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## EFFECT OF STEM BARK EXTRACTS OF *OROXYLUM INDICUM*; AN ETHNOMEDICINAL FOREST TREE ON SILK PRODUCTION OF *BOMBYX MORI*

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### Keywords:

*O. indicum*, *Bombyx mori*, Mulberry, Stem bark extract

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**ABSTRACT:** The present investigation was under taken to find out the effect of stem bark extracts of medicinally important forest tree *Oroxylum indicum* (L) Kurz on silk production of *Bombyx mori*. Silk worms were fed with the leaves of mulberry fortified with stem bark extracts of *O. indicum*. The silk worms were reared up to the end of fifth instar. As the concentration of stem bark extract of *O. indicum* increased, there was significant increase in the average cocoon weight, pupal weight, shell weight, silk percentage and also filament length of silk. Hence, the stem bark extract of *O. indicum* can also be considered as cheap and abundant source to enhance the commercial characters of silk.

**INTRODUCTION:** Medicinal and aromatic plants constitute a major source of natural organic compounds widely used in human health care. These plants produce many compounds as secondary metabolites that have no apparent metabolic, physiologic and structural role in the producer, but often have effects on other organisms.

In many cases they are believed to function as biochemical defense<sup>1</sup>. Isolation of secondary metabolites from the bark of *O. indicum* showed that it contains antimicrobial, analgesic, antifungal activity<sup>2, 3</sup> and it is included in famous tonic formulation *Chyawanaprasha*.

The species *O. indicum* is widely used in Ayurvedic preparations and is one of the ingredients of *Dasamoolam*, *Sidhartha Kadhiagadam*, *Misraka sneha*, *Amrotharishta* and *Mashataila*. It possesses antiarthritic, antifungal and antibacterial activity<sup>4</sup>. Recent investigations on biologically active secondary metabolites from the stem bark of *O. indicum* showed that the stem bark has more antimicrobial effect than the root<sup>5</sup>.

Plants are the richest source of phytochemicals which influence the life and behavior of several insects<sup>6</sup>. Plant extracts are also considered as cheap and abundant source to increase the silk yield. *Bombyx mori* is of great economic importance as a foreign exchange earner for many silk producing countries of the world<sup>7</sup>.

The silkworm is the larva or caterpillar of the domesticated silkworm, *B. mori*. It is an economically important insect, being a primary producer of silk. A silkworm's preferred food is white mulberry leaves<sup>8</sup>.

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Plant extracts have tendency to increase biological characters such as larval, cocoon, pupal and shell weight, shell ratio percentage and length of silk filament.

Hence, the present investigation has been under taken to find out the efficacy of stem bark extracts of *O. indicum* on silk production of *B. mori* when fed with leaves of mulberry.

## MATERIALS AND METHODS:

**Plant material:** The stem bark of *O. indicum* was collected from trees growing in the Kakatiya Arboretum, Research & Development, Forest Department, Warangal district, Andhra Pradesh, India.

**Preparation of extract:** The collected plant material (stem bark) was washed thoroughly with distilled water to remove the surface contaminants and shade dried under room temperature for 30-45 days. The material was finely powdered using an electric blender and stored in air tight containers until use. 25gm of the dried powder was soaked in 150 ml of distilled water over night. The extract was filtered on the next day through a muslin cloth and filtrate was centrifuged at 3000 rpm for 15 min. The supernatant was maintained as stock solution (100%).

From this solution 1:1, 1:2 and 1:3 concentrations were prepared using distilled water. Fresh extracts were prepared for every 3<sup>rd</sup> day at the time of use. The leaves were soaked in three concentrations (T<sub>1</sub>, T<sub>2</sub> & T<sub>3</sub>) of stem bark extract and these fortified leaves were fed to silkworm larvae from 2nd moult onwards to till spinning. Rearing was conducted in wooden trays with four feedings per day.

**Silk worm rearing and collection of samples:** For present investigation, ten dfls of Bivoltine dihybrid

silk worms (*B. mori*) purchased from NSSO (National Silkworm Seed Organization), Bangalore, Karnataka, India were used. The silk worms were reared upto the end of fifth instar as per the standard rearing method suggested by Datta *et al.*, 1996<sup>9</sup> using package of practices by Krishnaswami *et al.*<sup>7</sup>. The larvae after second moult were selected for treatment and were divided into four experimental groups and each group consisted of three replicates with 300 larvae each.

The stock solution (10ml) of the bark extract was diluted with known quantity of distilled water and three different concentrations of plant extracts T<sub>1</sub> (1:1), T<sub>2</sub> (1:2) and T<sub>3</sub> (1:3) (plant extract: Distilled water) were prepared to serve as treatments. These solutions were sprayed on the required quantity of mulberry leaves with an atomizer. The sprayed leaves were shade dried to remove excess moisture and fed to silk worms. The mulberry leaves sprayed with distilled water were served as control. The leaves fortified with different concentrations of stem bark extracts of *O. indicum* were given daily to the silk worms after second moult till the day of spinning.

**Data Analysis:** Data on cocoon, shell, pupal weight and filament lengths were recorded periodically. Maximum of 30 replicates were maintained for each experiment and each experiment was repeated at least thrice. The data were analyzed statistically following the method of Pillai and Sinha (1968)<sup>10</sup>.

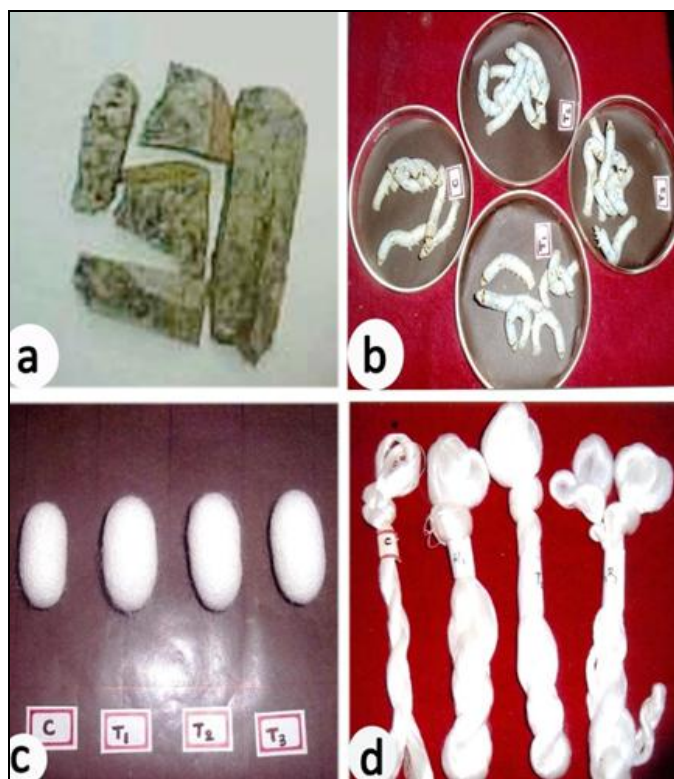
**RESULTS AND DISCUSSION:** The results on the influence of stem bark extracts of *O. indicum* on economical traits of silk worm are presented in **Table 1** and shown in **Fig. 1**. All the concentrations of the stem bark extract of *O. indicum* recorded higher cocoon, shell, pupal weight than the control.

**TABLE 1: EFFECT OF STEM BARK EXTRACTS OF *O. INDICUM* ON COMMERCIAL CHARACTERS OF SILK WORM**

Treatments	Average cocoon weight (gm)	Average pupal weight (gm)	Average shell weight (gm)	Average silk percentage (%)	Average filament length (m)
T <sub>1</sub>	1.951±0.11	1.555±0.10	0.40±0.005	20.51±0.89	989±40.02
T <sub>2</sub>	1.845±0.05	1.493±0.07	0.35±0.025	19.02±1.53	902±12.70
T <sub>3</sub>	1.765±0.03	1.439±0.04	0.33±0.011	18.75±0.99	899±16.07
C	1.701±0.01	1.392±0.04	0.311±0.011	18.23±0.73	714±8.72

T<sub>1</sub>= 1:1, T<sub>2</sub>= 1:2 and T<sub>3</sub>= 1:3; Data representing an average of 10 cocoons.

Average cocoon weight is increased at T<sub>1</sub> in comparison to all other treatments. Pupal weight was found to be enhanced at T<sub>1</sub> (Fig. 1 b-c). Highest percentage of silk production was observed at T<sub>1</sub> followed by T<sub>2</sub> and T<sub>3</sub>. The same effect of stem bark extract was noted in shell weight. It was interesting to record that the silk filament length also has been enhanced maximum with T<sub>1</sub> treated silk worms compared to controls and also rest of the treatments (Fig.1 d).



**FIG. 1 a-d: EFFECT OF STEM BARK EXTRACTS OF *O. INDICUM* ON COMMERCIAL CHARACTERS OF SILK WORM (*B. MORI*)** a) Stem bark ; b) Silkworms fed with mulberry leaves coated with stem bark extracts; c) Cocoons (C=Control, T<sub>1</sub> =1:1, T<sub>2</sub>=1:2, T<sub>3</sub>=1:3); d) Enhanced quantity of silk production in various treatments (C=Control, T<sub>1</sub> =1:1, T<sub>2</sub>=1:2, T<sub>3</sub>=1:3 respectively).

The effectiveness of the plant extract was due to combined action of chemical compounds such as alkaloids, flavonoids, triterpenoids, and other compounds of phenolic nature which are classified as antimicrobial compounds<sup>11, 12, 13</sup>. Extensive studies using these extracts on the growth and production of the mulberry silk worm, *B. mori* are likely to throw much light on the possibility of using such extracts as a prophylactic measure during silk worm rearing to improve silk production<sup>14</sup>.

Thus, the stem bark extracts of *O. indicum* showed the influence on enhancement of silk production. The results indicate that the plant secondary metabolites can be used not only to control diseases of silk worm<sup>15</sup> but also to increase the commercial characters of silk worm.

**CONCLUSION:** From the present investigation, it can be concluded that the biologically active secondary metabolites present in *O. indicum* beside their medicinal importance can also be used as a source that can enhance the commercial characters of silk worm, which improve silk yield.

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