



EFFICACY OF 2% BLEACHING POWDER IN CONTROLLING SECONDARY CONTAMINATION OF PEBRINE DISEASE INTASAR SILKWORM ANTHEREAE MYLITTA DRURY (DABA T.V)

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ABSTRACT

Pebrinedisease found to be highly virulent and harm the larval and cocoon characters of tropical tasar silkworm *Antheraeamylitta Drury (Daba TV)*.Therefore an attempt has been made to evaluate the effect of 2% bleaching powder solution in controlling the pebrine disease attained through secondary contamination by studying larval and cocoon characters. In comparison with the healthy control (T1 batch larvae reared on untreated plantation),the results reveal a significant decrease in larval span,larvalweight,number of cocoons harvested, effective rate of rearing,cocoonweight,shellweight,shellratio,filament length, reelability, weight of silkreeled, length of shell, width of shell, shell thickness, peduncle thickness, peduncle length, peduncle weight, peduncle diameter in T2 batch (infected larvae reared on untreated *Terminaliaarjuna* plants) but a slight decrease was observed in T3 batch (healthy and infected larvae reared combined on 2% bleaching powder solution treated plantation).The results also show that maximum mortality in T1 batch and T3 batch larvae was due to viral and bacterial infections and other factors rather than pebrine disease whereas in case of T2 batch nearly 50% of larval mortality was due to pebrinedisease.Based on the results obtained from present study 2% bleaching powder solution is found efficient in controlling pebrine disease attained through secondary contamination in *Daba TV*.

KEYWORDS: pebrine, secondary contamination, 2%Bleaching powder solution, *Daba TV*.



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INTRODUCTION

Antheraea mylitta Drury a lepidopteran insect of the Saturniidae family produces tasar silk of commercial importance. This species is endemic and distributed in different geographical regions of India in the form of 44 ecological races. The varied voltinism and higher interference of environment on silkworm rearing performance, heavy mortality of larvae due to pests, predators, parasites attack, reduced the crop yield and made the silk industry unreliable^{1,2}. *Pebrine* is one of the dreadful disease seen in *Antheraea mylitta* Drury (*Daba TV*), caused by intracellular parasite *Nosema* species. *Pebrine* can be acquired from the mother moth (primary infection) or through the excreta of pebrinised larvae and the contaminated environment (secondary infection). The pathogen is causing considerable yield loss upto 40% in combination with other pathogens³. Black pepper like spots on the integument of infected larvae are the infected hypodermal cells which become enlarged and vacuolated get blackened due to the formation of melanin⁴. The infected larvae of *Bombyx mori* and *Antheraea mylitta* drury show significant changes in the cocoon weight, shell weight, denier, reelability etc.,^{5,6}. Three *Nosema* sp. from three non-mulberry silkworms as *Nosema mylitta* from *Antheraea mylitta*, *Nosema ricini* from *Philosamia ricini* and *Nosema assamensis* from *Antheraea assamensis*⁷. No silkworm race reported to be completely immune to *pebrine*. Effectiveness of fungicides (Carbendazim) and antimalarial drugs (Chloroquine) to control the disease has been investigated by several workers^{8,9,10}. The present work includes the study of larval and cocoon characters of *Daba TV* to understand the effect of 2% bleaching powder solution in controlling pebrine disease attained through secondary contamination.

MATERIALS AND METHODS

Daba TV cocoons were collected as per the standard norms such as weight, colour, size of cocoons and length of the peduncle from the field plantation of Central silk board, Chennai, Adilabad District, Andhra Pradesh, India. The

cocoons were preserved in the cages made up of wire mesh of size 2ft x 2ft x 2ft under temperature of 29±1°C and humidity 70±1%. The emerged moths were tested for pebrine by a method derived from that used in sericulture¹¹. In this method, the abdomen of moth is severed with scissors, placed in a small mortar, mixed with water and crushed with pestle. A drop of the smear is placed on a clean slide and examined under a microscope of 600X magnification for *Nosema* sp., spores. (19). The eggs laid by healthy and infected moths were collected and incubated for further research. The hatched larvae were reared in three different fields to prevent secondary contamination. Two days before brushing of larvae and for every four days of interval throughout the rearing period, one of the rearing field along with the trunks of *Terminalia arjuna* plants was sprayed with 2% Bleaching powder solution which is prepared from the commercially available bleaching powder. The first instar larvae hatched from the eggs laid by the healthy moths were kept as T1 batch and reared on untreated plantation. The first instar larvae hatched from the eggs laid by the pebrine infected moths were kept as T2 batch and reared on untreated plantation. The first instar larvae hatched from the eggs laid by the healthy and pebrinised moths were kept combined as T3 batch and reared on 2% bleaching powder solution treated plantation. Each batch had three replications of 50 larvae and was reared till cocooning following standard procedure. Larvae that were died because of pebrine were examined for the presence of spores under light microscope everyday till spinning and included for data analysis.

STATISTICAL ANALYSIS

Each assay was replicated 3 times. Values were expressed as mean ± SE of replication and Student's *t*-test was applied to locate significant ($P \leq 0.05$) differences between treated and untreated larvae.

RESULTS AND DISCUSSION

Present studies shows that the pebrine virulence was high and had much impact on various characters of the ecorace. Table 1 show that T2 and T3 batch larvae have shown 21% and 4.7% reduction in their larval span in comparison with T1. In case of T2 batch the larval weight was 22% less than T1 batch. The decrease in food consumption, digestion, relative consumption rate, efficiency of conversion of ingested food in fifth instar of

A. mylitta infected with *Nosema sp.* reduced the relative growth rate of the larvae¹². The administration of certain chemicals like prostaglandins increases the larval lifecycle in silkworm¹³. Present results also show that out of 150 larvae brushed the number of cocoons formed were significantly low in case of T2 batch which in turn reduced the ERR%. Much variation was not observed between T1 and T2 batches in case of number of cocoons formed and ERR%.

Table 1
Effect of 2% bleaching on rearing performance of Daba TV Ecorace

Larval characters	Healthy Control Larvae reared on untreated plants (T1)	Infected Control larvae reared on untreated plants (T2)	Larvae reared on 2% Bleaching Powder Solution treated plants (T3)
No. of larvae brushed	150	150	150
Larval span (days)	43	34(-20.9)	41(-4.7)
Larval weight (g)	36	28(-22.2)	35(-2.8)
No. of cocoons Harvested	135	76(-43.7)	118(-12.6)
Effective rate of rearing by number (ERR) (%)	90	50.6(-43.8)	79(-12.2)

Table 2 explains the mortality rate of *Daba TV* larvae. In case of T1 batch the mortality rate was maximum due to infections and other attacks rather than pebrine disease. Nearly 50% mortality rate in T2 batch can be attributed to pebrine disease. In case of T3 batch maximum loss was found to be due to micro-organisms attack and other factors.

Each value represents the mean of 3 different observations.

Table 2
Effect of 2% bleaching on mortality of Daba TV during larval stages

No. of larvae lost due to	Healthy Control larvae reared on untreated plants (T1)	Infected Control larvae reared on untreated plants (T2)	Larvae reared on 2% Bleaching Powder Solution treated plants (T3)
Pebrine	0	35	3
Viral	3	12	9
Bacterial	5	11	10
Others	7	16	10
Total	15	74	32

Each value represents the mean of 3 different observations.

Table 3
Effect of 2% bleaching on Commercial characters of Daba TV Ecorace

Cocoon characters	Healthy Control larvae reared on untreated plants (T1)	Infected Control larvae reared on untreated plants (T2)	Larvae reared on 2% Bleaching Powder Solution treated plants (T3)
Cocoon weight (g)	9.68±1.12	7.86±0.06(-18.8)	9.07±1.02(-6.3) *
Shell weight (g)	0.97±0.21	0.68±0.02(-29.9) *	0.88±0.03(-9.3)
Shell ratio (%)	10±0.08	8.65±0.05(-13.5)	9.71±0.05(-2.9) *
Filament length (m)	354.82±2.87	143.5±1.65(-59.6)	320.45±0.07(-9.7) *
Reelability (%)	5.16±0.25	4.32±0.04(-16.3)	5.1±0.13(-1.2) *
Reel silk weight (g)	0.5±0.08	0.34±0.05(-32.0)	0.46±0.05(-8) *
Denier	12.68±0.15	21.32±0.25(+68.13)	12.92±0.25(+1.9) *

The values presented into the parentheses indicate the percent increase (+) or decrease (-) over control. *Significantly different at $P \leq 0.05$ (Students' t-test). All the values are the mean values of five replications

Table 3 indicate the rearing performance of 2% bleaching powder solution in controlling pebrine disease and the influence on cocoon characters. In comparison with the healthy control cocoon weight of T2 and T3 batches found decrease by 19 and 6% respectively. It is observed that high shell weight was recorded in T3 batch cocoons compared to T2 which may be due to the resistance attained against pebrine disease.⁶ working on pebrine disease in *Andhra local ecorace*, *Antherea mylittadrury* have recorded low cocoon weight and shell weight in the cocoons of both trasovarial, secondarily infected larvae rather than the healthy control. *A. mylitta* larvae infected with *Nosema* species have shown decrease in shell weight¹⁴. 0.005% carbendazim treatment of larval stages during rearing has a definite effect in suppressing the development of *Nosema* sp. in *A. mylitta* and increases the cocoon weight and shell weight¹⁰. The administration of certain neurohumoral factors, vertebrate hormones, chemicals like prostaglandins increases the cocoon weight, shell weight in silkworm^{13,15,16}. It is evident from the results that the SR% of T1 and T3 batches did not vary much whereas T2 batch has shown a significant reduction. The results also show that filament length of T2 and T3 batch cocoons have decreased by 60 and 10%

respectively when compared to that of healthy control. Pebrine disease in *Andhra local ecorace* will seriously affect the filament length⁶. It is found that the B1, B2, B3 and B4 batch cocoons have decreased in reel ability by 1.17, 3.11, 2.33 and 3.11% respectively than that of healthy cocoons. In case of reel ability there is no much variation between T1 and T3 batches whereas a significant reduction was noticed in T2 batch cocoons. Pebrine disease will significantly affect the reel ability in tasar cocoons⁶. When compared with the healthy control the weight of the silk reeled of T2 batch cocoon was very much low by 32%, whereas in T3 batch cocoons it was low by 8%. The reduced silk gland weight in *A. mylitta* larvae infected with *Nosema* sp. will finally reduces the silk production¹⁴. Lowest denier value can be attributed to healthy control cocoons next comes the T3 batch cocoons. A significant increase (68%) in the denier values of T2 batch cocoons was noticed which can be attributed to the serious impact of pebrine infection and reduction in silk quality.⁶ working on pebrine disease in *Andhra local ecorace*, *A. mylittadrury* have reported a significant variation between the denier values of nosema infected cocoons and healthy control. Silk produced from the cocoons of pebrine infected larvae is usually much inferior¹⁷.

Table 4
Effect of 2% bleaching on Shell and peduncle characters of Daba T.V ecorace

Cocoon characters	Healthy Control larvae reared on untreated plants (T1)	Infected Control larvae reared on untreated plants (T2)	Larvae reared on 2% Bleaching Powder Solution treated Plants (T3)
Length of shell(cm)	4.03±0.15	2.05±0.03(-49.1)	3.98±0.12(-1.3) *
Width of shell(cm)	2.56±0.17	1.02±0.05(-60.2) *	2.39±0.16(-6.7)
Shell thickness(mm)	0.53±0.05	0.14±0.02(-73.6) *	0.39±0.04(-26.5)
Peduncle thickness (mm)	2.43±0.17	1.08±0.04(-55.5)	2.21±0.14(-9.1) *
Peduncle length(mm)	4.15±0.19	1.18±0.08(-71.5)	3.54±0.18(-14.7) *
Peduncle weight(g)	0.13±0.05	0.03±0.01(-76.9) *	0.09±0.02(-30.7)
Peduncle diameter (cm)	1.18±0.04	0.06±0.02(-94.9) *	1.08±0.06(-8.5)

The values presented in the parentheses indicate the percent increase (+) or decrease (-) over control. *Significantly different at $P \leq 0.05$ (Students' t-test). All the values are the mean values of five replications

Table 4 shows the results of shell and peduncle characters. In comparison with T1 batch cocoons, the shell length of T2 batch cocoons was 49% low but T3 batch cocoons did not show much variation. In case of T2 batch, the cocoons have shown significant decrease in shell width than T3 batch when

compared with T1. A noticeable decrease of 73% was identified in the shell thickness of T2 batch cocoons when compared to T1 batch. T3 batch cocoons have shown 26% less shell thickness than T1 batch cocoons. Thick shell of *Daba T.V.* denotes the successful adaptation of the ecorace¹⁸. When compared with T1

batch, the peduncle thickness value recorded for T2 batch cocoons was 55% low whereas T3 batch cocoons have shown almost the similar peduncle thickness. The Peduncle length of T2 batch cocoon was found decreased significantly in relation with T1 batch but T3 batch cocoons have shown a slight decrease. The peduncle weight of T2 batch and T3 batch cocoons was 76.9% and 30.7% less than T1 batch cocoons. An enormous reduction in peduncle diameter was recorded in T2 batch cocoons in comparison with T1 batch cocoons. Peduncle diameter in T3 batch cocoons did not show much variation from the healthy control. Thus in conclusion 2%

bleaching powder solution is efficient in controlling secondary contamination of pebrine disease and the treatment improves the larval characters, cocoon characters of infected *Daba TV*.

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