



# **SURVEY OF GROWTH AND MANAGEMENT OF BIVOLTINE SILKWORM, *BOMBYX MORI* FED WITH V1 MULBERRY IN DIFFERENT SEASONS**

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**Abstract:** An attempt was made to compare the sericulture farming in two villages, TKN Puthur and Ponnapuram in palani taluk, Dindigul District, Tamil Nadu, India. The study was carried out in summer and winter seasons. Farmers who were regular in the practice of Bivoltine silkworm rearing were randomly selected and data were collected from 5 sericulture farms in each village by using structured schedule through personal interview method. Our study was aimed to study the growth and management of bivoltine silkworm (*Bombyx mori*) fed with V1 mulberry variety in two different seasons. The present study observation reported that winter season produced more quantity of cocoons compared to other seasons.

**Key Words:** Bivoltine silkworm, V1 Mulberry, Season, Cocoon weight.

## **I. INTRODUCTION**

The rearing of silkworm is called sericulture, that word is derived from the Greek Sericos meaning silk and the English culture rearing. Sericulture need low investment and it helps to earn higher returns in short gestation period, so the farmers mostly attracted to this industry and it is best tool to improve the rural economy as well as to improve their living status (Jalba, 2016). It is a one of the cottage industries, which provides more employment opportunities to rural poor people's (Purusothaman *et al.*, 2012). In Sericulture is industry is the only cash crop in agriculture division that give quick income within 30 days (Yadav, 2013).

In the sericulture industry the primary producer of silk is silk worm. The silkworm mainly fed with mulberry leaves. The mulberry leaves have a rich amount of nutrients, such as a quality of mulberry leaves closely related to the mulberry plant varieties, environmental condition and cultivation practices. Mulberry leaf quality is determined by chemical contents viz protein, carbohydrate, minerals, water and chlorophyll contents etc (Bongale *et al.*, 1997). Mulberry is the backbone of sericulture industry, because, both economically and traditionally it is a very important plant for the development of this industry. India is a unique distinction of being a producer of all the four commercially traded varieties of natural silks namely, Mulberry, Tasar, Tasar, Eri and Muga (Giridhar *et al.*, 2010).

At present 20,863 farmers are practicing sericulture in Tamil Nadu, cultivating 33,861 acres of mulberry. This gives employment opportunities to 1,69,305 persons as on 30.06.2014. Tamil Nadu has occupies fourth position in the country in silk production. Now it is working with an aim to occupy third position. The annual silk production in Tamil Nadu is 1200 metric tonnes (1 metric ton = a unit of 1000 Kilograms). Tamil Nadu is well known for its traditional silk sarees and dhoties woven on handlooms to use all traditional and cultural functions. The weaving industry of Tamil Nadu comprises mostly of handlooms. The Kancheepuram handloom silk saree is a famous all over world market. The Kancheepuram, Arani, Kombakonam, Salem, Coimbatore, Madurai, and Tirunelveli are important weaving centres in Tamil Nadu.

### **AIM OF STUDY:**

The main objective of the present study was to study the growth and management of bivoltine silkworm fed with V1 mulberry variety in two different seasons.

### **RESEARCH METHODOLOGY:**

The survey was carried out in silkworm rearing farms in and around the Ayakudi villages (Ponnapuram and TKN Puthur) Dindigul District Tamil Nadu, India. The rearing farms were analysed at different seasons like summer season (April-June) and winter season (December-February) of year 2019 to 2020. The collection of information from the farmers should be initiated systematically depending upon the labours and materials available on the farms. An average of 2 to 3 acre mulberry cultivated farmers can be selected for these surveys. The questionnaire for this purpose was designed within the framework of the objective. A questionnaire would consume a lot of time, both of the farmers and the surveyor. Therefore, the questionnaire should be comprehensive with less number of questions based on which more information can be pooled out to draw valid conclusions. Such a survey should include the understanding of rural farms with reference to their role in technology and socio-economic cultural changes in rural communities.

#### **2.1 Study Area:**

The investigation has been conducted in Dindigul district of Tamilnadu State, India. The district has eight taluks and Palani is one of the taluk of this district. Survey was conducted Palani surrounding villages Ponnapuram and TKN Puthur. Palani taluk chiefly comprises red loam soil, red sandy loam soil, in addition to having black cotton soil in some villages. The selection of villages and number of farmers interviewed for collection of data in each village depends on the mulberry area and large rearing house based. The study was formulated based on the preliminary field survey and in consultation with farmers in each village of the Palani taluk.

### **IV. RESULTS AND DISCUSSION**

Survey of sericulture practices by the farmers conducted during the period from April, 2019 to February, 2020, in Palani surrounding Ponnapuram village and TKN puthur village. The data collected by the present study by visiting and interviewing ten farmers practicing sericulture in these villages. Only sericulture farm relevant aspects are taken into consideration in each village and the results are presented below.

#### **Ponnapuram village:**

In Ponnapuram village 2 to 3 acres of land area having 5 farmers were selected for questionnaire and visited their farms for mulberry cultivation survey. The areas of mulberry cultivation in different farms (Pon1, Pon2, Pon3, Pon4 and Pon5) were 3.0 acres, 3.0 acres, 2.5 acres, 2.5 acres and 2.0 acres respectively. Out of five farms, the farms Pon1 and Pon2 have red soil land, another 2 farms such as farms Pon3 and Pon4 have black soil, another one farmer (Farm Pon5) have red loamy soil (Fig 1).

The data observed in Ponnapuram village was given in the Table 1. The silk worm rearing shed sizes were varied depend upon the acre of plantation of mulberry. The variation of rearing shed sizes such as Pon-1, Pon-2, Pon-3, Pon-4 and Pon-5 were, 80 x 22 ft, 85 x 22 ft, 72 x 22 ft, 74 x 22 ft and 78 x 22 ft respectively. Size of the windows was other important properties for air free flowing inside the shed for maintain the temperature. Hence the windows of the rearing shed is one of the temperature maintaining properties, therefore all the farms were constructed with number of windows depending upon the surrounding climatic conditions. The varying sizes of windows in five farms were 12 (3'x3'), 24 (4'x3'), 16 (3'x3'), 14 (3.5'x3') and 12 (3'x3') respectively. Further that, the number and sizes of mountages in five different farms showed some small variations, such as 70 (5'x10'), 70 (10'x5.5'), 60 (2.5'x5'), 50 (5'x7') and 50 (5'x8') of five farms respectively. Further that, the roofing type is another important aspect for maintaining the temperature in the rearing shed. In the five rearing farms, rearing house roofs were woven by the coconut palm leaves.

In the Ponnapuram village, Cocoon yielding in different seasons was given in the Table 2. In summer season the average cocoon yield was observed in rearing farms Pon-1,  $249\pm1$  kg of cocoon, Pon-2 harvested  $205\pm5$  kg of cocoon, Pon-3 harvested  $197\pm3$  kg of cocoon, Pon-4 harvested  $157\pm6$  kg of cocoon and Pon-5 harvested  $188\pm8$  kg of cocoon. Similar manner monsoon season average cocoon yield was observed in 5 different rearing farms were Pon-1 ( $260\pm0$  kg), Pon-2 ( $230\pm0$  kg), Pon-3 ( $228\pm8$  kg), Pon-4 ( $174\pm6$  kg) and Pon-5 ( $225\pm5$  kg) were harvested. In winter season average cocoon yield was observed in 5 different rearing farms were Pon-1( $295\pm5$  kg), Pon-2 ( $250\pm5$  kg), Pon-3 ( $254\pm6$  kg), Pon-4 ( $248\pm12$  kg) and Pon-5 ( $245\pm5$  kg).

**Table 1. Data of Mulberry cultivation and silkworm rearing in five different sericulture farms at Ponnapuram village**

Particulars	Mulberry cultivation				
	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
<b>Area ( acre)</b>	3.0	3.0	2.5	2.5	2.0
<b>Soil type</b>	Red soil	Red soil	Clay loamy Soil	Clay loamy Soil	Red loamy soil
<b>Soil pH</b>	6.66	6.7	6.58	6.84	6.93
<b>Plantation system</b>	3'x3'	3'x3'	3'x3'	3'x3'	3'x3'
<b>Irrigation</b>	Surface	Surface	surface	Surface	Surface
Rearing House					
<b>Shed size</b>	80 x 22 ft	85 x 22 ft	72 x 22 ft	74 x 22 ft	78 x 22 ft
<b>Roofing type</b>	Coconut leaves woven				
<b>Windows</b>	12 (3'x3')	24 (4'x3')	16 (3'x3')	14 (3.5'x3')	12 (3'x3')
<b>Mountages</b>	70 (5x10)	70 (10'x5.5')	60 (2.5'x5')	50 (5'x7')	50 (5'x8')

**Table 2. Cocoon yielding of different seasons in Ponnapuram village**

Seasons	Farm 1		Farm 2		Farm 3		Farm 4		Farm 5	
	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)
<b>Summer</b>	<b>300</b>	$249\pm1$	<b>250</b>	$205\pm5$	<b>250</b>	$197\pm3$	<b>300</b>	$257\pm3$	<b>250</b>	$188\pm8$
<b>Monsoon</b>	<b>300</b>	$263\pm3$	<b>250</b>	$230\pm0$	<b>250</b>	$228\pm8$	<b>300</b>	$174\pm6$	<b>250</b>	$228\pm8$
<b>Winter</b>	<b>300</b>	$300\pm5$	<b>250</b>	$250\pm5$	<b>250</b>	$254\pm6$	<b>300</b>	$298\pm12$	<b>250</b>	$245\pm5$

### T.K.N Puthur village:

Similarly, T.K.N Puthur village 2 to 3 acres of land area having 5 farmers were selected for questionnaire and visited their farms for mulberry cultivation survey. The selected farms (TKN-1, TKN-2, TKN-3, TKN-4 and TKN-5) of mulberry cultivation were 3.0 acres, 2.5 acres, 2.0 acres, 2.0 acres and 2.0 acres respectively (Fig. 4). The two farms land have (Farms TKN-1 and TKN-3) loamy soil, another three farms land (Farms TKN-2, TKN-4 and TKN-5) have red loamy soil (Fig 2).

The data observed in the TKN Puthur village were given in the Table 3. In the rearing shed sizes in farms TKN-1, TKN-2, TKN-3, TKN-4 and TKN-5 were 85 x 22 ft, 42 x 22 ft, 78 x 22 ft, 47 x 22 ft and 60 x 22 ft respectively. The roofing types were varied in these rearing houses such as TKN-1, TKN-2 and

TKN-5 were woven by the coconut palm leaves and the farm TKN-3 and TKN-4 were roofed by asbestos. Further that, the number of windows and their sizes were vary in these farms (TKN-1 to TKN-5) and the size of windows were 24 (3'x3'), 16 (3'x3.5'), 24 (3'x3'), 15 (2.5'x3) and 14 (3'x3') respectively. Likewise, the number and sizes of mountages of these farms were different and they are 60 (5'x10'), 40 (10'x5'), 54 (10'x5'), 30 (5'x10') and 72 (5'x10').

In the T.K.N Puthur village, Cocoon yielding in different seasons was given in the Table. 4. In summer season the average cocoon yield in rearing farms viz, TKN-1(198±8 kg), TKN-2 (134±6 kg), TKN-3 (174±6 kg), TKN-4 (145±5 kg) and TKN-5 (197±3) kg of cocoons were harvested. Likewise the monsoon season average cocoon yield in 5 different rearing farms viz, TKN-1(235±7 kg), TKN-2 (153±7 kg), TKN-3 (209±1 kg), TKN-4 (170±6 kg) and TKN-5 (215±5) kg of cocoons were harvested. Similarly the winter season average cocoon yield in 5 different rearing farms viz., TKN-1 (255±5), TKN-2 (205±5), TKN-3 (245±5), TKN-4 (204±6) and TKN-5 (254±6) kg of cocoons were harvested.

**Table 3: Data of Mulberry cultivation and silkworm rearing in five different sericulture farms at**

**T.K.N. Puthur village**

<b>Particulars</b>	<b>Mulberry cultivation</b>				
	<b>Farm 1</b>	<b>Farm 2</b>	<b>Farm 3</b>	<b>Farm 4</b>	<b>Farm 5</b>
<b>Area ( acre)</b>	3.0	2.5	2.0	2.0	2.0
<b>Soil type</b>	loamy Soil	Red loamy Soil	loamy Soil	Red loamy Soil	Red loamy Soil
<b>Soil pH</b>	6.7	6.78	6.93	6.84	6.85
<b>Plantation system</b>	3'x3'	3'x3'	3'x3'	3'x3'	3'x3'
<b>Irrigation</b>	Surface	Surface	surface	Drip	Drip
<b>Rearing house</b>					
<b>Shed size</b>	85 x 22 ft	42 x 22 ft	78 x 22 ft	47 x 22 ft	60 x 22 ft
<b>Roofing</b>	Coconut leaves woven	Coconut leaves woven	Asbestos	Asbestos	Coconut leaves woven
<b>Window</b>	24 (3'x3')	16 (3'x3.5')	24 (3'x3')	15 (2.5'x3')	14 (3'x3')
<b>Mountages</b>	60 (10'x5')	40 (5'x10')	54 (10'x5')	30 (5'x10')	72 (5'x10')

**Table 4: Cocoon yielding in different seasons at T.K.N Puthur village**

<b>Seasons</b>	<b>Farm 1</b>		<b>Farm 2</b>		<b>Farm 3</b>		<b>Farm 4</b>		<b>Farm 5</b>	
	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)	No of DFLs reared	Total Yield average (Kg)
<b>Summer</b>	<b>250</b>	198±8	<b>200</b>	134±6	<b>250</b>	174±6	<b>200</b>	145±5	<b>250</b>	197±3
<b>Monsoon</b>	<b>250</b>	235±7	<b>200</b>	153±7	<b>250</b>	209±1	<b>200</b>	170±6	<b>250</b>	215±5
<b>Winter</b>	<b>250</b>	255±5	<b>200</b>	205±5	<b>250</b>	245±5	<b>200</b>	204±6	<b>250</b>	254±6

Sericulture plays a vital role in rural development and unemployment, as it integrates well with the farming systems and has the potential to generate attractive income throughout the year. It needs low capital and provides year round employment (Hanumappa and Erappa, 1985). The quality of mulberry leaves play an important role for success in the sericulture industry and direct its economics (Choudhury *et al.*, 1997). Mulberry cultivation is the agriculture part of sericulture which constitutes rearing of silk worms and reeling of silk.

In our observations farmers were identified the diseased worms and removed before the start of spinning. Each season contains some more variation in harvesting of cocoon harvesting. Despite of farmers reared number of dfls to be same. In ponnapuram village farms Pon-1 and Pon-4, reared 300 dfls, but the average cocoon yielding varied like in summer 249 kg and 257 kg respectively. The same quantity of dfls reared in winter season farmers harvested 300 kg and 298 kg respectively. These results also concluded the results of Rahmathulla and Suresh, (2012). In the TKN puthur village farms TKN-1, TKN-3 and TKN- 5 were reared 250 dfls in all seasons. But the average yield of cocoon in summer 198 kg and winter 255kg of farm TKN-1, summer 174 kg and winter 245 kg of farm TKN-3, summer 197 kg and winter 245kg of farm TKN-5. The 200 dfls reared farm TKN- 2 harvested in summer 134 kg and winter 205 kg of cocoons. Similarly, the 200dfls reared farm TKN- 4 harvested in summer 145 kg and winter 204 kg of cocoons.

For the overall consideration winter seasons harvested have more production of cocoons compared to other seasons. Shivkumar *et al.*, (2018) cocoon harvested 323 kg, who reared 300 dfls in winter season. These results are confirmed that the farmers report. The average kg of harvesting in three villages 300 dfls and 200 dfls was reared slight changes occur in production of cocoon in all season. Harendra Kumar *et al.* (2013) found that, spring season showed better rearing performance than other seasons. The present observation results are also in agreement with the findings of Masrat *et al.* (2014) who have reported higher cocoon weights for these genotypes during spring and summer seasons under temperate climatic conditions.

In the present observation results also confirmed that in the winter, batches reared under natural climatic conditions had a higher conversion efficiency of ingested and digested food. This indicated that during the summer environmental conditions were unfavourable for silkworm growth, larval duration was shorter; the lifecycle was completed early and naturally. As per the farmer statement, less food was required under optimum temperature and humidity conditions to produce 1gm of shell when compared with the rainy and summer season batches.

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