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STUDIES ON CROP PERFORMANCE OF TROPICAL TASAR SILKWORM *ANTHERAEA MYLITTA* (DRURY) IN *ZIZIPHUS MAURITIANA* LAM. (BER), AN AVAILABLE SECONDARY FOOD PLANT IN SIMILIPAL BIOSPHERE RESERVE, ODISHA FOR COMMERCIAL EXPLOITATION

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ABSTRACT
The availability of food plants and their nutritional status play a pivotal role for successful tasar culture both in commercial and seed crops. In the present investigation an experimental rearing of Indian tasar silkworm *Antheraea mylitta* Drury was carried out during commercial season in the Kalapathar village of Tasar Rears Co-Operative Society (TRCS), Bhuasuni in the district Mayurbhanj of Odisha state located in the peripheral zone of Similipal Biosphere Reserve. The experiment was undertaken to study the effect of *Ziziphus mauritiana* Lam. (Ber), a secondary food plant on cocoon crop performance. The rearing performance of the silkworm on *Z. mauritiana* in terms of cocoon per DFLS and silk ratio was found comparable to that with *Terminalia tomentosa* (Asan), a primary food plant species of *A. mylitta* Drury. It is seen that the crop production (yield) is about 18 to 21% in terms of ERR and is comparable to that of traditional primary food plant *i.e.* 24-28%. This study indicates the commercial perspective and feasibility of *Ziziphus mauritiana* as alternate food plant of tasar silkworm rearing in the period of exigency.

INTRODUCTION

Antheraea mylitta Drury is a semi domesticated tasar silkworm reared for production of tasar silk in India. It is a polyphagous insect and the larval stage primarily feeds on the leaves of Asan (*Terminalia tomentosa*), Arjuna (*T. arjuna*), Sal (*Shorea robusta*) and secondarily on more than dozen of foods plants (Satyanarayan and Srivastava, 2005; Satyanarayan *et al.,* 2005; Reddy *et al.*, 2010, Deka and Kumari, 2013). The leaf nutrition of tasar food plants can affect better crop yield as the feed quality has direct influence on the growth and development of the silkworm (Dash *et al.,* 1962; Ray *et al.*, *1998*; Sinha *et al.*, *2000*; Rehman *et al.*, 2004; Saikia *et al.*, 2004; Reddy *et al.,* 2010 and Reddy, 2010). Therefore, for successful tasar culture both for commercial and seed crops, the selection of food plant is very vital (Deka and Kumari, 2013). The district Mayurbhanj of Odisha is commercially important for tasar silk production due to abundance of food plants and concentrated mainly peripheral area of Similipal Biosphere Reserve (Saxsena, 1989; Dixit, 2007). However, vast availability of *Ziziphus mauritiana* Lam. (Ber), sinonym *Ziziphus jujuba* Lam. (Ber), a secondary food plant in tasar rearing areas of Similipal Biosphere Reserve and lack of information on its commercial feasibility for tasar rearing prompted to take up the present investigation.

MATERIALS AND METHODS

The experiment was carried out in Kalapathar-village of Tasar Rear Co-operative Society (TRCS), Bhuasuni situated in the periphery of Similipal Biosphere during 2010 - 2012 continuously for three years in six crops. The silkworm rearing was conducted on *Ziziphus mauritiana Lam.* (Ber) food plant plentily available in the nearby area. The village Kalapathar is situated about 300-350 meters ASL and annual temperature ranges from 20ºC-31ºC during rearing periods *i.e.* July - October. The 1st crop (July - August) was experimented with 1000 worms hatched from 5 B.V. dfls supplied by Research Extension Centre, Central Silk Board, Bangriposi, Mayurbahnj, Odisha and reared in as per recommendation of FAO manual and guidelines published by Regional Tasar Research Station Central Silk Board, Baripada, Mayurbhaj, Odisha with crop duration *i.e.* 35-40 days . About 10 full grown plants were used for feeding and conducting seed crop rearing. The cocoon crop was evaluated taking different rearing parameter like larval weight, ERR (%), cocoon weight, pupa weight, shell weight, silk ratio etc. in two consideration (Dash and Nayak, *1992*). Similarly the second Crop (September - October) was

Table1: Rearing performance of *A. mylitta* Drury,on *Ziziphus mauritiana* (Ber) food plant

Sl no	Parameters	2010		2011		2012		Average	
1	Rearing Seasons	1st	2nd	1st	2nd	1st	2nd	1st	2nd
2	Larval Wt.(g)	38 +0.32	43+0.24	39+0.28	44+0.33	38+0.29	44+0.31	38+0.29	44+0.27
3	ERR%	18 +0.24	21+0.18	20+0.31	22+0.29	17+0.17	20+0.25	18+0.20	21+0.28
4	Cocoon Wt.(g.)	8.21+0.37	8.74+0.31	8.17+0.28	8.65+0.38	8.07+0.30	8.53+0.33	8.15+0.35	8.64+0.32
5	Pupae Wt.(g.)	6.85+0.29	6.98+0.33	6.80+0.37	6.92+0.30	6.14+0.38	6.87+0.32	6.59+0.31	6.92+0.28
6	Shell Wt.(g.)	0.68+0.14	0.79+0.19	0.66+0.15	0.74+0.12	0.62+0.16	0.75+0.17	0.65+0.13	0.76+0.18
7	Silk Ratio (SR%)	8.28	9.03	8.07	8.55	7.68	8.79	7.97	8.79

Table 2: Effect of meteorological parameters on seasonal crop success

Sl. No.	Meteorological Parameters	1st Crop (rainy)			2nd Crop (autumn)		
		Min	Max	A.V.	Min	Max	A.V.
1	Temperature	25+0.31	28+0.26	27+0.29	22+0.72	26+0.54	24+0.63
2	Humidity (%)	84+0.65	96+0.47	90+0.55	80+0.52	88+0.75	84 +0.46
3	Rainfall (mm)	-	-	558	-	-	426
4	No. of Rainy Day	-	-	41	-	-	36
5	Photoperiod (Hours)	9	12	11	8	11	10

Table 3: Comparative rearing performance of *A. myllita* on *Z. mauritiana* and *T. tomentosa*

Sl No.	Parameters	Average for 3 years on *Z. mauritiana* (Secondary)		Average for 3 years on *T. tomentosa* (Primary)	
1	Rearing Seasons	1st	2nd	1st	2nd
2	Larval Wt.(gm.)	38+ 0.29	44+ 0.27	40+ 0.36	47+ 0.27
3	ERR%	18+ 0.20	21+ 0.28	24+ 0.37	28+ 0.28
4	Cocoon Wt.(gm.)	8.15+ 0.35	8.64+ 0.32	9.12+ 0.38	9.64+ 0.32
5	Pupae Wt.(gm.)	6.59+ 0.31	6.92+ 0.28	7.34+ 0.30	7.92+ 0.28
6	Shell Wt. (gm.)	0.65+ 0.13	0.76+ 0.18	0.86+ 0.12	1.60+ 0.18
7	Silk Ratio (SR%)	7.97+ 0.27	8.79+ 0.34	9.42+ 0.41	12.3+ 0.47

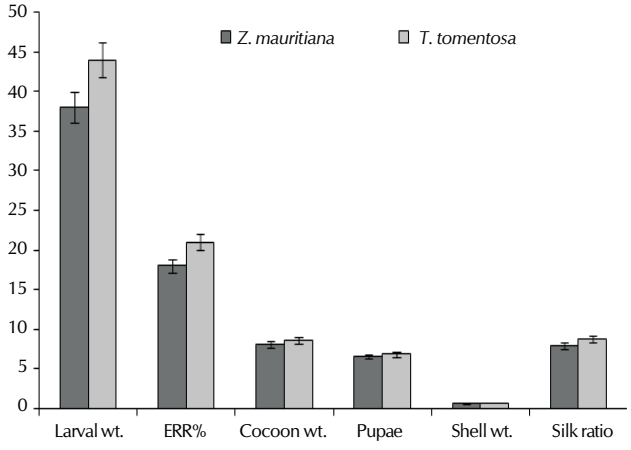

Figure 1: Comparative study of crop performance on *Z. mauritiana* and *T. tomentosa*

started with 1000 worms as per above methods with crop duration 45 - 50 days. About 15 food plants were used for conducting seeds crop rearing and subjected to evaluation as mentioned earlier. The experiment was conducted for 3 years *i.e.* from 2010 -12 in same villages with two crops per year and the result were statistically analyzed (Sokal and Roff, *1969)*.

RESULTS

The rearing performance of *A. mylitta Drury* on Ber (*Z. mauritiana*) plant and *T. tomentosa* plant revealed that the performance is higher in autumn season (II Crop) than Rainy Crop (1 Crop) in all respect (Table 1).

The silkworm crop for last three seasons (6 crops) was a success (plate 1) and ERR ranges from 17 to 22 cocoons per crop in 1st and 2nd crop respectively in *Z. mauritiana* (Table 2). The t-tests also indicates significant ($p < 0.005$) seasonal difference in all the above parameters (Fig. 1). From meteorological data, it is presumed that second crop is more favorable for crop success than first due to average temperature ranges from 22-26°C and humidity 80-88% with 36 rainy day and 10 hours photoperiods (Table 2).

The data presented on (Table 3) indicates the comparative rearing performance of *A. mylitta* on *Z. mauritiana* and *T. tomenstosa* food plants and level of statistical significance.

It is evident that no significant difference in cocoon characteristics was observed for the silkworm reared on two different food plants *i.e. Z. mauritiana* (secondary food plant) and *T. tomenstosa* primary food plant) (Table 3, Fig. 1). The study indicates the commercial perspective and feasibility of *Z. mauritiana* as alternative food plant for tasar silkworm rearing.

DISCUSSION

The food plant and their nutritional status in tasar culture play a pivotal role for successful larval rearing resulting to higher cocoon number for better quality in addition to climatic condition. Production of cocoons in rainy is always less due to high temperature and high humidity. The autumn crops are favorable for silkworm rearing irrespective of the availability of food plants (Dash *et al.*, 2012). It is understood that climate

Figure 1: a. Brushing of silkworm in *Z. mauritiana*, b. Feeding of silk worm in leaves, c. Formation of silkworm coccons, d. Matured silk worm larvae

condition has also an important role in addition to food plants (Yokoyama, 1962) for success of tasar crop. The autumn cocoon crop is better in comparison to rainy, may be due to favorable temperature, humidity, photoperiods and no. of rainys day less than rainy season. Secondly, rearers were habituated with Asan (*T. tomentosa*) plants available in forest due to bushy and non thorny nature. However, due to deforestations (primary food plants were severely cut by wood cutter for its high fuel value), silkworm rearing is badly affected for shortage of food plant especially in autumn crop. They can use *Ziziphus mauritiana* as substitute food plants for conducting silkworm commercial rearing (Deka *et al*., 2013). Rearers can use *Ziziphus mauritiana* for commercial exploitation as the period do not favour flower and fruiting in the plant and leaf is fully matured for crop. Lot of *Ziziphus* plants are available in Similipal Biosphere which can be exploited for tasar rearing to achieve better crop and best return in the form of money. Rearer can also use *Ziziphus mauritiana* plant for rearing substitute to primary plant in exigency of shortage of *T. tomentosa* plant. The study indicates the commercial prospective of *Ziziphus mauritiana* as alternate food plant for tasar silkworm rearing feasible.

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