

Quality is a general term applicable to any trait. It can be defined as measure of excellence or a state of being free from defects, deficiencies and significant variations. Superior cocoon quality can be brought about by the strict and consistent adherence to measurable and verifiable standards. The cocoon output achieved should satisfy the silk reeling requirements.

It has been established that cocoon quality contributes to the tune of about 80 per cent of the raw silk quality. Cocoon quality is governed by several parameters, each of them has importance at certain level. Some of the important quality parameters usually considered are Shell percentage, Defective Cocoon Percentage, Average Filament Length, Average Non Broken Filament Length, Denier, and Reelability percentage. Of these, Shell percentage and Defective Cocoon percentage have been identified as the most significant ones especially because these are relatively easy to determine. It has been established that each of the quality parameters has its own relative significance on the reeling efficiency and raw silk quality.

A series of natural circumstances will produce variations in cocoon quality. Some of the most noteworthy include:

- Differences in cocoon quality in the same batch;
- Differences in cocoons produced in the same location by different farmers who have reared the same hybrid.
- Seasonal influences and the environmental conditions such as temperature and humidity affect cocoon reelability
- Processing technique in reeling will impact reeling efficiency as well as raw silk quality.
- Bivoltine cocoons are superior in quality compared to Multivoltine x Bivoltine cocoons.

### Key Factors

#### Temperature, humidity and aeration during mounting

Maintain temperatures at or near 25°C and relative humidity around 65 percent for silkworms to spin good quality cocoons with a high reelability. Due to heavy urination before the onset of spinning and

due to oozing of silk and its drage during spinning humidity will be more in the rearing house. To drive out the excess moisture in the rearing house, it should have good cross ventilation and also exhaust fans. Sufficient spacing should be there for mounting either inside or outside rearing. Further, the management and the manipulation of the environmental conditions plays a major role.

#### Mounting device

Although different mounting practices are employed among rearers, rotary mounting frames provide good ventilation resulting in improved reelability of cocoons.

#### Harvesting and handling of fresh cocoons

Cocoons should be harvested only after complete pupation. In practice, the appropriate harvesting day would be the fifth day and the seventh or eighth day in winter from the mounting date. If premature harvesting is done, the silkworm will still be in its larval stage, weigh more, have fragile skin and could likely be crushed which would cause stains to the cocoon and also may lead to melting during handling and transportation.

#### Transport of fresh cocoons

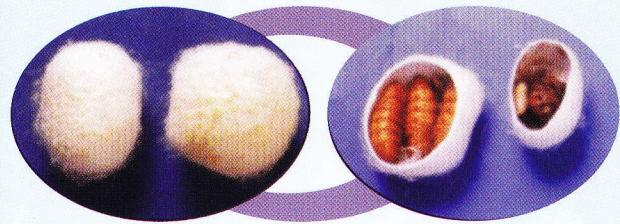
After proper harvesting and removal of diseased or damaged cocoons, the fresh cocoons are taken to the market. For short distances, the farmer can carry the cocoons in baskets or bags. If the distance is longer, cocoons are to be transported in a van or a bus. Caution should be exercised when loading fresh cocoons on to the van to ensure that containers are loosely packed in tiers to avoid damage. Vibration and shock during long trips can spoil fresh cocoons. If there are defective cocoons, the fresh cocoon quality will be harmed. It is advisable to avoid carrying cocoons over long distances, however, in case of transportation, use of P.V.C. containers with 15 kgs capacity is recommended. Shock absorbers, such as sponge can prevent damage over long distances. To minimize the risk of heat deterioration, transportation should be done only during the night or early morning. Ideally, the fresh cocoons should arrive at the stifling unit within two to three days after harvest.

#### Classification of defective cocoons

When cocoons are sold at the market, price is assessed on the basis of cocoon quality. This is judged by grading shell percentage and the percentage of defective cocoons. If the percentage of defective cocoons is high, the price will be less. Therefore it is necessary to know different kinds of defective cocoons and ways and means to avoid their occurrence. An account of defective cocoons is given under.

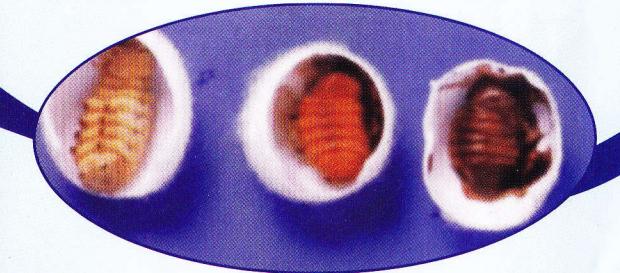
### 1. Double cocoons

A double cocoon is spun by two worms, producing a filament, which does not unwind smoothly and tangles easily. As these cannot be reeled along with normal cocoons, double cocoons are used for manufacture of a coarse, non-uniform yarn called "dupion". Double cocoons are due to crowded mounting conditions, high temperature and high humidity.



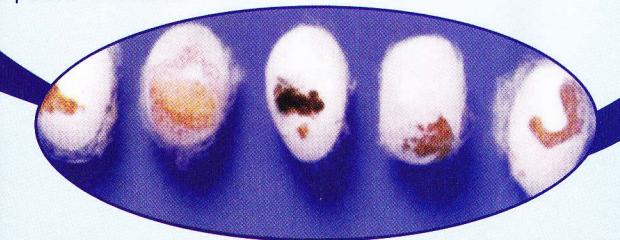
### 2. Inside Stained/Melt cocoons

Dead cocoons are also known as melted cocoons. In this case, the pupa is dead and sticks to the inside shell of the cocoon causing a stain. Melted cocoons are called mutes because they do not make a sound when shaken. These cocoons are difficult to process and will result in silk which is dull in colour.



### 3. Outside stained cocoons (dead cocoons)

These are recognized by a rusty colour spot on the cocoon shell caused by absorption of intestinal fluid/urine of the mature worm formed during mounting. Reelability is very poor in this case.

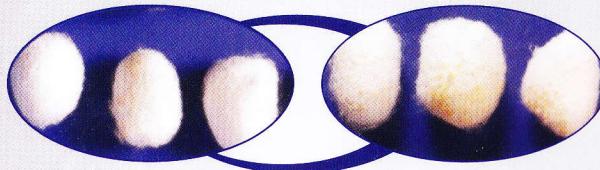


**4. Mountage pressed cocoons**

This defect may happen due to improper mounting frames. These are also called scaffold pressed cocoons.

**5. Deformed cocoons**

These are abnormally shaped cocoons. This defect may be due to racial characteristics.

**6. Flimsy cocoons**

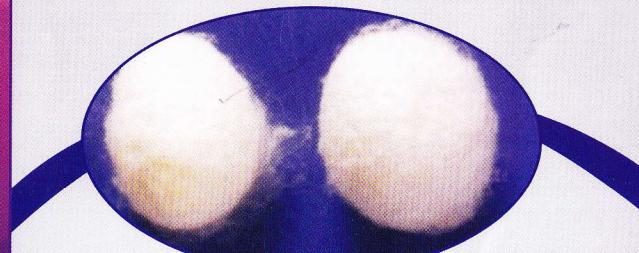
Here, the shell is loosely spun in layers and has a low silk content. These cocoons are easily overcooked and produce waste.

**7. Thin-end cocoons**

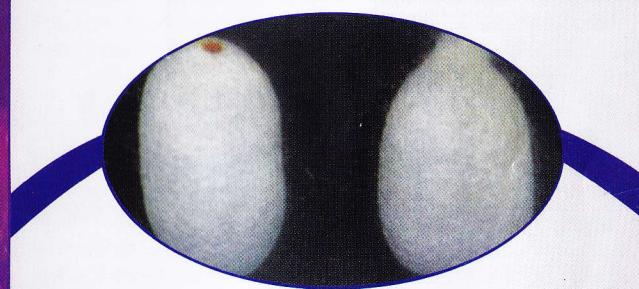
One or both ends of the cocoon are very thin and there is a risk of bursting when processed. The cause of this defect may be attributed to racial characteristics or improper temperature and humidity during rearing and mounting.

**8. Multi layered cocoons**

Coons having two are three layered shell. The cause of this defect may be attributed to racial characteristics.

**9. Pierced cocoons/Uzi infected**

This happens when a moth has emerged or in the case of the emergence of uzi fly. Pierced cocoons are unfit for reeling and can be used only for hand spinning or as raw material of machine spun silk yarn.



The quality of silk cocoons depends on many characteristics and each of these measure different aspects of quality of cocoons. All these aspects are important at different stages of further processing such as reeling, weaving etc., However, the permissible limit of defective cocoons in any given lot is only 5% beyond this the rate/kg of cocoons gets reduced. Therefore, utmost precaution needs to be taken to avoid the occurrence of defective cocoons.

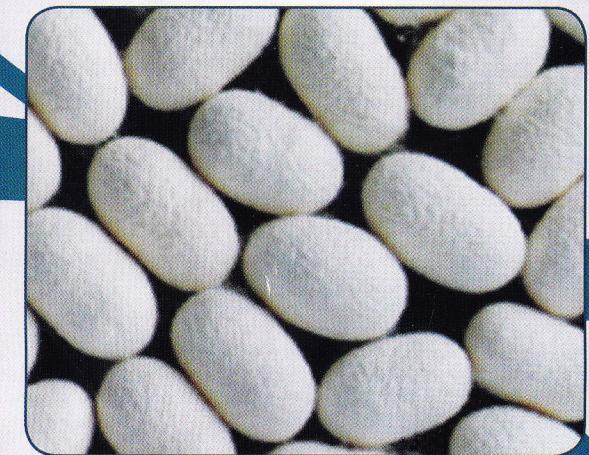
**Published by Dr. B. B. Bindroo, Director**

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# Quality cocoon production for gradable silk



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