Int. J. Indust. Entomol. Vol. 17, No. 1, 2008, pp. 153~155

[Note]

International Journal of
Industrial Entomology

Studies on Tolerance Level Against *Antheraea mylitta* Cytoplasmic Polyhedrosis Virus (AmCPV) in Different Eco-races of Tropical Tasar Silkworm, *Antheraea Mylitta* Drury

G. P. Singh*, S. B. Zeya[1], A. K. Srivastava[1], N. G. Ojha and N. Suryanarayana[2]

Silkworm Pathology Laboratory, Central Tasar Research and Training Institute, Ranchi - 835 303, India
[1]Silkworm Breeding and Genetics Laboratory, Central Tasar Research and Training Institute, Ranchi - 835 303, India
[2]Central Tasar Research and Training Institute, Ranchi - 835 303, India

(Received 22 June 2008; Accepted 5 August 2008)

Pathogenic infection in tasar silkworm, *Antheraea mylitta* Drury is common and there is a breed specific response regarding tolerance. Hence, the tolerance level of three eco-races of tasar silkworm *viz.* Daba, Sarihan and Raily to *Antheraea mylitta* cytoplasmic polyhedrosis virus (AmCPV) infection was tested. The survival of Daba, Sarihan and Raily eco-races was significantly different ($p < 0.05$) when challenged with the same concentration (1×10^5 polyhedra/ml) of AmCPV. Daba eco-race was more tolerant to the AmCPV infection having higher survival (65.7%) and LC_{50} values (1000893.17 polyhedra/ml) of AmCPV followed by Sarihan eco-race (50.7% survival and LC_{50} value of AmCPV 187203.6168 polyhedra/ml) and Raily eco-race (24.3% survival and LC_{50} value of AmCPV 5176.37 polyhedra/ml). The tolerance level of Daba and Sarihan eco-races against AmCPV was more than two times than Raily eco-race.

Key words: *Antheraea mylitta*, AmCPV, Tolerance

Introduction

In general, the silkworm breeds or the breeds of different geographical origin do differ in the degree of susceptibility to pathogens. Ratnasen *et al.* (1999) reported that silkworm breed g133 exhibited three times higher tolerance than breed KA on challenge with the same concentration of nuclear polyhedrosis virus. Singh *et al.* (2003) found that SU12 was more tolerant to densonucleosis virus than Zhenon1when screening the tolerance level of silkworm breeds for breeding of *Bombyx mori* densonucleous virus (BmDNV) resistant silkworm. Singh *et al.* (2003) studied the susceptibility of Indian silkworm breeds to *Aspergillus* infection.

Tropical tasar silkworm, *Antheraea mylitta* Drury, an economically important insect is reared in out door condition on *Terminalia arjuna, Terminalia tomentosa* and *Shorea robusta* food plants to produce natural silk. Virosis caused by *Antheraea mylitta* cytoplasmic polyhedrosis virus (AmCPV) is one of the important diseases, which cause 25~30% loss in cocoon crop (Sahay *et al.*, 2000). The tasar silkworm eco-races *i.e.* Daba, Sarihan and Raily, reared by tasar farmers in different parts of India are known for their good commercial characters (cocoon weight, shell weight, silk ratio *etc.*). Information on tolerance of the tasar silkworm eco-races to cytoplasmic polyhedrosis virus infection is scanty. Hence, in the present study the tolerance level of these eco-races to cytoplasmic polyhedrosis virus was tested.

Materials and Methods

Silkworm eco-races

Three tasar silkworm eco-races *i.e.* Daba, Sarihan and Raily, reared by tasar farmers in different parts of India and known for their good commercial characters (cocoon weight, shell weight, silk ratio *etc.*) were selected to test their tolerance level against cytoplasmic polyhedrosis virus infection.

*To whom the correspondence addressed
Central Tasar Research and Training Institute, Piska Nagari, Ranchi 835 303, India. Tel: +91 651 2775810; Fax: +91 651 2775629; E-mail: gpscsbranchi@rediffmail.com

Table 1. Probit analysis of the mortality % in response to AmCPV (1×10^3 to 1×10^7)

Silkworm Breed	LC_{50}	Y Mean	X Mean	Proibit equation	Chi square	SE of b	Probability	Fiducial limit
Daba BV	1000893.1796	4.6664	5.3200	y = 2.0581 + 0.4902902	2.7339	0.0484	0.4345	520554.1215 to 1924463.0205
Sarihan	187203.6168	4.9108	5.0782	y = 2.55777 + 0.4594415x	0.7407	0.0453	0.8636	102740.3217 to 341104.5783
Raily	5176.3714	5.4305	4.6118	y = 3.2191 + 0.4795092x	0.7214	0.0494	0.8682	2489.7046 to 10762.2490

***Antheraea mylitta* cytoplasmic polyhedrosis virus (AmCPV) inoculum**

Fresh cytoplasmic polyhedrosis virus inoculum was prepared from diseased silkworms of Daba, Sarihan and Raily. Completely whitened mid-gut obtained from cytoplasmic polyhedrosised silkworm at an advanced stage of infection was homogenized in sterile distilled water. The polyhedral suspension was filtered through a cheese - cloth and the filtrate was centrifuged at 3000 rpm for 15 minutes and the polyhedra were purified following Aizawa (1971) by repeated and differential centrifugation.

Inoculation of polyhedra occlusion bodies (POBs) of AmCPV and rearing of silkworm larvae

The silkworm larvae of all three eco-races were inoculated orally with 200 ml of AmCPV suspension containing 1×10^3, 1×10^4, 1×10^5, 1×10^6, 1×10^7 polyhedra/ml by feeding of AmCPV smeared leaf 24 hrs after 1st moult. Three replications with 100 silkworm larvae each were maintained separately in each eco-race for different concentration. Silkworm larvae were reared on leaf of its primary food plant, *Terminalia tomentosa* (Asan) in indoor under normal rearing conditions up to spinning.

The observations were made on development of disease symptoms and larval mortality. The dead larvae during rearing were examined microscopically for presence of concerned pathogens. Data recorded for mortality due to concerned pathogen, were statistically analyzed using Completely Randomized Design (Snedecor and Cochran, 1995).

Results and Discussion

The survival percent of the eco-races is presented in Fig. 1. The survival of Daba, Sarihan and Raily was significantly different ($P < 0.05$) when challenged with the same concentration (1×10^5) of AmCPV. The higher survival (65.70%) of Daba showed their higher tolerance to AmCPV followed by Sarihan eco-race (50.7% survival) and Raily eco-race (24.30% survival). The tolerance level of Daba and Sarihan eco-races against AmCPV was more than two times when compared with Railly eco-race.

LC_{50} value of AmCPV to Daba, Sarihan and Raily eco-races are presented in Table 1. Observation revealed that Daba eco-race was more tolerant to AmCPV infection followed by Sarihan and Raily. The LC_{50} value of AmCPV to Daba eco-race was higher (1000893.17 polyhedra/ml) which decreased to 187203.6168 polyhedra/ml in case of Sarihan eco-race and 5176.37 polyhedra/ml was recorded against Raily eco-race.

The results of survival percent of silkworm and LC_{50} values of AmCPV indicated that the tasar silkworm eco-races tested in the present study have varied degree of susceptibilities to the infection of cytoplasmic polyhedrosis virus. The Daba eco-race was more tolerant against AmCPV infection than Sarihan and Raily. Similar studies have been conducted by earlier workers in mulberry silkworm, *Bombyx mori* L. Watanabe (1967) observed the difference in survival of different silkworm strains fed with cytoplasmic polyhedrosis virus. Aratake (1973) reported that the different strains of *B. mori* have variation in the resistance to a nuclear polyhedrosis virus. Uzigawa and Aruga (1966) found the difference in survival of different silkworm strains fed with same dose of infectious flacherie virus. Ratnasen *et al.* (1999) found that bivoltine silkworm breed g133 was more tolerant to the infection of nuclear polyhedrosis virus than breed KA. A bivoltine

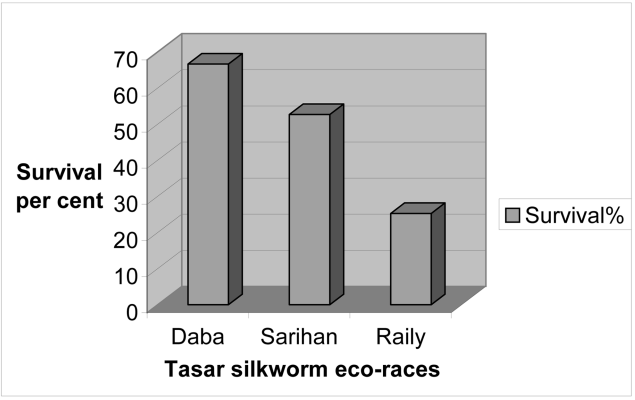

Fig. 1. Survival percent of different tasar silkworm eco-races infected with AmCPV (1×10^5 polyhedra/ml).

silkworm breed SU12 of *B. mori* was having five times more survival than Zhenon1 when challenged with the same dose of *B. mori* densonucleosis virus (Singh *et al.,* 2003). The findings of the present study may help in the breeding of disease resistance silkworm variety.

References

Aizawa, K. (1971) Structure of polyhedra and virus particles of cytoplasmic polyhedrosis; in *The cytoplasmic polyhedrosis of the silkworm*. Aruga, H. and Y. Tanada (eds.), pp. 23-36, Univ. Tokyo Press, Tokyo.

Aratake, Y. (1973) Strain difference in the silkworm, *Bombyx mori* L. in the resistance to a nuclear polyhedrosis virus. *J. Seric. Sci. Jpn*. **42**, 230-238.

Ratnasen, M., M. Ahsan and R. K. Datta (1999) Induction of resistance to BmDNV in to a susceptible bivoltine silkworm breed. *Indian J. Seric*. **38**, 107-112.

Sahay, D. N., D. K. Roy and A. Sahay (2000) Diseases of tropical tasar silkworm, *Antheraea mylitta* D., Symptoms and control measures, in *Lessons on Tropical Tasar*. Thangavelu, K. (ed.), pp. 104, Central Tasar Research and training Institute, Piska Nagri, Ranchi, India.

Singh G. P., T. Selvakumar., S. D. Sharma, B. Nataraju and R. K. Datta (2003) Susceptibility of CSR hybrids of silkworm, *Bombyx mori* L to two species of *Aspergillus* fungi. *Sericologia* **43**, 319-323.

Singh G. P., M. Xu, Y. Chen and R. K. Datta (2003) Development of resistance to *Bombyx mori* densonucleosis virus into a susceptible silkworm breed. *Int. J. Indust. Entomol*. **6**, 145-149.

Snedecor, G. W. and W. E. Cochran (1995) Statistical Methods. Oxford IHB Publishing Co. pp. 339-361, New Delhi.

Uzigawa, K. and H. Aruga (1966) On the selection of resistant strains of infectious flecherie virus in the silkworm, *Bombyx mori* L., *J. Seric Sci. Jpn*. **35**, 23-26.

Watanabe, H. (1967) Development of resistance in silkworm, *Bombyx mori* to per oral infection of a cytoplasmic polyhedrosis virus. *J. Invertibr. Pathol*. **9**, 474-479.