rearing?

Ans.: Pure races (seed crop rearing) are more susceptible to various diseases than hybrids. More care has to be taken for rearing of seed crop by providing satisfactory disinfection, required environmental condition, hygienic conditions and good quality of leaf.

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ENTOMOLOGY

Q1. When insect-pest infestation occurs in mulberry?

Ans. In Eastern India, generally insect pest infestation occurs during Mar-Nov.

Q2. What are the major pests of mulberry?

Ans. Three major pests are of serious concern viz. Thrips, Mealy bug & Whitefly, responsible for about 11-24% crop loss. Some times Bihar hairy caterpillar also causes havoc.

Q3. When Thrips infestation occurs?

Ans. Generally from March onwards till the onset of monsoon it prevails. In absence of rain for long spell it may appear in large number during rainy seasons.

Q4. What are the control measures?

Ans. Fortnightly irrigation reduces Thrips infestation. But if population goes beyond 20/leaf, 0.1% dimethoate (Rogor)(3.3ml/lit of water) is recommended for spray with a safe period of 14 days.

Q5. What is Tukra?

Ans. Tukra is manifestation of mealy bug infestation in mulberry when apical portion of the mulberry twig is curled, thickened and becomes deep green. Under the crumbled leaves colony of mealy bug covered with white mealy substance is noticed.

Q6. When Tukra occurs and what are the control measures?

Ans. Tukra generally occurs during June to August. But sporadic incidence is noticed throughout the year. In the initial stage removal of affected portion by top clipping and release of *Scymus bourdilloni*, a native predator @ 600 pairs/acre is recommended. If Tukra incidence goes beyond 10%, then spray 0.1% dimethoate(Rogor) (3.3ml/lit of water is recommended) with a safe period of 14 days.

Q7. What is Whitefly, when they appear and how they cause losses in Mulberry?

Ans. Whiteflies are small sucking insects appear generally during July-Nov., cause serious damage to mulberry. Primarily chlorosis appears, then leaves become curled and sooty mould covers the upper layer of leaves renders whole mulberry shoot unsuitable for rearing. It accounts for about 24% crop loss.

Q8. What are the control measures?

Ans. From July onwards regular monitoring of incidence is required. In the initial stage release of *Brumoides suturalis* @ 500 pairs/acre and installation of Yellow sticky traps @150/ac. is recommended, in case of severe infestation 0.1% dichlorvos (Nuvan) (1.3ml/lit of water) or 1% Neem oil (with 1500ppm azadiracthin) is recommended with 14 days safe period.

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Q9. What damage cause by Bihar Hairy Caterpillar?

Ans. Incidence of Bihar hairy caterpillar in mulberry is sporadic, during July – Nov. it is phytophagus in nature causes serious crop loss.

Q10. What are the control measures?

Ans. In the early stages of infestation, removal of egg masses and early instar larvae is easy, very much effective and economic. In later instars when larvae spreads in the whole field, spraying 0.15% dichlorvos (Nuvan) (2ml/lit of water) is recommended for spray with a safe period of 14 days.

Q11. When Uzi fly infestation occurs?

Ans. Generally during April to September Uzi fly infestation occurs with a peak during Aug-Sep.

Q12. What are control measures?

Ans. Rearing schedule should be strictly followed and there should not be any intermediate crops. Fixing of wire mesh/nylon nets in doors windows and ventilators prevents the entry of Uzi fly into the rearing house. Regular collection and destruction of Uzi maggots and pupae reduces intensity of infestation.

Q13. What is the chemical control of Uzi fly?

Ans. In case severe infestation freshly prepared 2% bleaching powder solution is recommended for spraying on the silkworm larvae (IV & V instar) on every 48 hrs. after bed cleaning in the morning. It kills the eggs of Uzi fly before it hatches.

SILKWORM PHYSIOLOGY & RTI

Q1. When disinfection of Rearing House & appliances is necessary ?

Ans. Rearing house & appliances should be disinfected 3 to 4 days before brushing of silkworm layings and just after completion of rearing.

Q2. When feeding to silkworm larvae should be stopped during moulting ?

Ans. Feeding should be stopped when 90% larvae are in moult.

Q3. When Labex (silkworm bed disinfectant) should be used?

Ans. Labex (a silkworm bed disinfectant) should be used after each moult. One additional dose should be used on 4th day of 5th instar.

Q4. How many "dalas" are required for rearing of 100 dfls ?

Ans. At least 17 dalas (6' x 4') are required for rearing of 100 dfls .

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Q5. What is the quantity of mulberry leaf required for rearing of 100 dfls?

Ans. 1000 kg, 850 kg and 700 kg of mulberry leaf is required for rearing of 100 dfls of Bi x Bi, Multi x Bi and Multi x Multi, respectively.

Q6. When cocoon will be harvested ?

Ans. Cocoon should be harvested on 5th - 6th day of spinning for both Multi x Multi and Multi x Bi hybrids. Bi x Bi cocoons should be harvested on 7th or 8th day of spinning.

SILKWORM PATHOLOGY

Q1. What are the different types of diseases of silkworm?

Ans. The different types of diseases of silkworm are Pebrine, Flacherie, Grasserie, Gattine and Muscardine.

Q2. What are the symptoms of Pebrine?

Ans. Irregular hatching and moulting of larvae, unequal sized larvae, black pepper like spots on the body of silkworms at the time of severe infection.

Q3. What are the preventive measures to be taken against Pebrine?

Ans.

- Disinfection of rearing room and rearing appliances as per recommended package of practices developed by the Institute.
- Rearing of disease free layings which have been subjected to strict mother moth examination.
- Use of bed disinfectant (Labex) during rearing period.
- Diseased worms should be collected and either burnt or buried under the soil.

Q4. What are the symptoms of Grasserie?

Ans. Affected worms turn slightly yellowish; swelling of inter segmental region of the larva; larval skin becomes very fragile; ruptures at a touch, releasing white fluid; the worms become very restless and move on round the edge of the tray.

Q5. What are the preventive measures for Grasserie?

Ans.

- Rearing in hygienic condition under optimum temperature (25-28 °C) and 70-90% RH%.
- Worms to be fed with quality leaves and as per their age.
- Feeding of wet leaves strictly to be avoided.
- Keep the floor of the rearing room dry by sprinkling lime.
- Use of bed disinfectant (Labex) during rearing period.

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Q6. During which season does Grasserie occur?

Ans. It occurs mostly during the month of July (Shravani) to September (Aswina).

Q7. During which season does Gattine occur?

Ans. It occurs mostly during the month of April (Baishakhi) to July (Shravani).

Q8. What are the symptoms of Gattine?

Ans. Swelling of head region of affected worms; saliva like extrusion from the mouth in the form of continuous thread; ripened worms become weak; affected worm looks like matured worm but fails to spin cocoon.

Q9. What are the preventive and control measures of Gattine?

Ans.

- Rearing to be conducted at the temperature range between 25-26°C and 70-75% R.H.
- Maintenance of hygienic condition and cross ventilation of air in the rearing room.
- Avoid injury to the larvae and overcrowding.
- Use of bed disinfectant (Labex) on alternate days till the disease symptoms disappear.

Q10. What are the symptoms of Flacherie?

Ans. Affected worms become weak and gradually die after which the body becomes black; later on the body putrefies and emit foul odour; affected worms vomit and their excreta become soft.

Q11. What are the preventive and control measures for Flacherie?

Ans.

- Removal of affected worms from the tray/ Dala;
- Used trays should be disinfected and dried in the sun;
- Worms to be kept with more spacing allowing free flow of cross ventilation air in the room
- Regular use of bed disinfectant (Labex) during rearing period.
- Maintenance of hygienic condition

Q12. When does Flacherie occur?

Ans. It occurs mostly during April to June.

Q13. What are the symptoms of Muscardine?

Ans. Affected worms become sluggish, loses appetite and the body gradually hardens. After death the body turns white, grey, green or red and looks like a stick depending upon the type of pathogen.

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Q14. What are the preventive measures for muscardine?

- Ans.**
- Maintenance of temperature around 25-26 °C, good ventilation and low moisture in rearing room;
 - Affected/dead worms to be collected and immersed in 2% Formalin solution kept in a vessel;
 - Healthy worms to be sorted out and reared separately;
 - Use of Sericillin / Labex and Formalin chaff as bed disinfectant.

Q15. How is disinfection of rearing room /rearing appliances done?

Ans. It is done by spraying of 5% bleaching powder solution in the following procedure:
(*Rearing room for 100 dfls rearing capacity*)

- 20 ltr solution is required
- Mix 500 gm of Bl.powder with 10 ltr water in a plastic bucket or earthen vessel and mix thoroughly with a stick
- After 15-20 min filter out the supernatant with a fine, clean cloth and use the liquid for disinfection of rearing room and appliances
- Smear the sediment, which has remained at the bottom of the bucket/vessel, on the outside wall of the rearing room
- After a few hours rearing can be conducted

Q16. What is disinfection?

Ans. Disinfection is an activity, which results in the destruction of specific pathogenic microorganisms. This could be achieved by physical or/ and chemical means.

Q17. Why is disinfection important?

Ans. The adverse environmental factors assist in lowering incubation period of pathogens through increasing the rate of multiplication and disease development. The diseases are caused by the microbial pathogens which are released into the silkworm-rearing environment. The pathogen contaminates the silkworm rearing environment and cause contamination of mulberry in the rearing house leading to secondary infection of silkworm during the rearing. Hence disinfection is a must.

Q18. What is a bed disinfectant?

Ans. A bed disinfectant is a chemical formulation having broad-spectrum activity and having the potentiality to kill a wide range of microorganisms present on the rearing seat/bed.

Q19. How and when a bed disinfectant is used?

Ans. Since it is available in powder form, it is dusted on the bed through a pouch of fine cloth, once after every moult and twice during the Vth stage, half an hour before resumption of feeding.

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Q20. How the RH inside the rearing house can be controlled?

Ans. The RH inside the rearing house can be decreased to a certain extent by putting lime (CaO) on the floor of the rearing room with periodic replacement of fresh lime. Moreover, doors and windows should be kept open for free circulation of air, which also helps in reducing the RH inside the rearing room. On the other hand, using Humidifier or hanging wet gunny clothes on the doors and windows can increase RH. A pool of water surrounded by sand in a corner of the room also helps to increase the RH and makes the room cooler to a great extent.

BIOTECHNOLOGY

Q1. How can biotechnology be useful for mulberry breeding?

Ans. The conventional breeding approach has several serious obstacles due to inherent biological genetic limitations in mulberry like highly heterozygous perennial nature of the plant system, lack of information about inheritance / genetics of various *planta* traits, and genetic markers / effective screening technique. However, intervention of molecular breeding approach integrated with classical breeding methods has opened new vistas for mulberry improvement programme especially in those areas, which are still unexplored.

Q2. How Biotechnology is being used in mulberry improvement programme?

Ans. The biotechnological research is promising in mulberry improvement programme, which includes genome characterization with isozyme and DNA markers. DNA fingerprinting using different marker systems is available for identification of mulberry cultivars and duplicate collections in the germplasm and also for germplasm registration. Besides, identification of QTLs / DNA markers linked for important agronomic traits and resistance for biotic and abiotic stress has been initiated.

Q3. What is clone and how are they propagated ?

Ans. A clone is any plant that is genetically the same as the parent plant. A clone can be propagated several ways, the most common examples are; grafting, softwood cuttings, hardwood cuttings, and tissue culture.

Q4. What is tissue culture?

Ans. Tissue culture is one of the branches of biotechnology, which helps to grow cells, tissues, organ and regenerate plants inside glass vessels on a synthetic nutrient medium under controlled temperature and light conditions. Through tissue culture plants can be propagated quickly and the tissue culture techniques are utilized in various screening processes for selection of plants under laboratory conditions, which saves space, time and inputs actually required in field conditions.

Q5. What is the role of tissue culture in mulberry improvement programme ?

Ans. Micropropagation through direct regeneration of shoots from leaf disc culture and axillary bud cultures in mulberry is promising due to the development of true-to-type

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plants, which is highly desirable in clonal multiplication. Besides, tissue culture techniques are also helpful in developing transgenic plants by any one of the methods like particle bombardment, microprojectile and *Agrobacterium* mediated transformation techniques.

ERI RESEARCH CELL

Q1. Are disease free eri silkworm layings easily available as and when required?

Ans. Indent must be placed at the concerned agencies, only Govt. at present in West Bengal well ahead of planned rearing.

Q2. Are there any recommended castor variety and eri silkworm breed for commercial rearing West Bengal?

Ans. Yes.

Q3. Can eri silkworm rearing be done remuneratively through out the year?

Ans. There are 2 seasons for commercial eri silkworm rearing i.e. spring and autumn, but it can be reared round the year and at least 4-5 crops can be harvested annually with proper management.

Q4. Is there recommended package of practices available in ericulture for this region?

Ans. Yes, literature is available.

Q5. What is the utility of eri pupae?

Ans. It is rich in proteins and HDL and consumed as delicious food in the north-eastern states and used in pisciculture in West Bengal.

Q6. What is the sale procedure of eri cocoons and pupae?

Ans. In West Bengal, disposal of eri cocoons and pupae is done through the Department of Textile (Seri.), Govt. of West Bengal.

Q7. Is it an environment friendly and women participatory vocation?

Ans. Yes, as the ericulture is carried out mostly with manual operations requiring no hard labour and much mechanization.

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TRAINING

Q1. What are the training courses imparted at CSR&TI, Berhampore, W.B.?

- Ans.** A) Structured course: Course of long-term duration of 15 months, i.e. Post Graduate Diploma in Sericulture affiliated to Kalyani University.
- B) (i) Non- structured Course: Course of short term duration ranging from 1 – 2 week i.e. Capsule courses and short Term Training programme (STTP).
(ii) On the job training (general mulberry sericulture) for 2 weeks duration

Q2. What are the programmes of Non – structured courses?

Ans. There are seven types of capsule courses viz.

- a. Extension Education.
- b. Reeling & Spinning.
- c. Mulberry & Silkworm Crop Protection.
- d. Mulberry variety & planting technique.
- e. Silkworm Seed Technology.
- f. Chawki rearing.
- g. Handi craft preparation.

There are three types of short term Training programme viz.,

- a. Integrated nutrient management for mulberry cultivation.
- b. Disease and Pest management in mulberry sericulture.
- c. Techniques of seed crop rearing and mounting.

Q3. What are the criteria for admission in the above-mentioned courses?

- Ans.** ➤ PGDS: A candidate should have B.Sc. Sericulture /Botany/ Zoology/ Biochemistry /Agriculture /with minimum 45% marks (40% in case of SC/ST) in aggregate.
- Capsule & STTP courses: A candidate should have to be sponsored by CSB/ DOS/ NGO Private Entrepreneurship.

Q4. Is there any course fee for the above-mentioned courses?

- Ans.** ➤ PGDS: course fee per candidate is (Rs. 10,000/- direct selection, Rs.5, 000/- for DoS/ DoT/ State Govt. sponsored candidate, Rs.7,500/-for NGO sponsored Candidate)
- Capsule & STTP: Course fee Rs. 150/- and Rs.200/- (50% less for DOS Sponsored)
- On job training: Course fee Rs. 8000/-

Q5. Can a farmer get training from your institute?

Ans. Yes, but one should be sponsored from DOS/NGOs on payment basis.

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POST COCOON TECHNOLOGY

Q1 What does 'PCT means?

Ans. 'PCT' means POST COCOON TECHNOLOGY involving the following processes:

- a. Cocoon Stifling
- b. Cocoon Cooking
- c. Cocoon Reeling
- d. Raw Silk Twisting
- e. Raw Silk Weaving & its preparatory processes
- f. Raw Silk Dyeing, Printing & Finishing
- g. Yarn & Fabric manufacturing by Silk Waste Spinning

Q2 What is the role of Reeling & Spinning in Post Cocoon Technology?

Ans. Reeling & Spinning is a part of Post Cocoon Technology.

Q3 What activities does R&S generally include?

- Ans.**
- a. Cocoon procurement
 - b. Cocoon Stifling or Drying
 - c. Storing, Cooking, Reeling, Re-Reeling, Lacing, Skeining and Booking
 - d. Degumming of silk-wastes, Spinning

Q4 How many types of cocoons are generally available in Eastern & North-Eastern region?

Ans. Multivoltine, Multi x Bi & Bivoltine cocoons.

Q5 How is it possible to assess suitability of a cocoon simply by putting hand to it?

Ans. Simply by putting hand on the cocoon lot, one expert can assess its big size, hard shell, fine grains, uniformity of size and shape and the brightness of its colour.

Q6 How many types of reeling machines are generally available in Eastern & North-Eastern Region?

- Ans.**
- a. Predominantly Country Charkha for conversion of bulk of the cocoons to wet yarn/
 - b. Predominantly Improved type of Charkha viz., Ghosh Reeling Machine for conversion of bulk of cocoons to warp yarn.
 - c. Stray existence of Improved Cottage Basin & Multi-end Reeling Machine for conversion of meager quantity cocoons to higher quality Raw Silk.

Q7 What types of cocoons are suitable for which Reeling Machines?

- Ans.**
- a. Cocoons with lower shell weight & filament length and non-breakable filament length viz., multivoltine cocoons are suitable for high speed-high temperature

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reeling i.e., Charkha or improved charkha.

- b. Cocoons with moderate shell weight, & filament length and non-breakable filament length viz., multi x bi hybrid cocoons are suitable for low speed-low temperature reeling i.e., Improved Cottage Basin.
- c. Cocoons with higher shell weight, & filament length and on-breakable filament length are suitable for low speed-low temperature reeling with all control mechanisms i.e., Multi-end Reeling Machines.

Q8 Whether bivoltine cocoons should be reeled on traditional country charkha?

Ans. Technically, bivoltine cocoons can be reeled on traditional charkha. But this practice has to be out rightly rejected to avoid devaluation of ultimate product.

Q9 Is reeling performance of the cocoons depend on the rearing habits of the farmers?

Ans. Yes, largely. Rearing practice has direct role on the reeling performance of the cocoons.

Q10 Is sundrying advisable?

Ans. No, sundrying is not advisable because the ultra violet rays contained in sunlight weakens and breaks the molecular chains of the main silk chain – fibroin, making the silk fade in colour & weak in strength. This weak-link effect is not immediately visible.

Q11 What is the right process of cocoon drying?

Ans. Hot air drying.

Q12 What is croissure and what is the importance of croissure length in respect of raw silk quality?

Ans. Croissure is nothing but intertwining of filament around itself to remove excess water from the filament and to give a glossy look to the ultimate raw silk by imparting frictional resistance. Croissure length has immense importance to decide how much resistance to be given to the raw silk under process. Since presence of excess water causes gum spots etc. removal of it should be ensured at satisfactory level. Minimum croissure length should be one centimeter. However, it depends upon the speed of reeling, type of cocoons and type of machines. Hence croissure length should be decided according to the resistance bearing capacity of the thread.

Q13 Whether water has any role on the quality of reeling?

Ans. Yes, water has a major role to play during reeling. It should be colourless, odourless, limpid, soft and neutral. Total hardness of water should range from 80-100 ppm. Frequent change of water is required to improve the colour & quality of raw silk.

Q14 What does a reeler do if his reeling water is too hard?

Ans. A reeler can use water-softening agent to make his reeling water soft. Oxypon, SHMP, EDTA etc. are some of this water softener available in the market. However, a reeler may use these softeners when the total hardness of water goes beyond 200

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ppm, for economic conversion. Potash alum may be used to remove turbidity of water.

Q15 What sort of fabrics is made using silk and spun silk yarns?

Ans. Dress and furnishing materials like saree, kurta, Garod, wrappers & fancy fabrics like Baluchari, Koreal, Kantha Stich, Velvet, Muslin etc. are made using silk and spun silk.

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