

EFFECT OF CERTAIN ENVIRONMENTAL FACTORS ON THE BIOLOGY OF MANGO FRUIT WEEVILS (CURCULIONIDAE: COLEOPTERA)

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ABSTRACT

Sternochetus mangiferae (Fabr.) (mango stone weevil) and *S. gravis* (mango pulp weevil) are the serious pests of mango fruits in Manipur. The effect of certain environmental factors, especially temperature, relative humidity and rainfall, has been studied on the duration of their life cycle under the laboratory conditions during February 1987 to July 1989. The duration of life cycle of these weevils has been observed to vary from season to season. The longest duration (55 days) of the life cycle has been observed during 1988, and the shortest duration during 1987. The environmental parameters have been observed to play a vital role on the biology of these fruit weevils. An average temperature of 28°C and relative humidity of 72.77% have been found favourable for the longer life cycle whereas the average minimum temperature of 26.44°C with 74.66% relative humidity has been observed to shorten their life cycle.

INTRODUCTION

The mango fruit weevils *Sternochetus mangiferae* (Fabr.) and *S. gravis* (Fabr.) are the serious and specific pests of mango fruits. The destruction of mango fruits is done by both, the grubs and adult weevils. A fragmentary work has been done on biology and control of these pests by different workers like Subramanyam (1925), Balock & Kozuma (1964), Sesagiri Rao et al. (1971) and De & Pande (1988). But the role of environmental factors on the life duration of these weevils is not yet known. The present investigation was, therefore, undertaken to study the effects of the environmental factors, especially temperature, relative humidity and rainfall on the life cycle of these weevils.

MATERIALS AND METHODS

For studying effects of the environmental factors on the life cycle of *S. mangiferae* and *S. gravis* under the laboratory conditions during the mango fruiting season (February to August), 15 pairs of weevils were released inside a cage provided with an immature fruits of peanut size. The eggs were laid singly by making crescent shaped incisions on the skin of the fruits with the help of their ovipositors. The eggs are found near the base and beak of the marble size fruits. The incubation and hatching periods were noted. After emergence of the first instar grub, the fresh mango fruits were daily changed. The moulting of the instars was noted in each case. The intervals between successive moultings were minutely observed along with the particular temperature and relative humidity of the existing environment. The date and time of emergence were also recorded for calculating the periods. The meteorological data of the experiment were collected from the Tulihal Air Port Observatory, Imphal.

RESULTS AND DISCUSSION

The detailed observations on three different seasons have been given in Table 1. It is evident that the environmental factors like temperature and relative humidity play significant role and have marked influence on life cycle of the mango fruit weevils. It has been, thus, seen that life cycle of the weevils

Table1: Duration of different stages of mango fruit weevil in different environmental factors during the years 1987-89.

Stages	No. of Days			Average Temperature(°C) (Max.-Min.)			Average Relative Humidity (Max.-Min.)			Average Rainfall (mm)			Total no. of Days		
	1987	1988	1989	1987	1988	1989	1987	1988	1989	1987	1988	1989	1987	1988	1989
EGG	7	8	9	28.6- 15.2	29.0- 19.2	25.3- 12.0	81-81	50-59	67-70	33.9	150.1	16.0			
1 st Instar	6	9	6	29.4- 14.8	25.0- 11.8	28.2- 11.6	58-62	87-90	50-59	95.7	39.7	28.4			
2 nd Instar	7	7	6	27.1- 14.2	23.4- 11.5	29.4- 13.6	77-67	85-74	58-36	180.8	94.3	267.3			
3 rd Instar	8	7	8	21.9- 12.5	26.8- 14.6	30.4- 19.6	77-80	59-72	54-74	57.4	69.5	139.9			
4 th Instar	6	7	6	28.2- 14.3	26.8- 13.4	28.0- 16.5	96-75	89-81	63-57	248.5	301.1	177.6			
5 th Instar	6	6	7	30.0- 11.6	27.6- 14.5	31.3- 15.8	61-47	75-50	62-52	153.1	161.5	461.9			
Pre- pupa	2	4	3	28.7- 12.6	30.9- 13.8	29.9- 15.7	63-51	73-49	74-92	127.55	278.9	78.8			
Pupa	7	7	6	21.4- 13.2	29.4- 11.8	28.8- 16.5	75-60	71-49	63-57	56.65	101.3	126.7			
Adult				26.4- 13.8	32.8- 15.7	26.8- 16.7	81-77	63-33	87-50	332.55	87.5	70.4	49	55	51

varies from one season to another depending upon variation of the environmental factors. During 1987 (February to July) their life cycle was found to be shortest (49 days) on an average low temperature of 26.44°C and high relative humidity of 74.66% along with an average rainfall of 131.79 mm. Similarly during (February to July 1989), their life cycle was longest (55 days) on an average high temperature of 28°C and low relative humidity of 72-77% along with an average rainfall of 142.6 mm respectively during the season.

Therefore, it is concluded that the low temperature and high relative humidity shortens the life cycle while the high temperature and low relative humidity lengthens the life cycle of the mango fruit weevils. It is clear that the environmental factors influence the life cycle of these weevils to a great extent.

ACKNOWLEDGEMENT

The author is grateful to Head of Department, Life Sciences, Manipur University for providing laboratory facilities and Officer in-charge of the Meteorological Department, Tuliha Airport, Imphal for the supply of meteorological data for the research work.

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