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Qualitative Silk Cocoons in Silkworm, Bombyx Mori (L) Through the Topical Application of Acetone Macerative of Powder of Ganoderma Fruiting Body And Acetone Solution of It's Triterpenoid (Lucidone –D).

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ABSTRACT

Terpene and terpenoid contents of ganoderma fruiting body is well esteemed fact. Terpenes and terpenoids are the significant Insect Juvenile Hormone Analogues (JHA). Ten mircolitres of acetone maceratives of (20 ppm) of powder of ganoderma fruiting body and acetone solution of triterpenoid (lucidone –d) compound were topically applied separately to the fifth instar larvae of bivoltine silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)] at 48 hours after the fourth moult. The cocoons spinned by the larvae were used for analysis of shell ratio and silk filament for the denier scale. The shell ratio of the cocoons harvested from untreated and acetone treated groups was found measured 20. 197 and 20.428 respectively. The denier scale of the silk filament obtained from the untreated control and acetone treated control groups was 2.726 and 2.738 respectively. Topical application of acetone maceratives of (20 ppm) of powder of ganoderma fruiting body and acetone solution of triterpenoid (lucidone –d) compound separately to the fifth instar larvae of bivoltine raced silkworm, Bombyx mori (L) [(CSR6 x CSR26) x CSR2 x CSR27)] was found resulted into the cocoons with 29.381 and 33.321 shell ratio respectively. The denier scale of silk filament reeled from the fruiting body group and triterpenoid (lucidone –d) groups was 2.825 and 3.222 respectively. The acetone maceratives of (20 ppm) of powder of ganoderma fruiting body and acetone solution of triterpenoid (lucidone –d) compound were found most significant with reference to the quality of the cocoons and silk filament in silkworm, Bombyx mori (L) [(CSR6 x CSR26) x CSR2 x CSR27)]. The powder of ganoderma fruiting body and acetone solution of triterpenoid (lucidone –d) compound deserve applicability and exert a significant influence.

Keywords : Ganoderma, Lucidone, Bombyx mori (L), Shell Ratio, Denier.

I. INTRODUCTION

Terpenes are formed by two or more isoprene units. The binding generally takes place between C4 of one isoprene and C1 of another. Polyisoprenes can exhibit linear structure, such as geraniol (composed of two isoprene units), farnesol (containing three isoprene units), or squalene (with six isoprenes). They may also form cyclic structures in vitamin A, carotenes, lanosterol, and ubiquinone. The terpene derived organic compounds, the terpenoids are a large and diverse class of naturally occurring chemicals. They are also called as isoprenoids. There are about about 60% of known natural products are terpenoids. They contain additional functional groups, usually O-containing. Most of the herbal remedies used by human being belong to terpenoids. Credit of scent of eucalyptus; flavour of cinnamon, cloves, ginger goes to their terpenoid contents. The citral, menthol, camphor, salvinorin A in the plant Salvia divinorum

(L) ; cannabinoids found in cannabis ; ginkgolide and bilobalide found in Ginkgo biloba (L); curcuminoids found in turmeric and mustard seed are some of the well-known examples of naturally occurring terpenoids. (Ayoola, 2008). Most of the Insect Juvenile Hormone Analogues (JHAs) are reported as terpenes and or terpenoids. The Insect Juvenile Hormone Analogues (JHAs) terpenes and terpenoids (JHAs) regulate many aspects of insect physiology. The Insect Juvenile Hormone Analogues (JHAs) regulate development, reproduction, diapause, and polyphenisms in insects (Riddiford, 1994; Nijhout , 1994 ; Wyatt& Davey, 1996; Khyade and K. Slama,2014). The Insect Juvenile Hormone Analogues (JHAs) terpenes and terpenoids (JHAs) terpenes and terpenoids are a large and diverse class of organic compounds, synthesized by a number of plants. Naturally, the insect life stages are able to produce the terpenes and terpenoids. The insect derived terpenes and terpenoids are released through the osmeteria in the form of emission. The osmeterium is a organ belong to the body of larval stages of insects of butterfly family : Papilionidae that includes the swallowtails, birdwings, and apollos. . The osmeterium is used as defensive organ. The chemical composition of secretion of osmeterium varies from species to species. Osmeterial secretion contains monoterpene hydrocarbons, sesquiterpenic compounds or a mixture of aliphatic acids and esters. (J. Chattopadhyay, 2011). The osmeterium of papilinoid larvae is present situated in the prothoracic segment. When the larva feels threatened, it use to evert it's osmeterium. In this everted condition, osmeterium resembles a fleshy forked tongue. The osmeterial organ remains inside the body in the thoracic region in an inverted position and it is averted when the larva is disturbed in any way emitting a foul, disagreeable odor which serves to repel the ants (Eisner and Meinwald, 1965); small spiders (H. Damman, 1986) and mantids (Chow and Tsai , 1989). The chemical composition of secretion from osmeteria varies from species to species. It contains the chemical compounds like monoterpene hydrocarbons, sesquiterpenic compounds or a mixture of aliphatic acids and esters. Crossley, A.C. and Waterhouse D.F. (1969) studied the fine structure of the osmetrium of Papiliode moleuslibanius (L) (Lu, Chow-Chin; YienShing Chow, 1991;VitthalraoKhyade, Edvard Moser and May – Britt Moser,2015; Madhuri Anil Shivpuje, et al, 2016).

The titer or concentration of ecdysone (Moulting Hormone / MH) and juvenile hormone (JH) in the body of insect life stage serves a lot to proceed the metamorphosis . The ecdysone (Moulting Hormone / MH) and juvenile hormone (JH) are the two significant hormones in insect life stage body. Both of them are working for controlling majority of the growth and developmental activities of the insects. The Juvenile Hormone (JH) has been considered to be an exclusive insect hormone that deserve wide applicability for the control of insect pests of field crops. And thus it has attracted much attention in plant and grain protectionoriented research. The insect Juvenile Hormone (JH) is clearly a pleiotropic master hormone, which governs most aspects of their integration with the ecosystem and affects decisive life history parameters during their entire life cycles (Hartfelder, 2000). For the insect physiology, Juvenile Hormone (JH) regulates diverse traits in insects. Some of the traits under the control of insect Juvenile Hormone (JH) include: the synthesis of yolk protein; uptake of the molecule into the developing egg; diapauses; flight; embryonic development; reproductive features and dispersal polymorphisms (Denlinger 1985; Nijhout, 1999; Wyatt and Davey 1996; Era and Cisper 2001; Wheeler and Nijhout 2003). The insect juvenile hormone (JH) reportedly alter physiological processes essential for insect development and appears to act especially on insects (Siddall 1976; Ravindra D. Chaudhari and Vitthalrao B. Khyade, 1997).

Juvenile Hormone Analogues (JHAs) are the exogenous chemical compounds that are mimicking the action of natural insect Juvenile Hormone (JH).

Most of the Juvenile Hormone Analogues (JHAs) are terpenes and or terpenoids. The terpenes and terpenoids (JHAs) regulate many aspects of insect physiology. They regulate development, reproduction, diapause, andpolyphenisms in insects (Riddiford, 1994; Nijhout , 1994 ; Wyatt& Davey, 1996; Khyade and K. Slama,2014). The terpenes and terpenoids are a large and diverse class of organic compounds, synthesized by a number of plants. There are reports on some of the insects that are able to produce the terpenes and terpenoids. The terpenes and terpenoids synthesized by the insect are released through the osmeteria in the form of emission. The insect larvae of papilionid type are distinguished by presence of osmeteria. The osmeterium is a defensive organ found in all Papilionid type insect larvae, in all stages (J. Chattopadhyay, 2011). The osmeterium is present situated in the prothoracic segment. The osmeterium can be averted when the larva feels threatened. In averted condition, osmeterium resembles a fleshy forked tongue not unlike a snake tongue and this along with the large eye like spots on the body might be used to startle birds and small reptiles. The osmeterial organ remains inside the body in the thoracic region in an inverted position and it is averted when the larva is disturbed in any way emitting a foul, disagreeable odor which serves to repel the ants (Eisner and Meinwald, 1965); small spiders (H. Damman, 1986) and mantids(Chow and Tsai , 1989). The chemical composition of secretion from osmeteria varies from species to species. It contains the chemical compounds like monoterpene hydrocarbons, sesquiterpenic compounds or a mixture of aliphatic acids and esters. Crossley, A.C. and Waterhouse D.F. (1969) studied the fine structure of the osmetrium of Papiliode moleuslibanius (L) (Lu, Chow-Chin; YienShing Chow, 1991;VitthalraoKhyade, Edvard Moser and May – Britt Moser,2015; Madhuri Anil Shivpuje, et al, 2016).

The triterpene is a group of compounds that composed of three terpene units or it may also be thought of as consisting of six units of isoprenes. They are synthesized by animals, plants and fungi. The most important example of triterpenes is squalene and it forms the basis of almost all steroids. By definition triterpenes are hydrocarbons and possess no heteroatoms; functionalized triterpenes should instead be called triterpenoids. However this distinction is not always adhered to in scientific literature, with the two terms triterpene and triterpenoid often being used interchangeably. The basic difference between terpenes and terpenoids is that terpenes are hydrocarbons, whereas terpenoids contain additional functional groups. Triterpenoids possess a rich chemistry and pharmacology (e.g. cholesterol) with several pentacyclic motifs. Lupane, oleanane and ursane show particular promise as anti-cancer agents (Laszczyk Melanie , 2009 and Liu, Jie, 1995). Topical application of ten microliters of various concentrations of acetone solution of Fernasol Methyl Ether (FME) and each selected triterpene compounds (Squalene; Polypodatetraene; Malabaricane; Lanostane; Hopane and Oleanane) at 48 hours after the fourth was found reducing the deposition of body wall chitin in larval instars of silkworm, Bombyx mori (L) (Race: PM x CSR2). Reduction in the deposition of body wall chitin in the insect larvae is the significant role of insect Juvenile Hormone (JH) and it's analogues. With reference to reduction in the deposition of body wall chitin in the insect larvae; triterpenes and triterpenoids exert a Juvenoid influence in silkworm, Bombyx mori (L). The lucidone is one of the important terpenod isolated from the fruiting body of Ganoderma lucidium (L) , the polypore fungus belong to family: Ganodermataceae. This fungus deserve economic and medicinal significance. It is differentiated from otherpolypores in having double walled basidiopore. It is also called as shelf mushroom or fungus. In view to determine the effects of the topical application of acetone macerative of fruiting body of Ganoderma lucidium (L) and acetone solution of it's known triterpenoid compound, the lucidone on cocoon characters and silk filament parameters, the present study has been planned.

II. MATERIAL AND METHOD

The work on Influence of topical application of acetone macerative of powder of ganoderma fruiting body and acetone solution of it's triterpenoid (lucidone –d) on the Qualitative silk cocoons in silkworm, Bombyx mori (L) was carried out through the steps like: Preparation of acetone maceratives of fruiting body of ganoderma and acetone solution of Lucidone - d; Rearing of larval instars of silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)]; Topical treatment to larval instars; Analysis of characters of cocoons and silk filament economic and statistical analysis of the data.

(A). Preparation of Acetone Maceratives of Fruiting Body of Ganoderma and acetone solution of Lucidone –d :

The herbal powder of fruiting body of Ganoderma lucidium (L) and the lucidone – d , both were procured from Harry Organo Private Limited Ganpara, Durg - 491001, Chhattisgarh, India through local dealers for Sericulture unit of Krishi Vidnyan Kendra, Baramati (Malegaon Sheti Farm India). Known quantity of herbal powder of fruiting body of Ganoderma lucidium (L) was kept for maceration in known volume of acetone. Maceration was carried for twenty four hours at room temperature. After twenty four hours, the content was filtered. The filtrate was equalized with acetone to get the macerative of 20 ppm (mg/lit.) strength. In the similar manner, the acetone solution of lucidone – d was prepared. The strength of acetone solution of lucidone – d was also 20 ppm (mg/lit.). Both were prepared freshly.

(B). Rearing of larval instars of silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)]:

The rearing of silkworm larvae has been carried out through standard methods suggested by Krishnaswami, et al , (1992) and explained by Khyade (2004) and Vitthalrao B. Khyade, et al (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, and 2017). The disease free layings of bivoltine race (CSR6 x CSR26) x CSR2 x CSR27) of silkworm, Bombyx mori (L) were procured through the "Dr. APIS" Laboratory and processed for black boxing, rearing of early instars, rearing of late age instars, provision of mountage for spinning the cocoon and cocoon harvesting through the standard methods.

(C). Topical application of Acetone solution of known herbal source of triterpenoids and Known triterpenoid compound:

The fifth instar larvae were utilized for the carrying out the attempt on the use of topical application of acetone macerative of ganoderma fruiting body and acetone solution of lucidone – d, known triterpenoid compound to fifth instar larvae of bivoltine silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)]. Soon after the fourth moult, the fifth instared larvae were grouped into four groups (each with hundred individuals). The groups include: The Group of Untreated control; The Group of Acetone treated control; Group Treated with acetone solution of lucidone – d, known triterpenoid compound and Group Treated with acetone macerative of fruiting body of Ganoderma lucidium (L) (known Herbal Source of triterpenoid) . Ten microliters acetone solution of macerative of fruiting body of Ganoderma lucidium (L) were topically applied to respective group to the individual larva at 48 hours after the fourth moult. Ten microliters acetone solution of respective lucidone – d were topically applied to the individual larva in the concerned group. The individual larva of the group of acetone treated control was received with ten microliters acetone. The larvae of the group of Untreated control were without any treatment. The larvae of all the groups were maintained through standard schedule. Rearing was conducted in wooden trays with four feedings per day. The provision of mountage was made to the mature fifth larvae for spinning their cocoons (Khyade , 2004 and Vitthalrao B. Khyade, et al (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016).

(D). Analysis of economic parameters: The harvesting of the cocoons from the mountage was carried out on fifth day after the provision of mountage for spinning. For this purpose of analysis of economic parameters, twenty cocoons from each group were selected randomly. They were deflossed. The weight of individual deflossed cocoon was recorded. Each cocoon in the was cut vertically using the blade and weight of pupa was recorded. For knowing the shell weight of individual cocoon, the reading of the weight of pupa was subtracted from weight of respective cocoon. Weight of entire deflossed cocoon; weight of shell of cocoon and weight of pupa were noted. Through the use of readings of weight of entire deflossed cocoon and weight of shell of cocoon, the shell ratio was calculated. The reading of shell weight of was divided with reading of weight of entire deflossed cocoon. The quotient thus obtained was multiplied with hundred for getting the shell ratio (Shell Percentage) of individual cocoon.

Ten cocoons per replication were used for the purpose to reel the silk filament from individual cocoon. The length in meter (A) of unbroken silk filament was obtained by using eprouvate. Weight in gram of silk filament (B) from individual cocoon was recorded. Length (A) and weight (B) of silk filament were accounted for the calculation of Denier scale. The reading of weight of silk filament (B) was divided by the reading of length of silk filament (A). Quotient thus obtained was multiplied by 9000 for the purpose to get the denier scale of silk filament Vitthalrao B. Khyade and Abhilasha C. Bhunje, 20015 and 2016).

(E). Statistical Analysis of the data:

The experimentation was repeated for thrice for the purpose of consistency in the results. The data was subjected for analysis. The statistical methods were employed to calculate the mean, standard deviation, percent variation and student "t" - test (Norman and Bailey,1955).

III. RESULTS AND DISCUSSION

The results on the topical application of acetone macerative of ganoderma fruiting body, the known herbal source of triterpenoids and acetone solution of lucidone – d, known triterpenoid compound to fifth instar larvae of bivoltine silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)] are summarized in table-1 ; Figure 1 and 2 and presented in Figure - The weight (gm) of entire deflossed cocoon; it's shell weight (gm) and the weight of Pupa (gm) of the Untreated Control group were measured 1.822 (±0.086); 0.368 (±0.008) and 1.454 respectively. The ratio of shell to the entire cocoon in the untreated control group was calculated 20.264. The readings 795.46 (±9.612) ; 0.241 (±0.048) and 2.726 belongs respectively to the Silk Filament Length (SFL in meters); Silk Filament Weight (SFW in grams) and the denier scale of silk filament obtained from the untreated control group cocoons (Table – 1 and Figure 1 and 2).The weight of whole cocoon (deflossed) , shell weight, pupal weight, shell ratio and denier scale of silk filament of the acetone treated group was found measured 1.821 (±0.094); 0.372 (±0.013) ; 1.449 ; 20.197 and 2.726 respectively (Table – 1 and Figure 1 and 2).

The topical application of ten microlitres of acetone solution of lucidone – d, a known triterpenoid compound with known strength to fifth instar larvae was found resulted into the significant increase in the entire deflossed cocoon weight, shell weight, pupal weight, shell ratio, silk filament length, silk filament weight and denier scale of silk filament measuring 2.682 (±0.233); 0.788 (±0.064); 1.894 ; 29.381; 1009.77 (±59.923); 0.317 (±0.061) and 2.825 units respectively. The yield in terms of shell ratio of the cocoons in this group was significant over the control group (Table – 1 and Figure 1 and 2).

The topical application of ten microlitres of acetone macerative of ganoderma fruiting body powder, herbal source of lucidone – d (triterpenoid) with

known strength to fifth instar larvae was found resulted into the significant increase in the entire deflossed cocoon weight, shell weight, pupal weight, shell ratio, silk filament length, silk filament weight and denier scale of silk filament measuring 2.755 (±0.316); 0.918 (±0.119); 1.837; 33.321; 1139.47 (± 97.857); 0.408 (±0.089) and 3.222 units respectively. The yield in terms of shell ratio of the cocoons in this group was significant over the control group (Table – 1 and Figure 2).

Most important aspect in sericulture is the silk cocoon. This is because, cocoons are utilized for reeling the commercial silk fibre. Cocoon weight, shell weight and thereby the shell ratio were found influenced by the topical application of acetone solution of lucidone a known triterpenoid

Table 1. The quality of the cocoons and silk filament spinned by mature fifth instar larvae of silkworm, Bombyx mori (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)] received topical application of acetone solution of acetone macerative of powder of ganoderma fruiting body and acetone solution of it's triterpenoid (lucidone –d) compound at 48 hours after the fourth moult.

Parameters→ Group↓	**Cocoon Weight (gm)**	**Shell Weight (gm)**	**Pupal Weight (gm)**	**Shell Ratio**	**S F L (m) (A)**	**S F W (gm) (B)**	**Denier Scale of S F = (B÷A) x 9000**
Untreated Control (UT)	1.822 (±0.086) 00.000	0.368 (±0.0011) 00.000	1.454 00.000	20.197 00.000	795.46 (±9.612) 00.000	0.241 (±0.048) 00.000	2.726 00.000
Acetone Treated Control (ACT)	1.821 (±0.094) 00.000	0.372 (±0.013) 00.000	1.449 00.000	20.428 00.000	795.44 (±13.786) 00.000	0.242 (±0.053) 00.000	2.738 00.000
Treated with acetone solution of Lucidone d (Triterpenoid compound) (LT)	2.682** (±0.233) 47.281	0.788** (±0.064) 111.82	1.894* 31.710	29.381** 08.953	1009.77* (±59.923) 26.944	0.317 ** (± 21.786) 32.217	2.825** 03.177
Treated with acetone macerative of Ganoderma Fruiting Body (GFBT)	2.755*** (±0.316) 51.290	0.918*** (±0.119) 146.774	1.837*** 26.777	33.321*** 12.893	1139.47*** (±97.857) 43.250	0.408*** (±0.089) 70.292	3.222*** 17.677

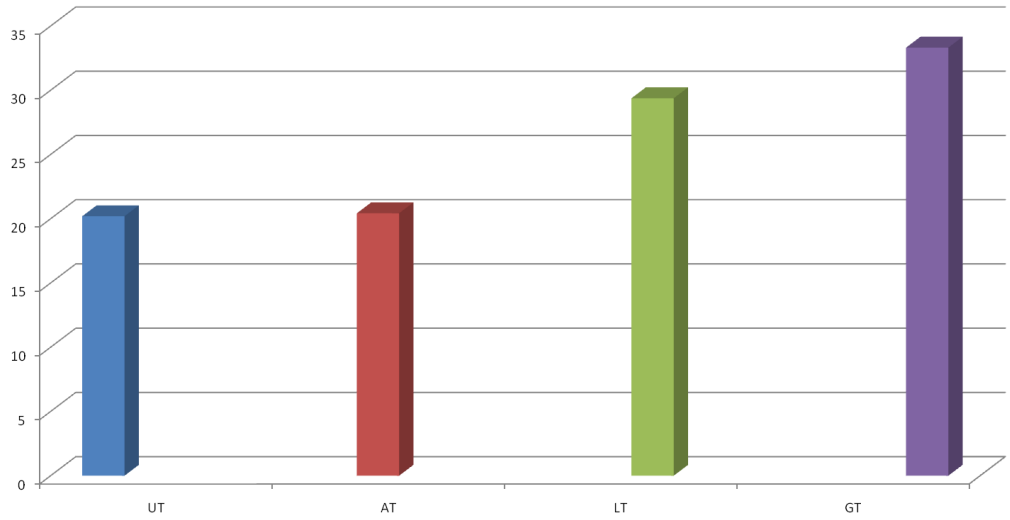
- Each figure is the mean of the three replications.

-Figure with ± sign in the bracket is standard deviation.

-Figure below the standard deviation is the increase for calculated parameter and percent increase for the others over the control.

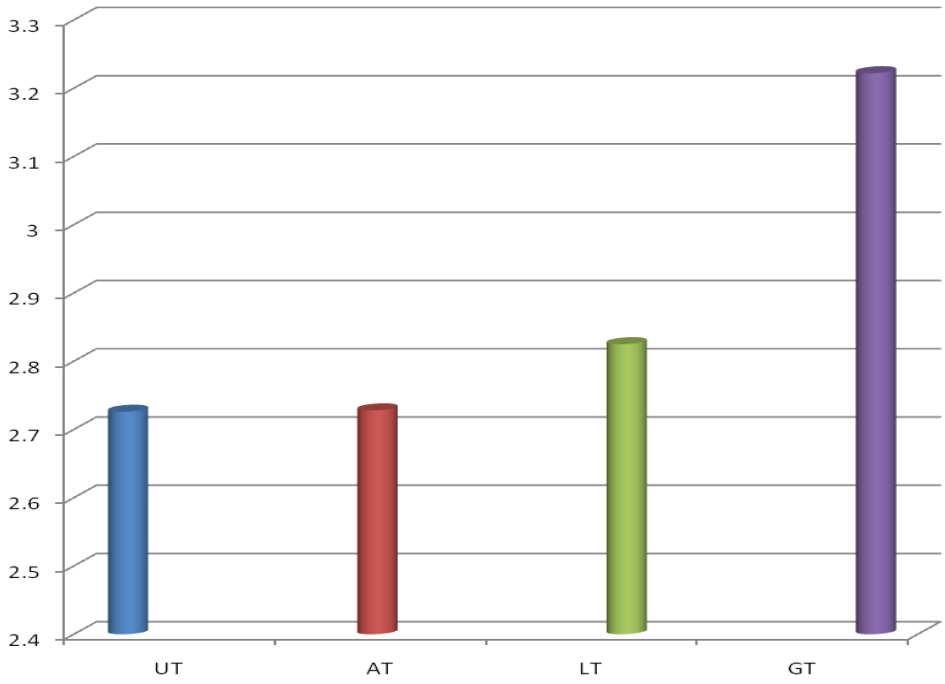
UTC=Untreated Control; ATC =Acetone Treated Control; LT: Lucidone Treated; GFBT: Treated with acetone macerative of Ganoderma Fruiting Body (GFBT); SFL= Silk Filament Length; SFW= Silk Filament Weight

* : P < 0.05;** : P < 0.005; ***: P < 0.01



UT=Untreated Control; AT =Acetone Treated Control; LT: Lucidone Treated; GT: Treated with acetone macerative of Ganoderma Fruiting Body (GFBT).

Figure 1. The Shell Ratio of the cocoons by mature fifth instar larvae of silkworm, *Bombyx mori* (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)] received topical application of acetone solution of ganoderma fruiting body, a known herbal source of triterpenoids and acetone solution of lucidone – d known triterpenoid compound at 48 hours after the fourth moult.



UT=Untreated Control; AT =Acetone Treated Control; LT: Lucidone Treated; GT: Treated with acetone macerative of Ganoderma Fruiting Body (GFBT).

Figure 2. The Denier Scale of the Silk Filament reeled from the cocoons spinned by mature fifth instar larvae of silkworm, *Bombyx mori* (L) [Race: (CSR6 x CSR26) x CSR2 x CSR27)] received topical application of acetone

solution of ganoderma fruiting body, known herbal source of triterpenoids and acetone solution of lucidone – d, a known triterpenoid compound at 48 hours after the fourth moult.

and the it's herbal source to the fifth instar larvae of silkworm, Bombyx mori(L). The range of percent increase in the cocoon weight and shell weight in the experimental (treated) groups was 47.281 to 51.290 and 111.82 to 146.774 respectively. Shell ratio of the cocoons was found improved in the corresponding groups of treatment. Both, lucidone – d, a known triterpenoid compound and ganoderma fruiting body, used for topical application in the present attempt were found most significant ($p<0.001$) with reference to the yield of the cocoons through shell ratio.

Quality of silk filament is the prime concern in sericulture. Denier scale is the unit for measurement of quality of silk filament. The length and weight of entire silk filament obtained from the cocoon through reeling are the qualitative measurements and they are used for calculation of it's Denier scale. The Denier scale of silk filament was found influenced through treating the larvae with lucidone – d, the known triterpenoid compound and known it's herbal source (Ganoderma Fruiting Body) through the acetone solvent. The denier scale of silk filament reeled from the cocoons from control group (both, untreated and acetone treated) was measured 2.738 units. The lucidone – d treatment was found influencing the denier scale of silk filament, measuring 2.825 (for treating the fifth instar larvae with lucidone – d, known triterpenoid compound through acetone) and 3.222 (for treating the fifth instar larvae with ganoderma fruiting body the known herbal source of lucidine – d, triterpenoid through acetone) units. Both, lucidone – d, known triterpenoid compound and it's herbal source (ganoderma fruiting body) through acetone was thus found resulted into fortification of silk filament, with reference to Denier scale.

According to Vitthalrao B. Khyade and Dhanashri R. Gaikawad (2016), most of the terpene compounds used for topical application to the larval instars of silkworm are the Juvenoids. The triterpenoids exert a insect Juvenile Hormone (JH) action through the reduction of chitin deposition in the body wall of larval instars of silkworm, Bombyx mori (L) (Vitthalrao B. Khyade, 2016). The lucidone – d, known triterpenoid compound and the it's herbal source, the ganoderma fruiting body received by the fifth instared larvae through the acetone in the present attempt may exerting the influence on the appetite, nutrition and absorption of digested food. And this may be reflected into accelerated growth of silk glands. The silk filament is obtained through reeling the cocoons. The cocoon is in fact, a protective shell made up of a continuous and long proteinaceous silk filament spun by mature silkworm prior to pupation. Nature availed silkworm the skill of spinning the cocoon for self protection from adverse climatic situations and natural enemies. The specific amount or the titre of juvenoid (endogenous and / or exogenous) in the body of insect larvae of silkworm, Bombyx mori (L) stimulate hypermetabolism (Slama, 1971). The endogenous and / or exogenous triterpene compounds deserve many more cellular and molecular activities that could potentially underlie their juvenomimetic index with reference to the phytophagous insects like, silkworm, Bombyx mori (L). The present attempt on topical application of acetone macerative of powder of ganoderma fruiting body and acetone solution of it's triterpenoid (lucidone –d) on the qualitative silk cocoons in silkworm, Bombyx mori (L) is going to help to establish the technology for the use of triterpenoids for qualitative improvement of silk spinned by mature fifth instar larvae of silkworm, Bombyx mori (L). The efficacy of the known lucidone – d, a triterpenoid and ganoderma fruiting body, known herbal source of lucidone – d, triterpenoids is observed in larval developmental setting, it will likely trigger for the fortified health of larval instars, that could spin the qualitative silky cocoon. The lucidone – d, triterpenoids are thus an example of the development of agents that will bridge the areas of applied

entomology like sericulture. The present attempt on use of lucidone – d for topical application to the larval instars of silkworm, Bombyx mori (L) hope more efficiently benefitting the areas of both the areas of sericulture and juvenoid research. Use of lucidone – d, a known triterpenoid compound and ganoderma fruiting body, a known herbal source of lucidone – d, triterpenoids through the acetone for topical application, thus chiefly reflected into the improvement of cocoon quality, shell ratio and silk filament quality (Vitthalrao B. Khyade, et al (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016). The attempt on the use of lucidone- d and it's herbal source, the ganoderma fruiting body through acetone for rearing of silkworm larvae is much more easy method and may open a new avenue in the sericulture.

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