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STUDIES ON THE REARING PERFORMANCE OF ERI SILKWORM SAMIA CYNTHIA RICINI BOISDUVAL ON DIFFERENT CASTOR VARIETIES

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Abstract: ***Eri-culture is practiced and proved economically beneficial to the tribals and other weaker section of the society in North-Eastern states of India. Recently the eri-culture has also spread to other parts of India like Orissa and Andhra Pradesh. Maharashtra is one of the Non-traditional states for sericulture. However, recently some of the trials were undertaken to prove success of the ericulture in some parts of the Maharashtra. Eri silkworm is polyphagus, in present study some castor varieties which are popular among the farmers for commercial castor seed production were chosen to feed castor silkworm Samia cynthia riciniBoisduval. The varieties including GCH3, GCH6, AKC-1, Girija, GCH-4, GCH-5 (Ricinus communis L.) were used for feeding the silkworms. Rearing was conducted under controlled conditions in laboratory at 25^{o} C±2 and RH 70 to 75 percent. Study was undertaken to know which variety is more suitable for promoting commercial ericulture. It was noticed that GCH 4 variety found more suitable as compared to the other varieties with respect to ERR, single cocoon weight, shell weight percentage, pupal weight, fecundity by 20 percent. The present study would be beneficial for popularization and commercialization of ericulture for castor growers of the state.***

Keywords: Ericulture, castor, GCH4, rearing.

Introduction

Samia cynthia ricini Boisduval, a Lepidopteran Saturniidae silkworm is commonly known as eri silkworm which is polyphagous in nature and feeding on leaves of some plant species belonging to families- Euphorbiaceae, Araliaceae. Among these, Castor (*Ricinus communis* L.) is the primary food plant. It can also be called as principal host plant of eri silkworms. The nutritional quality of castor leaves influences the growth and development of eri silkworms, cocoon yield and quality.

In the different states of India, people practise ericulture. Among all the states Assam occupies highest position in terms if Eri silk production. The morphological traits and nutritional factors could be used in selection of castor genotypes Solanki Joshi, 2001). In addition, the quality of feeds given to insects generally affects the economic products of insects. So, silkworm nutrition is one and the major factor which affect development and productivity of silkworms (Milner, 2004, Baruah, 2007). Silkworm nutrition deals about the substances required by silkworm for its growth and metabolic functions and obtained from ingested food and some other nutritional components synthesized through various biochemical pathways including proteinous silk fibre of commercial interest (Hamano *et al*. 1986). Silkworms have adapted to feeding to derive and store adequate energy, nutrients and water from the food they consume. Feeding silkworms provides energy for growth, development, reproduction and many of its other needs. Such nutritional requirements in food consumption have direct impact on the overall genetic traits such as larval and cocoon weight, amount of silk production, pupation and reproductive traits. Thus, successful sericulture depends on increased production of leaves with high nutritive values. Therefore, the better the quality of leaves, the greater the chances of getting good cocoon harvest (Krishnaswami, 1978). Moreover, a significant correlation has been reported between chemical compositions of castor leaf and larval growth and cocoon characters. Nutritional value of food plants either alone or in combination plays an important role in the larval growth and silk productivity. Improvement in larval and cocoon characters has also been witnessed with increase in chemical composition of leaves (Sannappa and Jayaramaiah, 1999). Rearing performance of eri silkworm *Philosamia ricini* (Hutt.) was successful under Vidarbha region of Maharashtra on different varieties of castor (Jadhav *et al.*,2012). Jayaprakash *et al.* have reintroduced eri culture in Andhra Pradesh (Jayaprakash *et al.*2003). Prospects of ericulture in Maharashtra are also been defined by(Jadhav *et al.*,2004). Sericulture brings better income to the farmers and also helps in women empowerment (Jadhav A. D. 2005, Jadhav A. D. 2008). Castor grows widely and abundantly in many parts of Maharashtra. Eri silkworm larvae feed on castor leaves to obtain essential nutrients for their growth, survival and production of silk. Thus, the success in good quality silk production depends upon variety on which the worms are fed. Therefore, it can be recognized that selection of good castor genotypes is essential to grow and develop bettereri larvae. Therefore, the present study was carried out to know the effect of selection of castor genotypes on rearing performance of eri silkworms under the climatic condition of Kolhapur district.

Material and method

The study was conducted at the laboratory of the Department of Zoology, Shivaji University, Kolhapur in the monsoon season of the year 2016. The eggs were taken from Central Silk Board, Jorhat, Assam and were reared in the

laboratory, under the favourable climatic conditions, the temperature and relative humidity were maintained for the development of larvae by using techniques described by Dayashankar(1982).

Four varieties of castor genotype were selected for the experiment GCH4, GCH6, Girija, GCH3. The silkworms were fed on the above said varieties. The larvae were fed 3 times a day from first instar to obtain 5th instar stage. Matured worms were picked and mounted on the plastic mountage for spinning, on 8th day cocoons were harvested, counted and weighed. Data was recorded and analysed for further study.

Results and discussion

In the present study it was observed that, feeding response of *S. Cynthia ricini*to different varieties of castor available was good. The larvae started feeding immediately when fed. It is noticed that, the growth was faster in GCH4 as compared to the rest of the four castor varieties GCH6, Girija, GCH3.Result arerecorded in table no.1 to 3.

Table 1. Larval parameters of eri silkworm at different instars by feeding with five castor varietiesduring monsoonseason

Variety of castor	Instar I (days)	Instar II (days)	Instar III (days)	Instar IV (days)	Instar V (days)	Total larval Duration (days)	Mature larval weight (gm)
GCH4	2.64	3.4	4.02	4.11	6.36	20.53	6.94
GCH6	3.45	3.88	4.64	4.76	6.88	23.61	6.51
Girija	3.18	3.75	4.24	4.58	6.67	22.43	6.71
GCH3	2.89	3.67	4.19	4.47	6.39	21.61	6.89

The results recorded in above table show that, duration taken to complete first instar with GCH 4 variety in 2.64 days, whereas, it was 3.45 in GCH 6, 3.17 in AKC-1, 3.18 in Girija and it was 2.89 daysin GCH 3. Second instar stage duration was completed in3.40 days in larvae fed with GCH4 variety,where as in GCH 6 it was noted for 3.88days, with respect to Girija variety duration was 3.75 days and 3.67 in GCH 3. The third instar takes 4.02 days to complete when fed on GCH 4 variety, 4.64 when fed on GCH 6. However, when larvae fed on Girija duration recorded was 4.24 days and it was 4.19 days when fed with GCH 3. Likewise, results are also recorded for fourth and fifth instar as well. The duration of larvae of fourth instar fed on GCH 4 variety was 4.11 days, that with those fed on GCH6duration was 4.76 days, with Girija variety feeding larvae took 4.58 daysand with GCH3 variety duration was 4.47 days to complete instar. In the fifth instar the larvae fed on GCH4 took 6.36 days. The weight of the larvae in fifth instar average weight noticed was 6.94 gram, when fed on GCH- 4, 6.51gms weight was recorded whereas with GCH6 variety it was, 6.56gms, when fed by Girija and GCH3 cocoon weight was 6.89.In the present study duration of larvae fed on GCH4 was 20.53 days, that with GCH6 it was 23.61 days, while by feeding AKC1 it was 22.7 days, in Girija 22.43 and by GCH3 fed, 21.61 days. The matured larvae average recorded weight was 6.94 gm in GCH4 variety of castor, 6.51 gm in GCH 6 variety, 6.56gm in AKC1 variety, 6.71 gm in Girija and 6.89gms in GCH3.

Table 2. Cocoon parameters of eri silkworm by feeding with five castor genotypes during monsoon season

Variety of Castor	Cocoon weight (gm)	Shell Weight (gm)	Shell Ratio (%)	ERR (%)
GCH4	2.65	0.44	16.60	93.4
GCH6	2.13	0.3	14.08	89.03
Girija	2.35	0.35	14.89	88.2
GCH3	2.5	0.39	15.6	92.07

The data recorded in above table it is found that the cocoon weight of the larvae fed on GCH 4 was 2.65 gm, it was recorded 2.13 gm in the larvae fed on the GCH6 variety, while the cocoon weight of the larvae fed on Girija was 2.35 gm, and the cocoon weight of the larvae fed on GCH 3 was 2.5 gm. The shell weight of the larvae fed on GCH4 was 0.44 gm, while it was 0.3 gm of the larvae fed on GCH6, shell weight of the larvae fed on Girija was 0.35 gm, however the

shell weight of the larvae fed on GCH3 was 0.39 gm. The shell ratio recorded was 16.60% in the larvae fed on the GCH4 variety, it was 14.08% in the larvae fed on the GCH6 variety, the shell ratio was 14.89% in the larvae fed on the Girija variety and 15.6 % in the larvae fed on GCH3 variety.

The effective rate of rearing in the larvae fed on the GCh 4 variety was 93.4%, it was 89.03% in the larvae fed on the GCH 6 variety while the effective rate of rearing in the larvae fed on Girija variety was 88.2% and 92.07 % in the larvae fed on the GCH3 variety.

Table 3. Grainage parameters of eri silkworm by feeding with five castor genotypes during monsoon s season

Variety of Castor	Pupal period (days)	Pupal weight (gm)	Average fecundity	Hatchability	Moth emergence
GCH4	13.78	2.19	365.43	99.16	96.8
GCH6	14.67	1.86	356.66	98.7	96.51
Girija	14.11	2.03	341.69	98.75	97.00
GCH3	14	2.15	340.45	99.12	98.14

The above table shows the data comparison of pupal period in days, pupal weight in gm, average fecundity, hatchability, moth emergence. It indicates the pupal period was 13.78 days when the larvae were fed on GCH4 variety, it was noted 14.67 days when they were fed on GCH6 variety, while the pupal period of larvae fed on the Girija variety was recorded 14.11 days and 14 days in the larvae fed on GCH3 variety.

The pupal weight when recorded was 2.19 gm of the larvae fed on GCH4 variety, 1.86 gm of the larvae fed on GCH6 variety. It was 2.03 gm of the larvae fed on Girija variety and 2.15 gm in the larvae fed on GCH3 variety.

The average fecundity was 365.43 in the larvae fed on GCH4 variety, 356.66 in the larvae fed on GCH6 variety, however the larvae fed on the Girija variety showed the average fecundity 341.69 and the average fecundity in the larvae fed on GCH3 variety was 340.45. The hatchability was 99.16% in the larvae fed on GCH4 variety, it was 98.7% in the larvae fed pn the GCH6 variety, however the larvae fed on Girija variety showed the fecundity 98.75% and 99.12 in the larvae fed on GCH3 variety.

The moth emergence percentage observed in present study was 96.8% in the larvae fed on the GCH4 variety, it was 96.51% in the larvae fed on the GCH6 variety, while it was 97.00% in the larvae fed on Girija variety, however it was 98.14% in the larvae fed on GCH3 variety.

From above study it is showed that GCH4 variety seems to be more suitable for rearing of eri silkworm and with respect to qualitative and grainage parameters.

Conclusion

The present study showed that castor varieties have strong influence on eri silkworm rearing performance. Therefore, selection of castor variety for eri silkworm rearing based upon its rearing performance should be done. Growth of Eri silkworm is very important in order to get better egg production, larval development and cocoon yield. Hence, with respect to Maharashtra conditions castor variety GCH-4 was found to be the best promising with respect to performance of eri silkworm. From the present study it is also concluded that the ericulture practice could be implemented in the western region of Maharashtra. This experiment helps very much in providing guidelines to the castor growers, that they can use eri culture as secondary source of income.

Single moth after emergence

Eggs of Eri silkworm

First instar larvae

Pupa after taken out from cocoon

Pupa kept for emergence

Moths and cocoons of Eri silkmoth

Mating of Male and Female eri silkmoths

Moths and cocoons of Eri silkmoth

Bibliography

Baruah A. B., Baruah P. K., (2007). Studies on the status of biochemical constituents in four morphotypes muga food plant som (Persea bombycina).

Dayashankar K. N., (1982). Performance of eri silkworm Samia Cynthia ricini Boisduval on different host plants and economics of rearing on Castor under Dharwad conditions. M. Sc. (Agri.) Thesis.

Hamano K., Miyazawa K., Mukiyama F. (1986). Racial difference in the feeding habit of the silkworm, Bombyx mori. Seric. Sci. 55: 68-72.

Jadhav A. D., Hazare T. N., Jagdish Prasad and Rode S. A., (2004). Prospects of Eri culture in Maharashtra. Indian Silk Vol. 43(5):15-16.

Jadhav A. D., (2008). Sericulture brings better income. Indian Silk46(9) 27.

Jadhav A. D., (2012). Rearing performance of eri silkworm Philosamia ricini (Hut.) on different varieties of castor grown under Vidarbha region, Bio spectra 7(1), 45-50.

Jadhav A. D., (2009). Value addition to Sericulture in South Korea. Indian Silk, 47(10): 12-13.

Jayprakash P., Rao B. V. S., Rao K. V., Rao J. V., Krishna and Sinha B. R. R. P., (2003). Reintroduction of Eri culture in Andhra Pradesh: Hopes galore. Indian Silk, 41(12): 19-20.

Sannappa B., Jayaramaiah M., Govindan R., and Chinnaswamy K. P., (2002). Advances in Ericulture. Seri Scientific Pub., Bangalore: 144.

Milner J. A. (2004). Nutrition and gene regulation: Molecular targets for bioactive food components. Nutr. 134: 2492-2498.