



Comparative Impact of Muscardine and Flacherie Diseases on the Free Amino Acid Profile of Female Silk moths (*Bombyx mori* L.) During Seed and Commercial Crop Seasons

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Abstract :

Cysteine, Lysine, Serine, Valine and Asparagine are traces during the seed crop season due to the effect of Muscardine disease. Cysteine and Methionine-sulphoxide are traces during the commercial crop season due to the effect of Muscardine disease. Alpha-alanine, Arginine, Asparagine, Cysteine, Glutamic acid, Leucine, Isoleucine, Serine, Threonine, Tyrosine and Valine are traces in seed crop season and Methionine-sulphoxide, Proline, Serine are traces in the commercial crop season due to the effect of Flacherie disease. Arginine, Glutamic acid, are absent during the seed crop season and Glutamic acid, Serine are absent in the commercial crop season due to the effect of Muscardine disease. Aspartic acid, Lysine, Methionine-sulphoxide are absent in the seed crop season and Cysteine, Threonine are absent during commercial crop season due to the effect of Flacherie disease.

According to data the impact of two diseases namely Muscardine and Flacherie has clearly shown that the Flacherie disease of the Female silk moths *Bombyx mori* L. has a greater pathological effect on free Amino acids of Female moths than the Muscardine disease. The commercial crop season provides relatively better dietary and Climatic conditions to Female moths than the seed crop season.

Keywords: Experimental, Female silk moths, Flacherie, Muscardine, Seasons.

INTRODUCTION

The Female Silkworm *Bombyxmori* L. is a sericigenous insect that feed on mulberry leaves and converts the leaf protein in to silk protein in to silk protein (Babu, 1994)^[4]. The free Amino acids supplementation can considerably enhance the growth and development of the silkworm and hence improve the quality of cocoons weight with filament length and regulates the reeling speed but also economic parameters of silkworm (Basti and Ashfaq, 1999^[5], Chattopadhyay et al. 2018,^[6] Etebari and Matindoost, 2005^[8], Goudar and kaliwal, 1999^[9] Kabila et al. 1994,^[15] Krishnappa, 1987^[17], Radjabi, 2010,^[19] Ramesh et al. 2018,^[21] Sannapa et al. 2002).^[22]

It has been observed during the process of mulberry silk moths rearing that it suffer great loss of crop (10-30%) due to diseases like Muscardine and Flacherie as a result the productivity and quality of mulberry silk evidently get affected. Due to species diversities of pathogens causing in the extent of harm made by pathogens are also reported by earlier investigators (Jolly, 1974)^[13]. It is further known that diseases of Female silk moths impair the growth and development by affecting the biochemical manifestations.

MATERIALS AND METHODS

Female mulberry silk moths of *Bombyx mori* L. infected with two different diseases were collected and carefully indentified for the biochemical investigation in respect of free Amino acids contents and analysis were carried out during both seasons (Jolly et al.1968).^[14] As per the standard methods suggested and a control was also maintained. Further data were collected, compared and analysed. The analysed data were finally presented in the tables 1 and 2. The entire work during both the seasons were carried out in the Department of Zoology, Magadh University Bodh Gaya, Bihar, India.

RESULTS AND DISCUSSION

The impact of Muscardine and Flacherie diseases on free Amino acids of Female moths of *Bombyx mori* L. have been examined in tables 1 and 2 during the seed crop and commercial crop seasons.

Table 1 reveals the number of free Amino acids in the experimental lot for Muscardine is 17 where as the total no. of free Amino acids in control is 19. The Arginine, Glutamic acid and Methionine-sulphoxide are absent in experimental lot. Further the Asparagine, Cysteine, Lysine, Serine and Valine have been found in traces under the experimental lot. The Alpha-alanine, Aspartic acid, Beta-alanine, Cystic acid, Glutamine Glycine, Histidine, Leucine, Isoleucine, Proline, Threonine and Tyrosine are abundant in the haemolymph of the Muscardine infected lot. Likewise the impact of Muscardine disease in respect of free Amino acids of Female moths during commercial crop season against the control has been presented in table 2. The table reveal the presence of altogether 18 free Amino acids under the infected lot in the comparison to 19 free Amino acids under the control lot. The Glutamic acid and Serine are absent in the experimental lot. Further the Cysteine and Methionine-sulphoxide are traces in comparison to control. It is further clear that the Alpha-alanine, Aspartic acid, Glycine and Threonine are excess in control. Whereas this acids show presence in respect of Muscardine. The Glutamic acid and Serine are present in control but absent in respect of Muscardine.

The impact of Flacherie disease of mulberry silk moths (*bombyx mori* L.) caused by bacterial infection has also been evaluated and its relative analysis with Muscardine disease in respect of free Amino acids at Female moths stages of *Bombyx mori* L. has been carried out as per the tables 1 and 2 during seed crop and commercial crop season. According to table No. 1 *Bombyx mori* L. Female moths infected with Flacherie disease have total number of free Amino acids 16 in experimental lot and total no. of free Amino acids control is 19 during seed crop season. The Aspartic acid, Lysine and Methionine-sulphoxide are absent in the experimental lot. The Beta-alanine, Cystic acid, Glycine, Histidine and Proline are abundant in the haemolymph of the Flacherie infected lot. Likewise the impact of Flacherie disease in respect of free Amino acids at Female moths stage during commercial crop season against the control has been presented in table 2. The table reveal the presence of altogether 17 free Amino acids under the infected

lot in the comparison to 19 free Amino acids under the control lot. The Asparagine, Aspartic acid, Cysteine and Threonine are absent in the experimental lot. It is further clear that the Alpha-alanine and Glycine are excess in control. Whereas this acid show that presence in respect of Flacherie. The Methionine-sulphoxide, Proline and Serine are present in control but traces in respect of Flacherie.

The Muscardine and Flacherie diseases are very prominent among the Female silk moths *Bombyx mori* L. It retards the growth and development of a silk moths as a result the length and width of the moths get affected (Afrikian, 1960^[1]. Agarwal, 1974^[2], Argell, 1949,^[3] Heimpel and August, 1963,^[10] Hiratasuka, 1917^[11], Ishimori and Muto, 1951^[12], Jolly, 1974^[13], Pandey, 2003^[18], Sinha, 1970^[25], Steinhouse, 1954^[26]. Ram (2003)^[20] and whyatt (1961)^[27] have reported quantitative and qualitative changes in free Amino acids contents at different stage in the life cycle of Female silk moths.

CONCLUSION

According to data when we summed up the discussion it becomes very clear that Muscardine disease caused by fungal infection and Flacherie disease caused by bacterial infection among the Female silk moths *Bombyx mori* L. significantly affect the biochemical contents particularly free Amino acids resulting in to poor growth and development of Female silk moths stages of *Bombyx mori* L. during the both seasons (Sharma,2005^[24], Sinha, 1970).^[25]

**Table 1 : Relative Effects of Diseases on Free Amino acids Contents at Female Silk moths
Stages During the Seed Crop Season**

S.N.	Free Amino acid	Experimental		Control	C.D. at 0.5% Level
		M	F		
1	Alpha-alanine	+	+ -	+ -	H.S.
2	Arginine	-	+ -	+	
3	Asparagine	+ -	+ -	+	
4	Aspartic acid	+	-	+	
5	Beta-alanine	+	+	+	
6	Cystic acid	+	+	+	
7	Cysteine	+ -	+ -	+ -	
8	Glutamic acid	-	+ -	+ -	
9	Glutamine	+	+	+	
10	Glycine	+	+	++	
11	Histidine	+	+	+	
12	Leucine/Isoleucine	+	+ -	+	
13	Lysine	+ -	-	+	
14	Methionine-sulphoxide	-	-	+ -	
15	Proline	+	+	+	
16	Serine	+ -	+ -	+	
17	Threonine	+	+ -	+	
18	Tyrosine	+	+ -	+	
19	Valine	+ -	+ -	+	
		17	16	19	

+ = Present, ++ = Excess, + - = Traces, - = Absent, M=Muscardine, F=Flacherie, H.S.= Highly Significant

Table 2 : Relative Effects of Diseases on Free Amino acids Contents at Female Silk moths Stages During the Commercial Crop Season

S.N.	Free Amino acid	Experimental		Control	C.D. at 0.5% Level
		M	F		
1	Alpha-alanine	+	+	++	H.S.
2	Arginine	+	+	+	
3	Asparagine	+	-	+	
4	Aspartic acid	+	-	++	
5	Beta-alanine	+	+	+	
6	Cystic acid	+	+	+	
7	Cysteine	+-	-	+-	
8	Glutamic acid	-	+	+	
9	Glutamine	+	+	+	
10	Glycine	+	+	++	
11	Histidine	+	+	+	
12	Leucine/Isoleucine	+	+	+	
13	Lysine	+	+	+	
14	Methionine-sulphoxide	+-	+-	+	
15	Proline	+	+-	+	
16	Serine	-	+-	+	
17	Threonine	+	-	++	
18	Tyrosine	+	+	+	
19	Valine	+	+	+	
		18	17	19	

+ = Present, ++ = Excess, +- = Traces, - = Absent, M=Muscardine, F=Flacherie, H.S.= Highly Significant

The relative impacts of two diseases namely Muscardine and Flacherie have clearly shown that the Flacherie disease of *Bombyx mori* L. has greater pathological effect on the biochemical makeup of Female silk moths at different stages of life cycle than the Muscardine disease. The results become very clear when we consider the fact that the commercial crop season provide relatively better dietary and climatic condition to the developing stages of *Bombyx mori* L. than the seed crop season (Choudhary, 2008,^[7] Kumari 2003,^[16] Sen and Sinha, 1986)^[23]

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