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RESEARCH ARTICLE

STUDIES ON LIFE CYCLE OF *TYROPHAGUSLONGIOR*OCCURRING ON STORED WHEAT AND RICE IN WEST BENGAL

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ABSTRACT

Tyrophaguslongior is an important and notorious paste of stored wheat and rice and because of its infestation the wheat and rice get severely damaged and produces pungent smell. Its Life cycle at room temperature reveals that it took 28.12 ± 3.21days and 29.32 ± 3.64 on wheat and rice respectively. The fecundity was 25.2 ± 0.92 and 22.28 ± 0.59 eggs respectively for wheat and rice and female longevity was 25.53±2.19 and 35.43±3.19 days for wheat and rice respectively. Since the life cycle was completed was sort of time in wheat flour on which fecundity was slightly higher apparently wheat flour appears to be more preferable to the mite compared to rice flour.

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INTRODUCTION

Tyrophaguslongior is a Cosmopolitan species occurs in diverse habitats like stored products, bird nests, dusts and also sometimes on plant. However, it is considered to be more common on stored products where it will be invariably available and it's infestation causes quite often serious damage due to its feeding. Recently on stored wheat and rice infestation of this mite was seen which caused the wheat and rice powdersstincky, became brownies and finally a clumped formation took place. In view of that it was thought to undertake a study on life cycle of this mite on this two habitatsunder the laboratory condition and the results of that study is presented in this paper. Earlier Sarwar *et al*. (2010), Sanchez-Ramos *et al*. (2001) worked out life cycle of *Tyrophaguslongior* while Barkar (1967) worked out the effect of different humidity on life cycle of *Tyrophaguslongior* and Mostafa *et al* (2013) studied the effect of different dietson biology of *Tyrophaguslongior*.

MATERIAL AND METHODS

The infested wheat and rice flour was collected from ration shop at Panskura (22.3963386, 87.7232355), Medinipur where the infestation of *Tyrophaguslongior* was very severe form.

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The sample of both wheat and rice flour after collection was cultured in the laboratory in the culture medium made of powder dog biscuit+baking powder + small cut hairs in a test tube and one water soaked cotton ball was kept hanging in the test tube to provide required level of moisture. The mouth of test tube was closed with cotton plug. Five such test tubes each for rice and wheat flour where maintained as culture tubes. The life cycle was studied in in a petri dish 5cm diameter where the same culture medium mentioned above was used and on that 5 gravid females of *Tyrophaguslongior* were released for laying eggs. For each of wheat and rice flour 5 suchpetri dishes were maintained. After 24 hours petri dishes were examined for laying of egg and if sufficient number of eggs have been laid 10/each petri dish then the females were removed keeping only the eggs. The eggs were counted and and each of the egg was transferred to a new petri dish of 2 cm diameter and as such 15 such petri dishes were finally taken each one to serve as one replication. The eggs were transferred in a culture medium as mentioned earlier and each of the petri dishes were numbered. Therefore 15 petri dishes were taken for rice flour and 15 for wheat flour al together 30 replication. Observations were recorded after every 12 hours to record their Further development. The time taken to complete different stages of life cycle like incubation, larva, protonymph, deutonymph, egg-adult, pre Oviposition, Oviposition, post Oviposition period, fecundity, longevity, etc., were recorded till the adult female died.

Images of *Tyrophaguslongior*

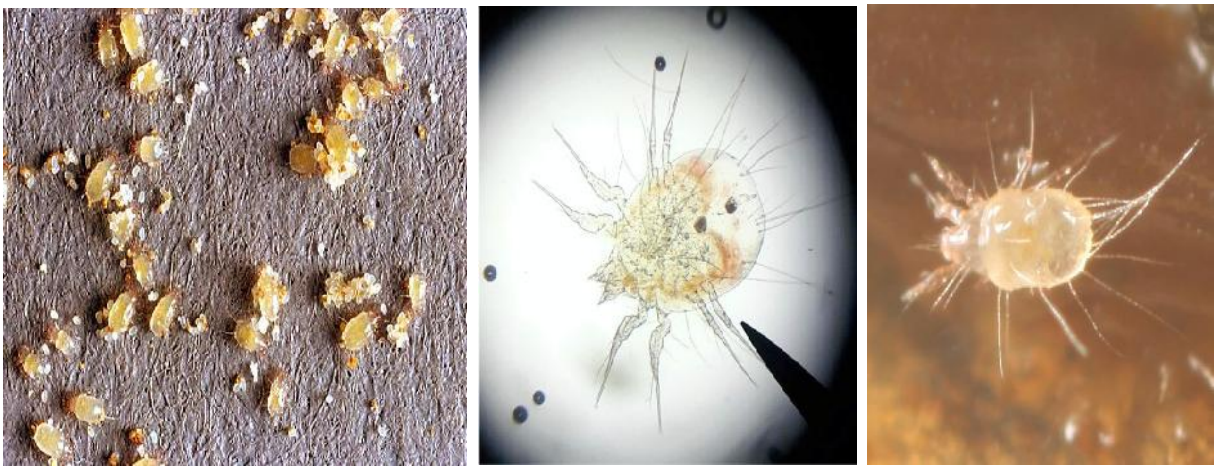

Table 1. Life Cycle of *Tyrophaguslongior* on Stored rice and wheat under laboratory condition

LIFE CYCLE OF *Tyrophagus.putrescentiae*				
Stages	**Range (in days)**	**Habitat I(wheat Flour) In days**	**Range (in days)**	**Habitat II(Rice Flour) In days**
Egg	4.0 – 5.0	5.82 ± 0.59	3.5 - 4.5	5.22 ± 0.59
Larva	4.0 - 5.0	5.32 ± 0.60	3.5 - 5.5	6.29 ± 0.71
Protonymph	5.5 - 6.5	6.92 ± 0.75	6.5 - 8.5	7.51± 0.45
Deutonymph	4.5 - 5.5	7.90 ± 0.75	3.5 - 4.5	9.57 ± 0.98
Life Cycle		25.96 ± 2.66		28.59 ± 2.73
Preoviposition Period	3.5 - 5.5	6.81 ± 0.69	3.0 - 4.0	7.49 ± 0.79
Oviposition Period	13.5 - 19.5	18.92 ± 1.85	14.0 - 16.0	16.79 ± 1.39
Postoviposition Period	2.0 - 3.0	3.58 ± 0.41	2.0 - 3.0	6.59 ± 0.75
Fecundity	22.5 - 27.0	25.2 ± 0.92	20.0 - 24.5	22.28 ± 0.59
Longivity Female	20.5 - 25.0	25.53 ± 2.19	8.0 - 15.0	35.43 ± 3.19
Longivity Male	22.0 - 24.5	23.21 ± 2.45	15.25 - 18.50	18.27± 0.69

RESULTS AND DISCUSSION

Biology of mould mite, *T. longior* was studied on Wheat flour and Rice flour at mean temperature of 32.2^{o}C and 98% RH in the laboratory. The data regarding durations of developmental stages viz., egg, larva, protonymph, deutonymph, life cycle and adult longevityof both male and female and pre-oviposition, oviposition, post-oviposition periods and fecundity of female were recorded and presented in the Table 1.

Egg: Table 1 indicates that there was slightly differences between the egg stage of *T. longior* female on different food types. This period averaged 5.82 ± 0.59 and 5.22± 0.59for eggs on wheat flour and rice flour, respectively. Mostafa*et al.*(2013) worked on four different food types and found different egg stages (in wheat flour 3.1±0.13; in milk powder 3.3±0.17; in granular chicken feed 3.6±0.11; in fish powder 4.0±0.1) respectively. Sarwar*et al.*(2010) studied on three different food types and reported different egg stages (in Maize 3.2 ± 0.1; in Soybean 3.7 ± 0.0 and in wheat flour 3.2 ± 0.1), respectively.

Larva: After emerging from the egg, the active larval period averaged 5.32 ± 0.60on wheat flour and 6.29 ± 0.71 on rice flour (Table 1). Mostafa*et al.*(2013) worked on four different food types and found different larval stages (in wheat flour 8.0±0.21; in milk powder 9.2±0.41; in granular chicken feed 9.7±0.11; in fish powder 10.0±0.8) respectively. Sarwar*et al.*(2010) studied on three different food types and reported varieties in duration of larval stage, (in Maize 1.8 ± 0.0; in Soybean 2.2 ± 0.0 and in wheat flour 1.5 ± 0.1), respectively.

Protonymph: The active phase of the protonymphal period averaged 6.92 ± 0.75 on wheat flour and 7.51 ± 0.45 on rice flour(Table 1). Sarwar*et al.*(2010) studied on three different food types and reported different protonymphal stages (in Maize 4.6 ± 0.1; in Soybean 5.9 ± 0.1 and in wheat flour 3.0 ± 0.1) respectively. HajarPakyari *et al.* (2011) studied protonymphal stage on Mushroom (4.08 ± 0.39).

Deutonymph: The active phase of deutonymphal periods averaged 7.90 ± 0.85 on wheat flour and 9.57 ± 0.98(Table 1). In the previous study, Sarwar*et al.* (2010) reported different deutonymphal stages on three different food types (in Maize 5.3 ± 0.2; in Soybean 6.9 ± 0.1 and in wheat flour 3.9 ± 0.0) respectively. HajarPakyari *et al.* (2011) reported deutonymphal stage on Mushroom (2.96 ± 0.41).

Egg to adult period: The total developmental period of *T. putrescentiae* averaged 28.12 ± 3.21on wheat flour and 29.32 ± 3.64 on rice flour respectively (Table 1). According to Mostafa*et al.*(2013),the total developmental period of *T. putrescentiae* averaged 11.1 ± 0.14 on wheat flour, 12.5 ± 0.71 on milk powder, 13.3 ± 0.45 on granular chicken feed, 14.0 ± 0.41 on fish powder respectively. According to Sarwar*et al.* (2010), the total developmental period of *T. putrescentiae* average was 15.2 ± 0.2 on Maize, 18.8 ± 0.2 on Soybean and 11.7 ± 0.3 on wheat respectively. According to HajarPakyar*et al.* (2011), the total developmental period of *T. putrescentiae* average was 15.87 ± 0.57 on Mushroom.

Oviposition and fecundity: The pre-oviposition, oviposition and fecundity parameters of the *T. putrescentiae* were studied.

Pre-oviposition period: The mean pre-oviposition period averaged 6.81 ± 0.69 on wheat flour and 7.49 ± 0.79 on rice

flour respectively (Table 1). Mostafa *et al.* (2013) studied the pre-oviposition period which average was 2.0 ± 0.2, 2.2 ± 0.1, 2.0 ± 0.3 and 1.9 ± 0.2 on wheat flour, milk powder, granular chicken feed and fish powder, respectively. According to Hajar Pakyari *et al.* (2011) the average on pre-oviposition on Mushroom was 2.2 ± 0.20.

Oviposition period: The oviposition period averaged 18.92 ± 1.85 on wheat flour and 16.79 ± 1.39 on rice floor (Table 1). Mostafa *et al* (2013) observed mean oviposition period was 34.6 ± 0.9 on wheat flour, 30.4 ± 0.3 on milk powder, 22.8 ± 0.6 on granular chicken feed and 21.0 ± 0.5 on fish powder respectively. According to Hajar Pakyari *et al.*(2011) oviposition period average was 18.5 ± 0.05 on Mushroom.

Post-oviposition: The postoviposition period averaged 3.58 ± 0.41 on wheat flour and 6.59 ± 0.75 on rice flour (Table 1). Mostafa *et al* (2013) observed mean post-oviposition period average was 2.6 ± 0.4 on wheat flour, 2.1 ± 0.2 on milk powder, 2.6 ± 0.5 on granular chicken feed and 2.2 ± 0.0 on fish powder respectively. According to Hajar Pakyari *et al.* (2011) oviposition period average was 2.5 ± 0.35 on Mushroom.

Fecundity: On an average the total number of eggs laid by a female was 25.2 ± 0.92 on wheat flour and 22.28 ± 0.59 on rice flour (Table 1). Mostafa *et al* (2013) reported mean total fecundity/female 39.0 ± 1.3, 34.0 ± 1.5, 30.0 ± 0.7, 27.8 ± 0.7 on wheat flour, milk powder, granular chicken feed and fish powder respectively. According to Sarwar *et al.* (2010) the mean total fecundity/female 17.1 ± 2.0, 11.4 ± 1.8, 23.8 ± 1.2 on Maize, Soybean and wheat respectively.

Longevity male: The sexually matured males had a narrow body with a distinctly pointed abdomen when compared to the females. The total period spent after deutonymph till they died (longevity) was averaged 23.21 ± 2.45 on wheat flour and 18.27 ± 0.69 on rice flour(Table 1). According to Sarwar*et al.*(2010) longevity averaged 23.5 ± 1.5 on Maize, 18.7 ± 1.8 on Soybean and 28.7 ± 0.8 on wheat respectively.

Longevity Female: The mean longevity was 25.53±2.19 on wheat flour and 35.43±3.19 on rice flour (Table 1) for female. Mostafa *et al.*(2013) reported average female longevity was 39.0 ± 1.14 on wheat flour, 34.7 ± 0.71 on milk powder, 27.3 ± 0.71 on granular chicken feed and 25.1 ± 0.71 on fish powder respectively. According to Sarwar *et al.* (2010) studied average longevity for female was 34.1 ± 1.5 on Maize, 27.0 ± 2.4 on Soybean and 40.8 ± 0.6 on wheat flours respectively. Also according to Hajar Pakyari *et al.* (2011) the average longevity of female was 23.2 ± 0.90 on Mushroom.

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