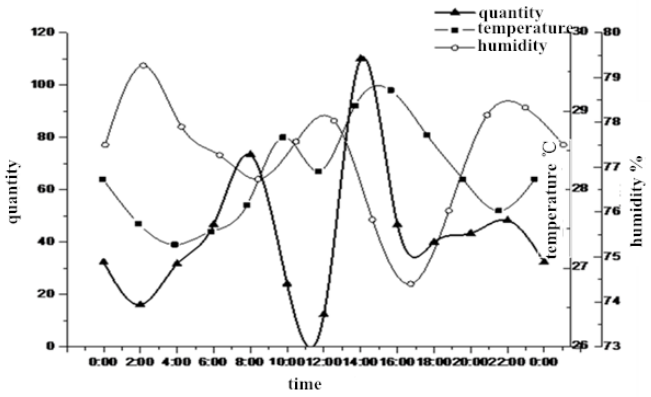

Fig. 3 Changes in temperature, humidity, and quantity of *L.paeta* trapped with time in Zhanjiang No. 4 warehouse

4. Discussion

In recent years, booklice has also became a new threat to global grain security (Zhang Shengfang, 1998), which is the problem that needs to be solved urgently (Muhammad Shoaibet al, 2010). The sticky trap in the study can be considered as a physical control method. It provides a new green and effective means for the prevention and treatment of booklice.

Since both the *L.entomophila* and *L. paeta* have obvious light-shielding properties (Yan Xiaoping et al, 2008), the principle of sticky trap remains to be further studied. It may be related to the fact that the *L.entomophila* prefers high humidity environment because of the stickiness. The glue on the glue sheet causes an increase in humidity.

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Development of a suitable rearing media for *Tribolium castaneum*

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Abstract

Tribolium castaneum is a serious pest of cereal flour and flour-based products, and thus a test insect in stored-product research. The composition of the rearing medium affects the progeny production, their performance and handling efficacy. The objective of this research was to develop a suitable rearing media for *T. castaneum*. The research tested wheat flour, crushed broiler feed, crushed dog feed and corn flour alone and in different combinations. Twenty adults of *T. castaneum* were introduced to each medium separately, and removed after 2 weeks. The progeny adults emerged in each rearing medium was determined. The progeny produced differed with the food medium. In general, the rearing media having a combination of ingredients produced more

progeny than a particular component alone. Different ratios of these food ingredients need to be tested to further increase the progeny production in *T. castaneum* and to determine the efficacy of these media on the progeny production in other species.

Keywords: *Tribolium castaneum*, rearing media, adult emergence, progeny

1. Introduction

Food security is a major issue throughout the world, and storage of food always has been a challenge due to infestation by insects (Wijayaratne et al., 2009; Wijayaratne et al., 2018). *Tribolium castaneum* larvae and adults cause quantitative and qualitative losses in stored products (Wijayaratne and Rajapakse, 2015), and hence appropriate control methods need to be developed. Thus *T. castaneum* is a test insect in many research and need to be handled in large numbers. A rearing media which facilitates healthy development of *T. castaneum* cultures and convenient handling of them is therefore important. Therefore this research was conducted to develop an effective rearing media for *T. castaneum* using food ingredients available at the local market.

2. Materials and methods

Tribolium castaneum reared in wheat flour at 30°C, 65% R.H. were used in the experiment. Wheat flour, crushed broiler feed, corn flour and crushed dog feed were used alone and in different combinations as given in Table 1. From each medium prepared, 100 g was weighed into a plastic vial and 20 adults (without sexing) were introduced into each vial. The adults were removed after two weeks. The progeny emerged in each container was counted at one and three months.

3. Results and Discussion

Progeny produced by *T. castaneum* varied with the medium (Figures 1-3). The medium that contained wheat flour, crushed dog feed and crushed broiler feed at 2:1:1 ratio produced the maximum adult progeny.

Tab. 1 Rearing media tested for progeny production by *Tribolium castaneum*.

Treatment	Wheat Flour(g)	Crushed Dog feed(g)	Crushed Broiler feed(g)	Corn flour(g)
A	100	-	-.	-
B	-	100	-	-
C	-	-	100	-
D	-	-	-	100
E	50	50	-	-
F	50	-	50	-
G	50	-	-	50
H	50	25	25	-
I	50	-	25	25
J	50	25	-	25
K	25	25	25	25

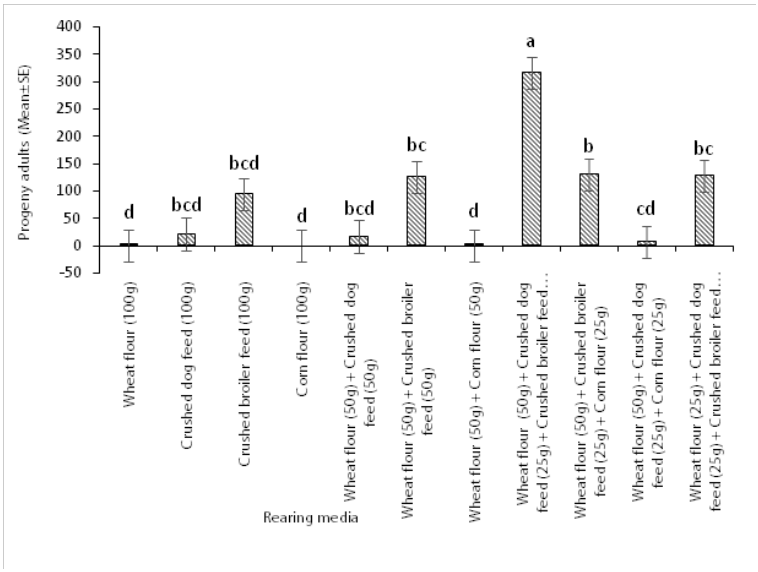

Fig. 1 Progeny *Tribolium castaneum* adults (mean±SE) emerged on different rearing media one month following infestation (n=4).

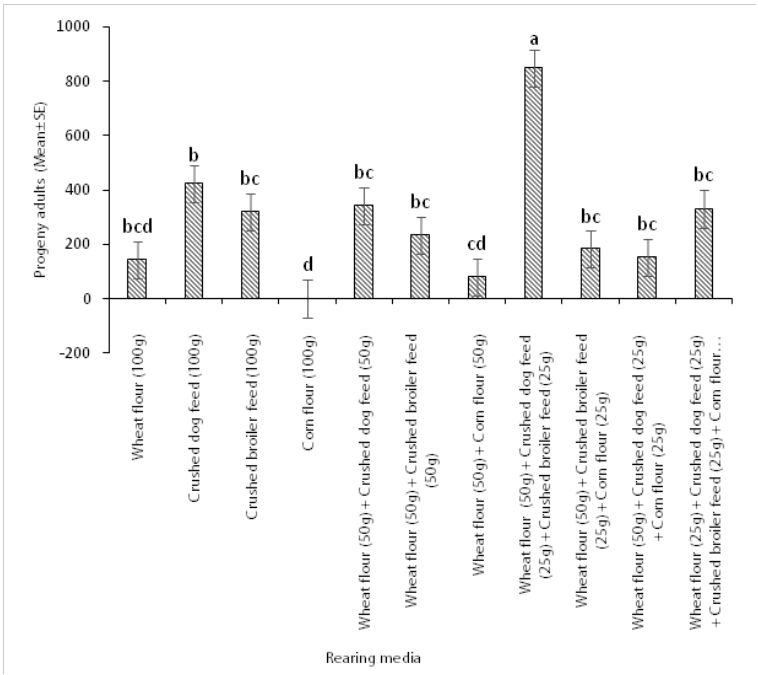

Fig. 2 Progeny *Tribolium castaneum* adults (mean±SE) emerged on different rearing media two months following infestation (n=4).

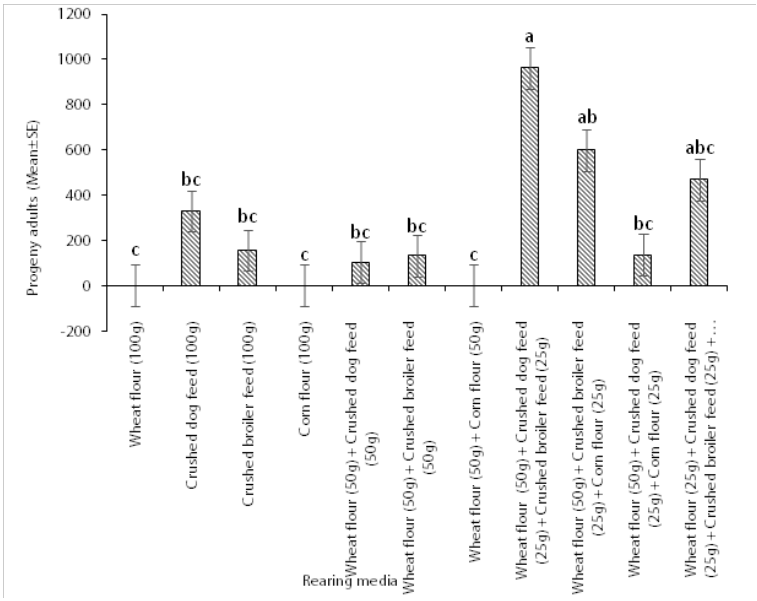

Fig. 3 Progeny *Tribolium castaneum* adults (mean±SE) emerged on different rearing media three months following infestation (n=4).

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Sitotroga cerealella (Olivier) resilience to extreme temperature and desiccation may explain its increasing pest status in changing climates

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Abstract

The mechanisms underlying *Sitotroga cerealella* survival under variable and increasing mean thermal and desiccation environments typical under global change is currently unknown. To understand how *S. cerealella* survives extreme abiotic stressors typical of stored-grain environments, we measured *S. cerealella* tolerance temperature and desiccation. The results showed that to survive desiccating grain storage environments, *S. cerealella* relied more on high body water content (BWC) (70.2 ± 3.72%) compared to lipid reserves (9.8± 0.81%). In desiccating environment, *S. cerealella* showed a reduced water loss rate (0.056mg/h) (equivalent of 1.81% of body water/hour) which would require 19.31 h to reduce the insect body water to its critical minimum (35.23% body water content at death), which is 50.20% of normal initial body water. Similarly *S. cerealella* exhibited high basal heat tolerance with critical thermal maximum of 46.09 ± 1.042°C and a heat knockdown time of 7.97 ± 1.64 minutes. Basal cold tolerance was relatively compromised (critical thermal minima of 4.52 ± 1.06°C and chill