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EFFICACY OF DIFFERENT BED DISINFECTANTS ON THE REARING PERFORMANCE OF MULBERRY SILKWORMS (*BOMBYX MORI* L.)

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ABSTRACT

The experiment evaluated the effectiveness of six bed disinfectant such as A Powder, Ankush, Ankush Vijetha, Vetcare Vijetha, B Powder, and slaked lime (control) on the growth, productivity, and disease resistance of mulberry silkworm (*Bombyx mori* L.) hybrid (*CSR2* × *CSR27*) × (*CSR6* × *CSR26*). Disinfectants were applied at 3–5 g per sq. ft depending on larval stage. Significant improvements were observed with Vetcare Vijetha + slaked lime, which recorded the highest mature larval weight (3.15 g), cocoon weight (1.699 g), shell weight (0.309 g), shell ratio (23.70%), pupal weight (0.991 g), and pupation rate (90.40%). Ankush showed the highest improvement in effective rate of rearing (ERR) at 93.47%. Disease incidence was lowest under Vetcare Vijetha for flacherie (0.83%) and under A Powder and Ankush Vijetha for muscardine (0.41%). Overall, Vetcare Vijetha proved to be the most effective disinfectant for improving productivity, disease management, and cocoon quality under Krishnagiri conditions.

***Key words*:** Mulberry Silkworm, Bed disinfectants, Economic Parameters

Introduction

Sericulture is one of the most important agro-based industries in India, and the successful rearing of mulberry silkworms largely depends on hygienic practices and scientific management throughout the larval stages. Due to continuous rearing, mulberry silkworm becomes highly susceptible to various diseases caused by different infectious organisms (Doreswamy *et al.*, 2004). During rearing, silkworm larvae have a possibility to get infected either through contaminated mulberry leaf or through other sources of contamination (Baig *et al.*, 1990). The infection by various microorganisms leads to crop losses is prevalent in all leading silk producing countries and is estimated to be about 15-20 kg per unit of 100 disease free layings which accounts for about 30% total loss (Selvakumar *et al.*, 2002). Nagarajan and Radha (1999) stated that control of diseases below the economic threshold level will increase silk production up to 25 per cent without any increase in the area under mulberry sericulture. A suitable disinfectant is the primary need to eliminate the persistent pathogen load from the rearing environment (Balavenkatasubbaiah *et al.*, 2016). Maintenance of hygienic conditions during rearing helps in preventing the entry of disease-causing germs from outside and also checks the spread of diseases (Jolly, 1986). Even after disinfection of the rearing house and its surroundings before the onset of rearing, there is every possibility for silkworm larvae to get infected during the course of rearing either through food or other sources of contamination. It is therefore essential to kill or inactivate these pathogens existing in rearing bed periodically, by applying bed disinfectants (Illahi *et al.*, 2003). In silkworm rearing, reports can be obtained on indiscriminate use of various bed disinfectants viz., Vijetha, Lime, Captan, Dithane M-45, Resham Keet Oushad, Ankush, Vijetha Green, Resham Jyothi, Formalin Chaff and Labex etc. in large quantities (Swathi *et al.*, 2014). different bed disinfectants effectively control major silkworm diseases

such as grasserie, flacherie, muscardine and Pebrine thereby improving larval growth and silk yield (Singhvi *et al*., 2004). An increase in larval weight on applying Ankush (Thakur, 2010, Karuppasamy *et al*., 2013). The silkworm *Bombyx mori* is highly sensitive to environmental changes and pathogens, especially in late instars when accumulated wastes and high humidity promote disease development. Poor hygiene often leads to grasserie, flacherie, muscardine, and *aspergillosis*, causing major losses to farmers. Using effective bed disinfectants is crucial for maintaining cleanliness, improving larval health, preventing diseases, and increasing cocoon yield. Various disinfectants like slaked lime, bleaching powder, Vijetha, Ankush, and other formulations are used, though their effectiveness varies. Hence, this study was undertaken to evaluate the efficiency of different bed disinfectants on growth, economic traits, and disease incidence in mulberry silkworms.

Materials and Methods

The experiment was carried out during 2024 at the Department of Agricultural Entomology, Adhiyamaan College of Agriculture and Research, Athimugam, Krishnagiri District. Disease-free hybrid layings of bivoltine double hybrid (*CSR2* × *CSR27*) × (*CSR6* × *CSR26*) were conducted this study. Victory-1 mulberry leaves from a well-maintained plantation were used for feeding throughout the rearing period. The rearing room and equipment were disinfected with 2% formalin solution to ensure a sterile environment prior to the introduction of silkworms. Six treatments were included in the study: A Powder + slaked lime, Ankush + slaked lime, Ankush Vijetha + slaked lime, Vetcare Vijetha + slaked lime, B Powder + slaked lime, and a control treatment consisting of slaked lime alone. Disinfectants were applied after every moult at 3 g for early instars and 5 g for late instars. A Completely Randomized Design with three replications and sixty larvae per replication was followed. Rearing procedures were conducted using the standard tray method. Bed cleaning was done once in the first and second instars, twice during the third instar, and daily during the fourth and fifth instars. Feeding schedules included three feedings per day for early instars and two feedings per day for late instars. Mature larvae were mounted on rotary mountages to spin cocoons, and harvesting was done on the sixth day after spinning.

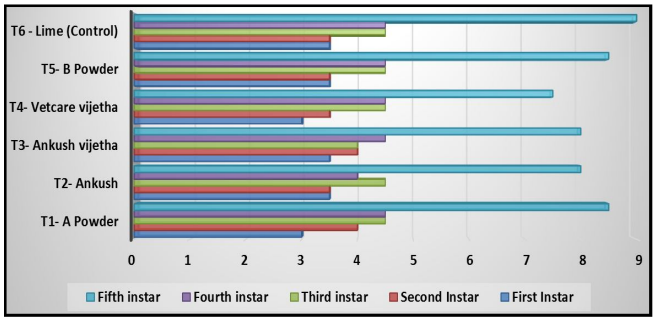

Fig. 1: Impact of different bed disinfectants against larval instar period of *Bombys mori*. L.

Observations were recorded on larval duration, larval weight, mature larval weight, cocoon weight, shell weight, shell ratio, pupal weight, pupation rate, larval mortality, defective cocoons, and effective rate of rearing (ERR). Disease incidence, particularly for grasserie, flacherie, muscardine, and aspergillosis, was assessed based on visual symptoms. Data were statistically analysed using AGRESS software for significance at a 5% probability level. The results indicated significant differences among the disinfectant treatments for almost all the parameters recorded.

Result and Discussion

The application of different bed disinfectants significantly influenced the larval duration across the instars. The shortest total larval period of 23 days was recorded in the treatment with Vetcare Vijetha and slaked lime, indicating efficient physiological development under hygienic conditions. This was followed by Ankush + slaked lime with 23.5 days, and Ankush Vijetha + slaked lime with 24 days. In contrast, the longest larval duration of 25 days was recorded in the control treatment, where only slaked lime was used. This delay in development under control conditions can be attributed to greater exposure to environmental contaminants and pathogens, which hinder larval feeding and digestion. The results align with previous findings that suggest proper hygiene reduces stress and accelerates larval development. Early-instar larval weights did not show significant variation among treatments, but by the 10th day, B Powder and Ankush produced the highest larval weights of 0.067 g and 0.066 g, respectively, indicating better early growth performance (Fig 1.)

The mature larval weight showed clear differences across treatments. The maximum mature larval weight

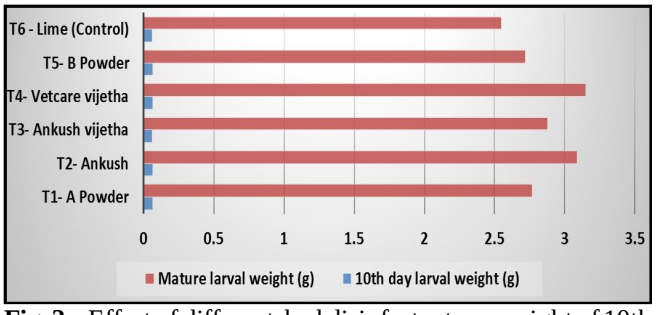

Fig. 2: Effect of different bed disinfectants on weight of 10th day and mature larvae of mulberry silkworm *Bombys mori*. L.

Table 1: Efficacy of different bed disinfectants against the spread of white muscardine in silkworm rearing.

S. No.	Treatment	NLB	WMD	HL
1	T1- A Powder	240	0.41	84.50
2	T2- Ankush	240	-	89.50
3	T3- Ankush vijetha	240	0.41	85.83
4	T4- Vetcare vijetha	240	-	90.40
5	T5- B Powder	240	-	83.30
6	T6 - Lime (Control)	240	0.83	76.60

NLB: No. of larvae/bed; HL: Healthy larvae (%)
WMD: % white muscardine disease

of 3.15 g was recorded in Vetcare Vijetha + slaked lime, followed by 3.09 g in Ankush + slaked lime. Ankush Vijetha, A Powder, and B Powder combined with slaked lime recorded weights of 2.88 g, 2.77 g, and 2.72 g respectively. The control treatment recorded the lowest mature larval weight.

Higher larval weight is directly associated with improved cocoon formation and silk yield, and the better performance of Vetcare Vijetha indicates its ability to maintain ideal hygienic conditions for larval development. These results are in close agreement with the findings of Datta, 1998, Surapwar *et al.*, (2019), who also reported increased mature larval weight with Vijetha powder treatments. (Fig 2.).

Cocoon parameters also showed significant improvement with disinfectant application. The highest cocoon weight (1.699 g) was obtained from the Vetcare Vijetha + slaked lime treatment, followed by Ankush (1.466 g) and Ankush Vijetha (1.395 g). A Powder and B Powder treatments recorded slightly lower weights of 1.352 g and 1.251 g respectively. The control treatment had the lowest cocoon weight. Higher cocoon weight reflects better silkworm health and efficient assimilation of nutrients from mulberry leaves, which is directly influenced by hygienic rearing conditions. The shell weight and shell ratio further supported the superior performance of Vetcare Vijetha. This treatment recorded a shell weight of 0.308 g and shell ratio of 23.70%, indicating a thicker

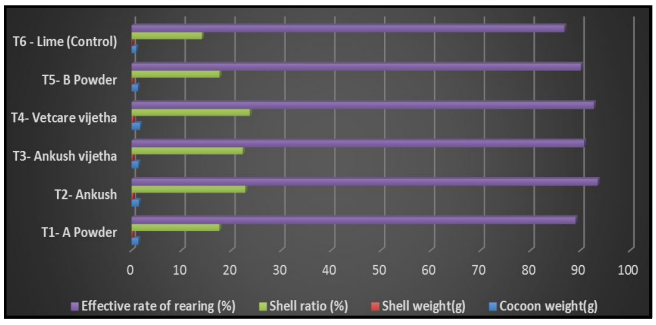

Fig. 3: Effect of different bed disinfectants on cocoon weight, shell ratio, shell weight and Effective rate of rearing of mulberry silkworm, *B. mori*. L.

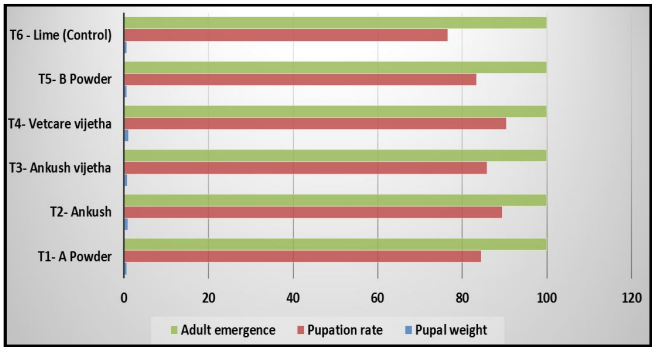

Fig. 4: Effect of different bed disinfectants on weight of mature larvae of mulberry silkworm, *B. mori*. L.

and stronger cocoon shell. Ankush and Ankush Vijetha treatments followed closely with shell ratios above 22%. The control treatment recorded the lowest shell ratio. The results corroborate earlier findings that emphasize the role of disinfectants in improving cocoon quality by minimizing disease pressure (Fig. 3).

Pupal parameters were equally influenced by the disinfectant treatments. The highest pupal weight of 0.991 g and pupation rate of 90.40% were recorded in Vetcare Vijetha + slaked lime. Ankush + slaked lime recorded a pupal weight of 0.900 g and pupation rate of 89.50%, followed by Ankush Vijetha + slaked lime and A Powder. The control treatment had the lowest pupal weight (0.621 g) and pupation rate (76.60%). These results confirm that hygienic conditions not only enhance larval survival but also support the successful transition from larval to pupal stage. Reduced pupation in the control treatment is directly linked to disease incidence and environmental stress (Fig 4.)

The effective rate of rearing (ERR), which represents the percentage of larvae successfully spinning cocoons, showed significant variation. The highest ERR was recorded in the Ankush treatment with 93.47%, followed closely by Vetcare Vijetha (92.70%). A Powder and Ankush Vijetha showed ERR values between 85–90%, while the control treatment had the lowest. These results clearly show that disinfectants play a crucial role in

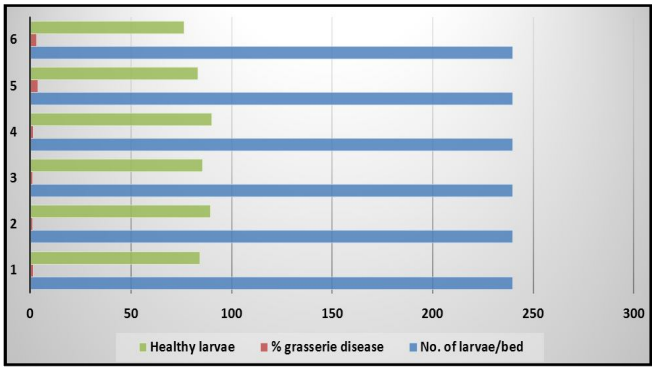

Fig. 5: Efficacy of different bed disinfectants against the spread of grasserie in silkworm rearing *B. mori*. L.

Table 2: Efficacy of different bed disinfectants against the spread of white *Aspergillus* in silkworm rearing.

S. No.	Treatment	NLB	WMD	HL
1	T1- A Powder	240	-	84.50
2	T2- Ankush	240	-	89.50
3	T3- Ankush vijetha	240	0.41	85.83
4	T4- Vetcare vijetha	240	-	90.40
5	T5- B Powder	240	0.83	83.30
6	T6 - Lime (Control)	240	-	76.60

NLB: No. of larvae/bed; HL: Healthy larvae (%)
WMD: % white muscardine disease

reducing mortality and enhancing overall rearing efficiency.

Disease incidence showed clear reductions under disinfectant treatments. Grasserie incidence was lowest (1.25%) in Ankush + slaked lime and Ankush Vijetha + slaked lime, whereas the highest incidence of 3.75% was recorded in B Powder + slaked lime and 3.30% in the control. Flacherie incidence was minimum in Vetcare Vijetha (0.83%), while control recorded the maximum (7.50%). Muscardine incidence was lowest in A Powder + slaked lime and Ankush Vijetha + slaked lime (0.41%), compared to 0.83% in control. Aspergillosis incidence was minimum (0.41%) in Ankush Vijetha and A Powder treatment. These results show that disinfectants, particularly Vetcare Vijetha and Ankush, effectively suppress pathogen growth and reduce disease transmission. Shashidhar *et al.*, (2018) the study revealed that, application of Ankush vijetha green and slaked lime powder combination bed disinfectant was recorded low incidence of silkworm diseases like grasserie (0.10 – 0.08 %), flacherie (0.25 – 0.15%) and muscardine (0.05 – 0.35%). Rasool *et al.*, (2018) showed that, minimum disease incidence percentage of 51.80 percent was recorded in vijetha powder. (Table 1 & 2. & Fig. 5 & 6).

Defective cocoon percentage varied notably across treatments. The lowest percentage of double cocoons (0.46%) was observed in Ankush, while the lowest stained

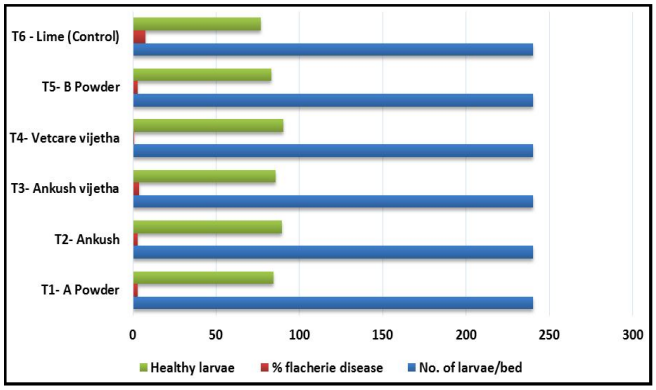

Fig. 6: Efficacy of different bed disinfectants against the spread of flacherie in silkworm rearing *B. mori*. L.

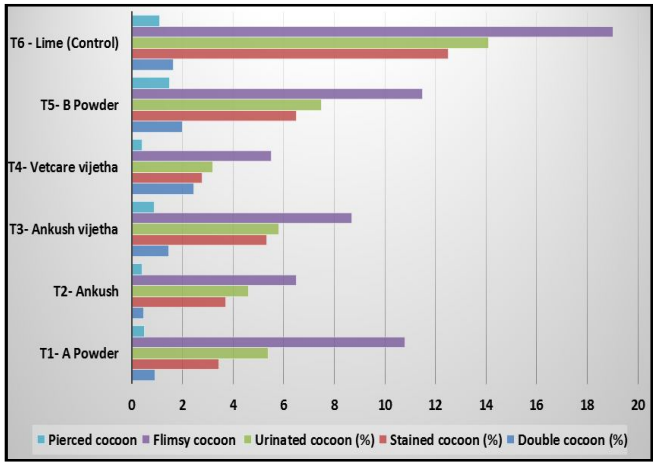

Fig. 7: Efficacy of different bed disinfectants against the spread of defective cocoon in silkworm rearing.

cocoons (2.77%), urinated cocoons (3.20%), and flimsy cocoons (5.5%) were recorded in Vetcare Vijetha, indicating healthier larval spinning behaviour. The control treatment recorded the highest defective cocoon percentages, which can be attributed to unhygienic conditions and disease stress affecting larval metabolism during cocoon spinning (Fig. 7).

Conclusion

In conclusion, the results of the present investigation clearly show that the use of bed disinfectants significantly enhances larval growth, cocoon yield, pupal performance, and disease resistance in mulberry silkworms. Among the treatments tested, Vetcare Vijetha + slaked lime consistently recorded the best performance across most of the economic traits, including larval weight, cocoon weight, shell weight, shell ratio, pupal weight, pupation rate, and reduced disease incidence. Ankush + slaked lime also performed exceptionally well, particularly in terms of effective rate of rearing and disease suppression. The control treatment, which included only slaked lime, recorded poor performance in nearly all parameters. Therefore, the study concludes that Vetcare Vijetha + slaked lime may be recommended as the most effective bed disinfectant for silkworm rearing under Krishnagiri conditions, followed by Ankush for enhancing disease resistance and rearing efficiency. These findings may help sericulture farmers adopt better rearing practices to improve cocoon yield and ensure sustainable silk production.

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