

Food rearing observation of *Tribolium freemani* Hinton (Coleoptera: Tenebrionidae)

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Abstract

Tribolium freemani was first found in Keshmer of India in 1893. Since then there was no discovery until 1978, when it was recaptured in Japan from imported Brazilian maize. In 1981 and 1984 this pest was collected from Kunming City of Yunnan Province and Urumqi city of Xinjiang Uygur Autonomous Region respectively by Professor Liu Yongping. In September of 1994 Huangpu Animal and Plant Quarantine Service captured the pest from imported Italian silkworm

After being captured this pest was reared and observed on adaptation to the conditions in Guangzhou region of China. The results suggest that the pest can survive and reproduce in Guangzhou. Using 21 varieties of products related with entry and exit to feed the pest and found that wheat bran, pupae of silkworm, wheat flour were more suitable to survive and reproduce; mixed flour, soybean flour, corn flour, bone meals of cow and sheep were suitable and bean meal, fish meal, almond, sesame, peanut were less suitable; cassava flour, grain of rice, grain of wheat, dried mushroom and tuckahoe could be for surviving but decreasing reproduction; dried fish (very hard and dry), grain of barley and soybean could not be for feeding.

Introduction

Tribolium freemani Hinton (FR) was first found in Keshmer of India in 1893. Since then, there was no discovery until 1978, when it was captured in Japan from imported Brazilian corn. In 1981 and 1984 this pest was collected from Kunming City of Yunnan Province and Urumqi region of Xinjiang Uygur Autonomous Region respectively by Professor Liu Yongping. In September of 1994 Huangpu Animal and Plant Quarantine Service captured the pest from imported Italian pod.

After being captured FR was reared and observed on adaptation to the conditions in Guangzhou region of China. The results indicate that the pest can survive and reproduce in Guangzhou. To better know feeding habits and quarantine

significance of FR, varieties of products related with entry and exit was used for feeding the pest and the results are as following.

Materials and Methods

Insect source

FR found in imported Italian pod in 1994 was maintained on wheat flour and pupae of silkworm for two years.

Food media

The following products were examined for the growth and development of FR

Wheat bran: imported for foodstuff

Pupae of silkworm: exfoliate from pod, which was imported from Italy

Wheat flour: imported wheat was broken in mortar

Mixed flour: bean flour mixed with wheat starch and wheat bran at a ratio of 1:1:3 by weight.

Soybean flour: local soybean was milled in mortar.

Corn flour: raw corn flour for foodstuff.

Bone meals of cow and sheep: imported for foodstuff.

Bean meal: imported for foodstuff.

Almond: exported.

Sesame: exported

Peanut: exported

Fish meal: imported for foodstuff.

Cassava flour: exported dried cassava was milled

Rice flour: imported rice was milled in mortar

Tuckahoe flour: exported dried tuckahoe was milled.

Dried mushroom: exported products broken to pieces.

Dried fish: exported products broken to pieces.

Grain of rice: imported.

Grain of wheat: imported.

Grain of barley: imported for beer producing.

Grain of soybean: local produced

Insect rearing condition

Common insect rearing room under natural condition, with one door opened on day and closed at night. It is control to about 30°C when the temperature is higher in summer and it is no control in winter.

Insect rearing means

Incubators with diameter 90mm and height 18mm are

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used Put some food media, inoculate FR and cover. Put the incubators into iron cabinet and close the door.

Insect rearing methods

1,2,3,4,5 pairs of newly emerged adults were put into different incubators with some food media respectively. After a period of time, calculate the offspring.

Results and Analysis

The adults were generally reared on different food media for 90 days. Lava developed differently on different food medium. On some food medium such as on wheat bran 2–3 batches mature larva were yielded, but on other food medium such as on cassava flour only one batch larva were yielded. The statistic results are as Table 1.

Table 1 indicates that each pair FR feeding wheat bran

yielded 69.30 in average of 15 pairs, which ranked the number one amount the food media. The next better food was wheat flour that yielded average 28.90 larva each pair. There were 19.48 and 16.04 larva on pupae of silkworm and mixed flour respectively each pair. The medium suitable food medium was soybean flour, bone meals of cow and sheep, which yielded 9.18 and 8.02 larva. Corn flour, soybean flour, almond, cassava flour and sesame in turn yielded larva 5.38, 4.48, 3.00, 2.96 and 2.12. Less than 2 larva can be produced on dried fish, grain of wheat, grain of rice, rice flour and tuckahoe flour. Especially on tuckahoe only average 0.01 larva were produced. No larva were produced on mushroom, dried fish, grain of barley and grain of soybean. The adults were died because they could not feed such hard food as dried fish, grain of barley and grain of soybean. Although FR fed mushroom, the reproduction was low or could not reproduce

Table 1. Larva content on different food media for *Tribolium freemani* (in Guangzhou, 1995–96).

Media	Average larva content each pair						notes
	1 pairs	2 pairs	3 pairs	4 pairs	5 pairs	average (15 pairs)	
Wheat bran	46	97.5	78.3	68.3	56.4	69.3	
Pupa of silkworm	8	16.0	43.3	17.5	12.6	19.48	
Wheat flour	54	24.5	33.0	16.8	16.2	28.90	
Mixed flour	21	19.0	16.7	10.3	13.2	16.04	
Soybean flour	11	14.5	13.3	5.5	1.6	9.18	
Corn flour	0	3.0	9.0	3.5	11.4	5.38	
Bone meals of cow and sheep	16	9.5	9.3	3.3	2.0	8.02	
Bean meal	1	6.5	5.3	3.0	6.6	4.48	
Almond	3	3.0	2.3	5.3	1.4	3.00	
Sesame	0	3.5	0.7	4.8	1.6	2.12	
Peanut	0	3.5	0.3	0	0.4	0.84	
Fish meal	1	2.0	2.7	1.5	1.0	1.64	
Grain of rice	5	1.0	0	0.3	0.6	1.38	
Grain of wheat	-	-	-	-	1.4	-	feed germ
Cassava flour	6	3.0	4.0	1.0	0.8	2.96	
Rice flour	2	0	2.3	0.2	1.6	1.22	
Tuckahoe flour	0	0.5	0	0	0	0.1	
Dried mushroom	0	0	0	0	0	0	
Dried fish	0	0	0	0	0	0	can't feed
Grain of barley	0	0	0	0	0	0	can't feed
Grain of soybean	0	0	0	0	0	0	can't feed

Base on preliminary rearing results, several unsuitable food media were chosen for further observation from adult inoculation to die. The results indicate that 1, 2 and 3 pairs of FR on cassava flour yielded 1, 9 and 3 larva, among

which only 2 larva developed to adults with smaller size and less longevity than normal. Feeding with rice flour, mushroom and tuckahoe, only few adults could produce larva and few larva developed to adults with small size and short

longevity.

Discussion

Wheat bran is the most suitable food medium for both FR larvae and adult. Adults can yield more offspring and larva develop fast. Wheat bran is one of frequently import and export products on port. It suggests that FR should be paid special attention in future inspection. Pupa of silkworm, wheat flour, corn flour, soybean flour are more suitable to FR for surviving and reproduction and also should be inspected in real earnest. When almond is attacked at beginning the hatching larva are small and not easy to survive, but adult reproduction and Laval survival rate become higher with the increasing of chipping. If almond is stored for a long period, FR can vast reproduce. Bone meals of cow and sheep, as well as fish meal, are suitable food media on which larva can be produced with medium amount and develop to adults normally. Feeding soybean flour and sesame, adults yield medium or low larva but the larva can develop normally. Adults yield low offspring and larva mortality is high in peanut. In tuckahoe, corn flour, rice flour, grain of rice, cassava flour and dried mushroom,

adults produce low offspring and larvae period is much prolonged; when the larva develop to adults there are smaller size and short longevity than normal.

Therefore, when conducting inspection to export and import products such as wheat bran, pod, wheat, corn flour, soybean flour, meals of cow and sheep, FR should be paid special attention.

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