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To evaluate the effect of infrared irradiation on stored insect pest i.e. *Rhyzoperth dominica* adults

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Abstract
Irradiation is an alternative and potential method of controlling stored insect pests. During this experiment, the effect of infrared irradiation on the survivability of adult *Rhyzopertha dominica* was examined. These adults play an important role in the infestation of whole grains. The experiment was conducted in labs of Lachoo Memorial College, Jodhpur. The instantaneous search rate increased with the increase in the period of temperature time. For Infrared radiation, the lowest mortality rate of 18.4% was observed at a distance of 5 cm from the source and an exposure time of 5 minutes. While the maximum mortality rate 97.2% observed at a distance of 15 cm during an exposure time of 15 minutes. *Rhyzopertha dominica* on a series of temperature bodies makes it a good candidate for control of stored grain pests.

Keywords: infrared irradiation, *Rhyzopertha dominica*, control

Introduction
Nearly over a thousand species of insects are distributed and correlated with stored products around the world, and studies have shown that damage caused by stored insect pest causes loss to food grains. Grains considered as the main ingredient in diet as they fulfill all the necessity required for human body. Billions of tons of wheat grains are grown worldwide. According to the Indian Ministry of Agriculture, around 305.43 million tons of grains were grown last year. Grain storage is the real challenge in India as the warehouses lack the right environment to maintain the right temperature and humidity levels. Such an imbalance provides a favorable environment for the growth and development of stored insect pests. Storage damage caused by insect pests degrades grain quality. Grains are infested with insects due to a lack of safe and scientific storage practices, ultimately resulting in significant economic damage every year. Irradiation method has shown potential for killing the stored insect pests. In the present study, an attempt was made to evaluate the effect of Infrared Irradiation on mature *Rhyzopertha dominica.*

Material and Method
1. Rearing of the *Rhyzopertha dominica*
Rearing conducting in the laboratory of Lachoo Memorial College of Science and Technology. Damage samples were collected from warehouses of local area of Jodhpur. The insect pests were obtained by collecting the adult's individuals from the infested wheat grains. The number of *Rhyzopertha dominica* were increased by setting multiple rearing bottles.

2. Temperature maintenance
The culture bottles were kept in an insect lifestyle cabinet, where temperature and humidity were maintained throughout the experiment using a yellow light bulb. These experiments have been performed at room temperature.

3. Treatment method
A 250 volt, 150 watt infrared instrument was used for the experiments. 25 mature *Rhyzopertha dominica* were transferred from the rearing bottle to a sterilized Petri dish. A total of three samples were made with three replicates of each sample. The first copy of the first sample was held 5 cm away from the infrared exposure for 5 minutes, the second copy of the first sample for 10 minutes and the third copy for 15 minutes continuously. The same procedure was carried out for the other two samples at different distances. The second sample was held at 10 cm infrared for 5 min, 10 min and 15 min. And the third sample was held at 15 cm for 5 min, 10 min and 15 min. Then the treated insects were kept in culture bottles and observed after 24 hours.

Table 1: Effect of infrared irradiation on adults of *Rhyzopertha dominica*

S. No.	No. of insects in sample(gm)	Distance from source cm.	Time duration sec	Temperature °C	Mortality R1 R2 R3	Mean	Percent (%)
1	25 in 50gm	5 cm	5 min	28°C	04 05 05	4.6	18.4
2	25 in 50gm	5 cm	10 min	28°C	15 15 16	15.3	61.2
3	25 in 50gm	5 cm	15 min	28°C	22 23 21	22	88
4	25 in 50gm	10 cm	5 min	28°C	06 05 06	5.6	22.4
5	25 in 50gm	10 cm	10 min	28°C	16 17 15	16	64
6	25 in 50gm	10 cm	15 min	28°C	23 24 23	23.3	93.2
7	25 in 50gm	15 cm	5 min	28°C	05 04 06	05	20
8	25 in 50gm	15 cm	10 min	28°C	19 20 19	19.3	77.2
9	25 in 50gm	15 cm	15 min	28°C	24 25 24	24.3	97.2

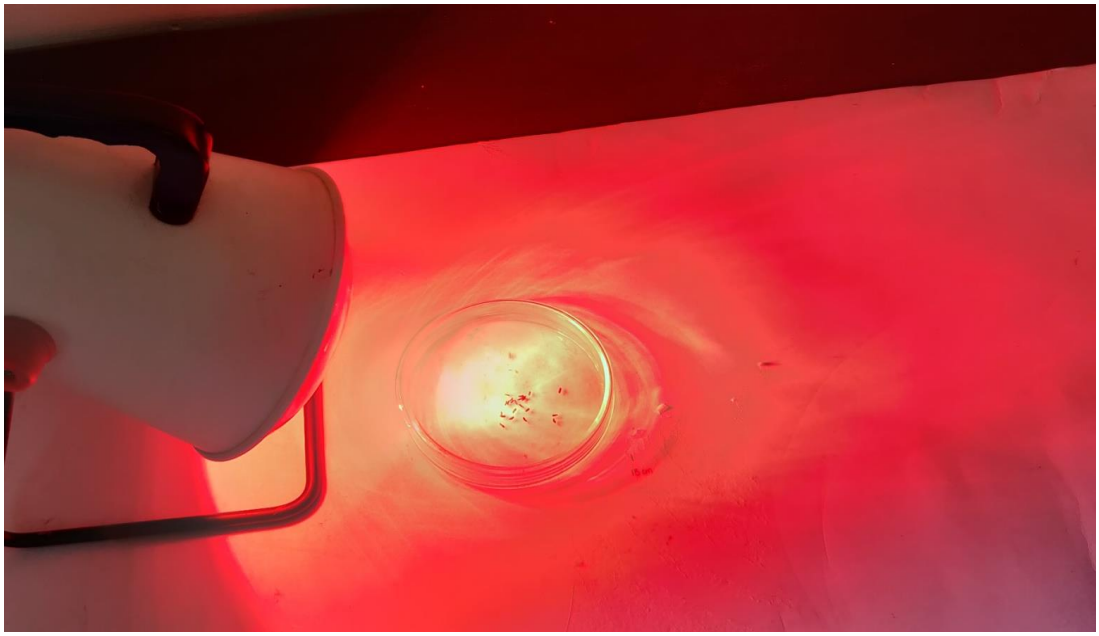

Fig 1: *Rhyzopertha dominica* treated with infrared irradiation

Results and Discussion

The highest and lowest mortality rate i.e 97.2% and 18.4% was ascertained at a distance of 15cm & 5cm for the 15-minute and 5-minute exposures. However, this level of mortality rate within 24 hours of exposure is encouraging. This indicates that this procedure is effective and range of keep stored insects will be controlled. With the assistance of infrared radiation, several stored grains can be protected from damage and may help to alleviate poverty and meet the want of grains. The use of conventional synthetic insecticides and their impact on the environment has forced the search for alternative non-toxic tactics to control insect pests. Irradiation has become a recognized technique for controlling stored product pests due to its residue-free advantages over chemical insecticides. Irradiation technology has established itself in food protection. Alternatively because it can extend the shelf life of the product and maintain the quality over a longer period of time. It has been found that irradiation does not significantly alter the quality of food material or stored seeds.

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