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DM Shinde
Department of Entomology, RCSM Collage of Agriculture Kolhapur, MPKV, Rahuri, Maharashtra, India

IA Ghonmode
Department of Entomology, Collage of Agriculture, Karad, MPKV, Rahuri, Maharashtra, India

AS Bagde
Department of Entomology, RCSM Collage of Agriculture Kolhapur, MPKV, Rahuri, Maharashtra, India

UB Hole
Department of Entomology, RCSM Collage of Agriculture Kolhapur, MPKV, Rahuri, Maharashtra, India

Corresponding Author:
DM Shinde
Department of Entomology, RCSM Collage of Agriculture Kolhapur, MPKV, Rahuri, Maharashtra, India

Study the response of silkworm races (*Bombyx mori* L.) to diseases

DM Shinde, IA Ghonmode, AS Bagde and UB Hole

Abstract
Disease free layings (Dfl's) of seven silkworm (*Bombyx mori* L.) races were reared at Silkworm Seed Production Center, Gadhinglaj, Kolhapur (Maharashtra State). In order to evaluate the performance silkworm (*Bombyx mori* L.) races were two bivoltine double hybrids; $FC_1 \times FC_2$ and $FC_2 \times FC_1$, one bivoltine pure race; CSR_2, three multivoltine pure races; MV1, Pure Mysore and Nistari compare with control multivoltine crossbreed race; PM × CSR_2 used as treatment and were fed with Victory (V_1) variety of mulberry (*Morus alba*). The observation recorded on mean disease occurrence was highest in late instars of silkworm (*Bombyx mori* L.) revealed that lowest in the following order; $FC_1 \times FC_2$ (3.33%) < $FC_2 \times FC_1$ (4.00%) < Pure Mysore (5.33%), < PM × CSR_2 (5.67) < MV_1 (6.00%) < Nistari (6.00%) < CSR_2 (8.67%).

Keywords: Silkworm (*Bombyx mori* L.), race, disease occurrence, bivoltine double hybrid $Fc_1 \times Fc_2$, $Fc_2 \times Fc_1$, bivoltine, Csr_2, multivoltine, mv_1, pure Mysore, nistari

Introduction
Sericulture is the science of rearing silkworm for the commercial production of raw silk and includes the operations, which are required for the production of silk fibre. *Bombyx mori* L. (Lepidoptera, Bombycidae) is a common silkworm, undergoes complete metamorphosis, *i.e.* its life cycle passes through four stages including egg, larva, pupa and adult (Krishnaswami, *et al.* 1973) [5]. Besides silk used in manufacturing the cloth, it is also used in making surgical sutures, artificial blood vessel, tire lining, parachute, electric insulating material, oil protein, vitamins; even its waste material (excreta) is used as artificial diet for animals and can be used as poultry and for fish feed due to their higher organic content (Ishfaq and Akram, 1999) [3].

India occupies second position with 14.57 per cent of the production of raw silk and additionally, it is the biggest consumer of raw silk and silk textiles in the glob (Singh and Bukhari, 2022) [13]. In the year 2021-22, India produced total raw silk 34,923 MT which was 3.4 per cent greter than the production level from the prior year 2020-21 (33,770 MT). In which mulberry silk production was 74.03 per cent (25,853 MT) and wild seed production includes Tasar (*Antheraea mylitta*) 4.17 per cent (1,456 MT), Eri (*Philosamia ricini*) 21.07 per cent (7,359 MT) and Muga silk (*Antheraea assamensis*) 0.73 per cent (255 MT). The production of bivoltine raw silk increased significantly by 17.6 per cent from 6,783 MT in the year 2020-21 to 7,978 MT production in the year 2021-22. (Anonymous, 2022) [1].

Maharashtra state is a non-traditional producer of silk, producing both mulberry and tasar silk. The state's unique characteristic is that it engages in 98 per cent bivoltine sericulture strong potential for creating jobs in rural areas. Development programme for mulberry silk is being conducted in 24 districts of Maharashtra State.

Genetic modification in the breeds plays a vital role on quantitative and qualitative traits in the breeds. Multivoltine silkworm races have low productivity and cocoons produced do not yield high quality silk, because of greater resistance to unfavourable climatic productions and the moderate level of disease tolerance and several physical qualities of silk such as softness, shine and their quick development these races are used as female parents as multivoltine × bivoltine hybrids which account for the majority of silk production in India (Kumaresan, 2017) [6].

Silkworm diseases are prevalent all over the year. And the disease incidence per cent varied significantly between seasons. The microbial agent such as viruses, microsporidia, bacteria and fungi cause the infectious disease in silkworm. Among the silkworm diseases flacherie observed during all the seasons. The flacherie caused by *Bombyx mori* Infectious flacherie virus (BmIFV), *Bombyx mori* Densonucleosis virus (BmDNV) and reovirus

(BmCPV). The present attempt was to investigate the susceptibility of bivoltine double hybrid, multivoltine breed, multivoltine cross breed and bivoltine breed to diseases.

Material and Methods

Present experimental analysis was conducted in laboratory Silkworm Seed Production Center, Gadhinglaj, Kolhapur, Maharashtra, for to study the response of silkworm races (*Bombyx mori* L.) to diseases. In the present experiment seven treatments and three replications were used. The experiment was carried out by using Completely Randomized Design. The seven silkworm races *viz.* (Bivoltine Double Hybrid) $FC_1 \times FC_2$, (Bivoltine Double Hybrid) $FC_2 \times FC_1$, (Bivoltine Pure Breed) CSR_2, (Multivoltine Pure Breed) MV_1, (Multivoltine Pure Breed) Pure Mysore, (Multivoltine Pure Breed) Nistari and Control (Multivoltine Cross Breed) PM × CSR_2 were reared on V_1 mulberry variety

Rearing method of silkworm breeds: Before the experiment began, the rearing room was sterilized twice a day by using 2 per cent formalin solution and 0.3 per cent bleaching powder. The improved method of silkworm rearing used in this experiment. The disease free layings (Dfl's) of mulberry silkworm races were procured from CSRTI, Mysore. The Dfl's were incubated at 25 ºC and 75 per cent relative humidity. In the rearing process, egg sheets were spread out in trays with single layer. Trays were covered by using paraffin paper to maintain the necessary humidity for incubation. When obtained the blue egg stage, the egg sheets were put inside black box and covered with black piece of fabric and left undisturbed for 48 hours to promote homogeneous embryo growth referred as "Black boxing". The eggs were exposed to bright day light for few minutes in the morning hour to ensure evenly hatching. Newly hatched silkworm larvae were brushed with the help of sterilized feather of bird and immediately fed with chopped pieces (0.5-1 sq. cm) of mulberry leaves of variety V_1. After passing each moult bed was disinfected with vijetha powder for control of infection caused by fungi, bacteria, protozoa and viruses. After reaching their full growth, the matured silkworms were released on chandrika. Silkworm spin the cocoon in between 48-72 hr. Fifth day after the discharge of the silkworm for mounting on chandrika, the cocoons were harvested. (Krishnaswami, 1979) [4]

The observation recorded on disease occurrence (%) by using following formula

The disease larvae will be recorded from first instar larvae to mature larval stage.

$$\text{Disease occurrence (\%)} = \frac{\text{No. of diseased larvae}}{\text{Total number of larvae reared}} \times 100$$

Result and Discussion

The results of mean disease occurrence of silkworm races are presented in Table 01.

The observations recorded on mean disease occurrence indicates that in early instars there was no disease occurrence was observed whereas in late instars flacherie disease occurrence was recorded. In late instars observation recorded in fourth instar shows that lowest mean disease occurrence in T_1 bivoltine double hybrid race $FC_1 \times FC_2$ (2.00%) which was significantly superior than rest of races. Followed by T_2 bivoltine double hybrid race $FC_2 \times FC_1$ (2.33%) which was at par with superior T_1. The highest disease occurrence was observed in T_3 bivoltine race CSR_2 (7.67%) followed by T_6 multivoltine race Nistari (6.67%), T_4 multivoltine race MV_1 (5.00%), T_7 multivoltine crossbreed PM × CSR_2 (4.67%) and T_5 multivoltine race Pure Mysore (4.00%). The range of disease occurrence on silkworm races varied from 2.00 to 7.67 per cent.

In late instars observation recorded on fifth instar shows that lowest mean disease occurrence in T_1 bivoltine double hybrid race $FC_1 \times FC_2$ (3.33%) which was significantly superior than rest of races. Followed by T_2 bivoltine double hybrid race $FC_2 \times FC_1$ (4.00%) which was at par with superior T_1. The highest disease occurrence was observed in T_3 bivoltine race CSR_2 (8.67%) followed by T_6 multivoltine race Nistari (7.67%), T_4 multivoltine race MV_1 (6.00%), T_7 multivoltine crossbreed PM × CSR_2 (5.67%) and T_5 multivoltine race Pure Mysore (5.33%). The range of disease occurrence on silkworm races varied from 3.33 to 8.67 per cent. The present research findings are contradict with Patil (1989) [7].

Table 1: Performance of silkworm races for mean disease occurrence (%)

Mean Disease Occurrence (%)							
Sr. No	Treatments	Initial instars			Late instars		Treatment mean
		First	Second	Third	Fourth	Fifth	
T1	$FC_1 \times FC_2$	0.00	0.00	0.00	2.00 (8.13)	3.33 (10.50)	2.67
T_2	$FC_2 \times FC_1$	0.00	0.00	0.00	2.33 (8.74)	4.00 (11.34)	3.16
T_3	CSR_2	0.00	0.00	0.00	7.67 (16.07)	8.67 (17.12)	8.17
T_4	MV_1	0.00	0.00	0.00	5.00 (12.92)	6.00 (14.18)	5.50
T_5	Pure Mysore	0.00	0.00	0.00	4.00 (11.54)	5.33 (11.54)	4.67
T_6	Nistari	0.00	0.00	0.00	6.67 (14.95)	7.67 (16.07)	7.17
T_7	PM × CSR_2	0.00	0.00	0.00	4.67 (12.46)	5.67 (13.76)	5.17
S.Em±		0.00	0.00	0.00	0.3531	0.3529	0.35
C.D at 5%		0.00	0.00	0.00	1.07	1.08	1.07
C.V. (%)		0.00	0.00	0.00	5.04	4.43	4.74

*****Figures in parenthesis are arcsine transformed value

Conclusion

The observation recorded on disease occurrence are shows that in the early instars of silkworm races there was no disease recorded but in late instars of silkworm races flacherie disease was recorded. In fourth instar, the superior performance with lowest disease occurrence was recorded in T_1bivoltine double hybrid $FC_1 \times FC_2$ (2.00%) followed by T_2 bivoltine double hybrid $FC_2 \times FC_1$ (2.33%), T_5 multivoltine race Pure Mysore (4.00%). Whereas, the highest disease occurrence was observed in T_3 bivoltine race CSR_2 (7.67%).

In fifth instar, the superior performance with lower response to disease was recorded in T_1bivoltine double hybrid $FC_1 \times FC_2$

(3.33%), followed by T_2 bivoltine double hybrid $FC_{2\times}$ FC_1 (4.00%), T_5 multivoltine race Pure Mysore (5.33%). Whereas, the highest disease occurrence was observed in T_3 bivoltine race CSR_2 (8.67%).

References

1. Anonymous. Silk industry and export in India; c2022. https://www.esilk.net/3G/view.aspx?AID=5190&En=en.
2. Hema M, Rao Sudhakara P, Begum Naseema A, Rakesh B. Susceptibility status of popular breeds of *Bombyx mori* L. to infectious flacherie virus. Indian Journal of Animal Research. 2011;45(2):109-114.
3. Ishfaq M, Akram W. Reshum kay kerhun ki parwarish. !st Edition. Pak Book Empire Publishing, Lahore; c1999. p. 11-12.
4. Krishnaswami S. New technology of silkworm rearing. Central Silk Board Publication, Banglore. 1979;2:1-10.
5. Krishnaswami SJ, Narasimhanna MN, Suryanarayan SK, Kumararaj S. Manual of sericulture, silkworm rearing. F. A. O United Nation, Rome; c1973. p. 121.
6. Kumaresan P, Sinha RK, Koundinya PR, Thangavelu K. Role of multivoltine silkworm genetic resources in improving silk productivity; c2017. https://www.researchgate.net/publication/277138878.
7. Patil CS, Bai M Geetha. Studies on the susceptibility of silkworm races to pebrine spore, Bombycis Naegeli. Journal of Applied Entomology. 1989;108(1-5):421-423.
8. Patil CS, Dandin SB. Silkworm disease and their management during chawki rearing. Ind Silk. 1990;28(11):21-25.
9. Reddy Bontha Kasi, Rao Jemmy Venkata Krishna. Seasonal occurrence and control of silkworm diseases, grasserie, flacherie and muscardine and insect pest, uzi fly in Andhra Pradesh. Int. J Indust. Entomol. 2009;18(2):57-61.
10. Sharma Aradhana, Bali Ramesh, Sharma Manish, Bali Kamlesh. Prevalence of silkworm diseases in subtropical zone of jammu division, J and K, India. Journal of pharmacognocy and Phytochemistry. 2019;8(1):2255-2257.
11. Sharma Arti, Sharma Palvi, Thakur Jyoti, Murali S, Bali Kamlesh. Viral diseases of mulberry silkworm, *Bombyx mori* L: A Review. Journal of Pharmacognosy and Phytochemistry. 2020;9(2):415-423.
12. Singh BD, Biag M, Balavenkatasubbaiah ML, Sharma BD, Sengupta K, Reddy NS. Studies on the relative susceptibility of different breeds of silkworm (*Bombyx mori* L.) to diseases under natural conditions. Ind. J Seric. 1990;29(1):142-144.
13. Singh V, Bukhari R. Comparative performance of bivoltine silkworm (*Bombyx mori* L.) breeds during autumn season in Jammu region of UT J&K. The Pharma Innovation Journal. 2022;11(3):1629-1633.
14. Sisodia Neha Singh, Geherwal S, Jain Renu. Determination of different diseases and in Biological Sciences. 2019;6(4):101-104.
15. Swamy MT, Nagraj M. Survey of disease occurrence in mulberry silkworm rearing around chandragiri, chitoor (A.P). National Con. Of Mulberry Seric Res, Mysore; c1992. p. 123.
16. Tayal Mukesh K, Chauhan TPS. Silkworm diseases and pests. Industrial Entomology; c2017. p. 265-289.