# NON MULBERRY GRAINAGE ACTIVITIES

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# GRAINAGE ACTIVITIES

# FOR

# TASAR SILKWORM

**Grainage -**

**Establishment for the preparation of DFLs of silkworm on scientific lines**

**French word *Grain*, means Seed**

**The wild nature of the tropical tasar silkworm is reflected in its dis-uniform and erratic emergence, coupling, egg laying, hatching and other habits.**

**Selection of seed cocoons**

**Healthy, well formed and tough cocoons are selected. Also, Stocks showing not more than 5-10% infection can be considered for seed.**

# Preservation of seed cocoons

**The pupal stage of a non diapausing crop lasts hardly a month (25-30°C and 70-80% R.H).**

**However, when a stock is preserved over the winter, the pupal stage lasts 5-7 months.**

**Indoor preservation**

**Outdoor preservation of cocoons in moderate climate**

## Transport of seed cocoons

**The cocoons should be packed loosely in split-bamboo baskets or perforated plywood boxes.**

Bamboo basket for the transport of seed cocoons

## Emergence

**Pupation takes about 30 days, (28-30°C; 75-85%). Emergence -onset of the monsoon, and in the second and third crops it takes place in August - September & November - December, respectively. Moths start emerging late in the afternoon, but the peak period is 7-9 PM.**

**A protease helps the moths to making a hole.**

## Coupling

After 2-3 hours of emergence the moths start to couple, the peak period being from midnight to 2:00. Generally, a number of male and female moths are kept in large bamboo baskets for mass coupling.

Recent studies show the advantages of outdoor coupling for commercial grainage.

Nylon-net for enhancing coupling efficiency

**Although coupling continues for 10-12 hours, a period of 2-4 hours is adequate.**

**In case of a shortage of male moths, they can be refrigerated at 10°C for 2-3 days and then safely utilized a second time.**

# Egg laying

**After the desired period of coupling, the moths are decoupled by hand. The mated females are then placed singly in small cages (monias) or together in large bamboo baskets for egg laying.**

**Moths prefer darkness for egg laying. The eggs are deposited in -batches of 5-10. The average fecundity being 200.**

**The devises developed are useful in egg laying by moths**

## Selection of disease-free layings

Microscopic examination of the mother moths ensures disease-free layings.

## Disinfection of eggs

As tasar silkworms eat a portion of the egg shell during hatching, surface sterilization is essential.

**The improved technology ensures removal of outer maconium layer.**

## Egg incubation

**The disinfected eggs are kept in thin layers in egg boxes made of plastic with a transparent top to admit light and perforated sides and bottom for aeration. The egg boxes are placed in a room for incubation at 30°C & 70 - 80% RH.**

## Hatching

The hatching commences early in the morning of tenth day and continues for six days. In tasar silkworm eggs, unlike those of mulberry silkworm, there is no "blue stage", perhaps because of the thick chorion, and hence “No black boxing”.

## Refrigeration of eggs

If necessary, hatching can be delayed a few days (1 week) by subjecting the eggs to 8-10°C .

# GRAINAGE ACTIVITIES FOR MUGA SILKWORM

# Grainage Activities for Muga Silkworm

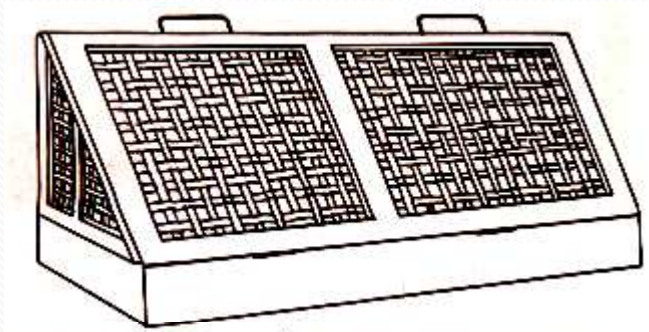
**Muga silkworm grainage is same as tasar grainage.**

**Selection of seed cocoons**

**The criteria of seed selection in muga culture are very different from those applied in other non-mulberry silk cultures. On the basis of visual inspection, the rearers select from the brood *i.e.*, larvae possessing a copper-coloured head capsule, two or three litters in the rectal part of maturity, five or more longitudinal striations on the litter, *etc.*,**

## Transport of seed cocoons

**For transportation the traditional rearers carry the seed cocoons thinly spread in bamboo baskets, or even in cocoonage if pupation is not completed.**



Storage of muga seed cocoons in a bamboo box

## Storage of seed cocoons

**Muga is a polyvoltine.**

**The traditional rearers store them in split-bamboo baskets hung from the ceiling.**

**In the organized grainage centres the seed cocoons are stored in bamboo boxes placed on wooden racks resting on antwells at 25-28°C and 70-80%.**

# Emergence

**The pupation in summer takes 16 days and 30 to 35 days in winter. Emergence starts at 6-9PM.**

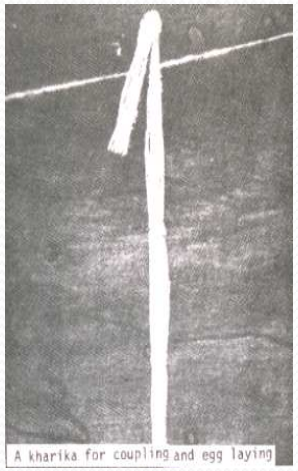
# Coupling

**Coupling starts - 30 to 45 minutes after emergence. The female moths are tied on "kharikas" which are then hung outdoors.**

**The optimum temperature and relative humidity for coupling are 25-28°C and 75-80%.**

**Coupling - 3 hours has been found adequate.**

**The successful utilization of male moths for a second coupling has been reported.**


A kharika for coupling and egg laying

# Egg laying

**The fertilized female moths are tied to kharikas with about 10 cm of cotton thread, thereby allowing them movements that facilitate laying. The moths are tied 25 cm apart on the kharika so as to give them adequate surface for oviposition.**

**Laying continues for 3 to 4 days. The maximum laying 60 to 70%, occurs on the second day, while 20 to 25% and 5 to 10% of the eggs are laid on the first and the third day, respectively. The average laying capacity is 150 to 250 from May to October, but it declines sharply to 80 to 100 during the winter.**

**The traditional rearers neither examine the mother moths nor disinfect the eggs, although it would be advisable to carry out these operations as suggested for tropical tasar.**

## Hatching

**The kharikas carrying eggs are also kept indoors, preferably in trays. Incubation : 7 to 8 days in summer and 14 to 15 days in winter.**

**Hatching usually commences in the morning hours - 4:30-6:00 in summer and 7:00-9:00 in winter- and is completed within three days.**

# Grainage Activities for Eri Silkworm

**This grainage differs from those of tasar and muga. The domestication makes grainage quite systematic & easy.**

## Selection and storage of seed cocoons

**The seed cocoon selection is same as for tasar. Eri is a polyvoltine, does not require prolonged preservation. For postponement subjecting them to gradually lower temperatures down to 5°C.**

**The seed cocoons are stored by spreading them thinly at 22 - 24°C and 70-80% R.H. Traditional rearers store in earthen pots or on split-bamboo mats, which are placed near the fire during the winter.**

## Emergence

**Depending on climate, the pupation ranges from 13 to 18 days. Emergence, which continues for 3-5 days, starts at 3:00-5:00 in the morning and may continue until 16:00-17:00 hours with maximum emergence in the hours 3:00 to 9:00. Eri moths easily emerges as the cocoons have an open end. Soon after emergence they emit a creamy excreta & Within 45 min to 1 hour they become fully active and prepare for mating.**

## Coupling

**The healthy female moths are collected and tied to kharikas with cotton thread 8 to 10 cm long. Eri moths remain coupled for 24 hours, although 3 to 6 hours are adequate.**

**The male moths can be utilized for a second coupling.**

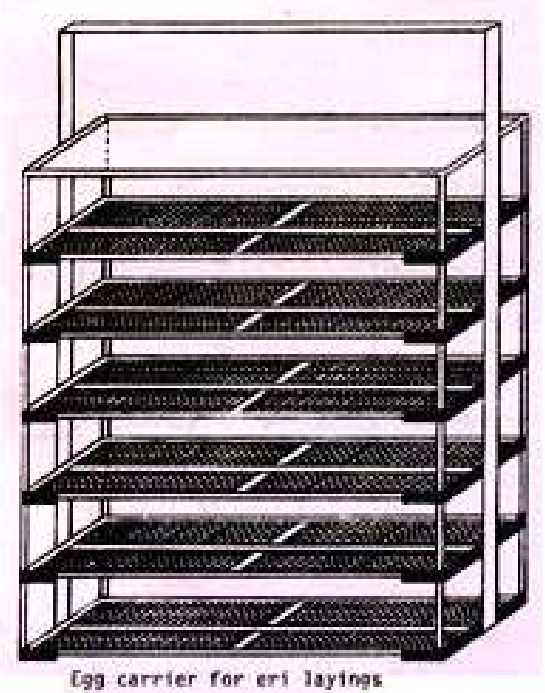
## Egg laying

**The decoupled fertilized females are left on the kharika. Egg laying starts 1 to 2 hours after decoupling and continues for 3 to 4 days. On the average, each moth lays 450-500 eggs, most of them on the first day. The eggs are deposited in a single layer at two or three places on the kharika.**

**For a stable and better crop it is desirable to use the cellular method of mother moth examination followed by disinfection of the eggs in 5% formalin for five minutes.**

# Hatching

**The disease-free layings are incubated either individually or collectively in the grainage house at normal room temperature and relative humidity, preferably at 22-24°C & 75-80% R. H. Hatching starts at 6:00 to 9:00 in the morning within 9 to 10 days in summer and 14 to 15 days In winter.**



Egg carrier for eri layings

# THANK YOU