

Host Preference and Damage potential of Rice Weevil,(*Sitophilus oryzae* L.) on different Stored Millets

ABSTRACT

The present investigation entitled, “~~Host preference and Eco-friendly management of rice weevil, (*Sitophilus oryzae* L.) on stored millets~~” was carried out at the Department of Entomology, SHUATS, Prayagraj during 2023-2024 to study the host preference and damage potential of rice weevil *Sitophilus oryzae* (L.) on different stored millets.

The laboratory experiment were conducted to study host preference and seed damage of rice weevil *Sitophilus oryzae* (L.) on different millets (sorghum, pearl millet, foxtail millet, finger millet, kodo millet). Among different millets, sorghum was found as most preferred host with 30.44 number of weevils after 15 days of release. Maximum and minimum seed damage (%) was recorded on sorghum and foxtail millet, respectively.

Key words : millets, seed damage, *Sitophilus oryzae*, sorghum

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INTRODUCTION

Millets are small-grained, warm-weather cereals from the grass family. In India, important types include Jowar (Sorghum), Bajra (Pearl Millet), and Ragi (Finger Millet). Additionally, Small Millets like Proso, Kodo, Foxtail, Barnyard, and Little Millet are cultivated. Millets thrive in semiarid tropics, offering staple crops where other food crops struggle due to low rainfall and poor soil fertility. They boast higher nutrient content compared to major cereals, ensuring food and nutrition security (NABARD, 2023).

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India is the top millet producer globally. Two main types, Pearl Millet (Bajra) and Sorghum (Jowar), make up about 19% of the world's production in 2020. Pearl Millet leads with 40.51%, followed by Sorghum at 8.09%. The key millet-producing states are Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, and Uttarakhand. These states together contribute around 98% of India's millet production. Six states, including Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, Haryana, and Gujarat, account for over 83% of total production, with Rajasthan alone contributing 28.61%. India grows various millet types like Pearl Millets, Sorghum, Finger Millet, Foxtail, Kodo, Barnyard, Proso, Little Millet, and Pseudo Millets such as Buckwheat and Amaranths. Pearl Millet, Sorghum, and Finger Millet make up the majority of India's millet production (APEDA, 2022).

Stored sorghum faces damage from various agents like insects, rodents, fungi, birds, mites, and moisture, resulting in both quantitative (quality deterioration through direct feeding and chemical changes) and qualitative loss (reduced weight). Sorghum, whether stored or processed, is consistently vulnerable to insect invasion, leading to progressive degradation in quality and quantity, affecting both weight and germination capacity (Ukehet *et al.*, 2012; Thomas *et al.*, 2010).

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The rice weevil (*Sitophilus oryzae* Linnaeus) is a significant storage pest in tropical and subtropical regions worldwide. Both the larvae and adults of this pest feed internally on grains, leading to significant damage to both the quality and quantity of the grains. Their voracious feeding renders the grains unsuitable for human consumption and seeding purposes. Studies have shown that infestations of rice weevils alone can cause up to 83.5% damage to sorghum grains over a six-month period (Kudachi and Balikai, 2014).

MATERIAL AND METHODS

The Present investigation entitled “~~Host Preference and Eco-friendly management of rice weevil, *Sitophilus oryzae* (L.) on stored millets~~” was carried out at Department of Entomology, SHUATS, Prayagraj, Uttar Pradesh during 2023-2024.

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Experimental details to study the host preference and damage potential of rice weevil on different stored millets

a) Seed

Five hundred grams seed of each millets i.e. sorghum, pearl millet, foxtail millet, finger millet and kodo millet was cleaned of straw, chaff, light seeds and other impurities before testing. All the seeds were disinfected by keeping in the oven at 60 °C for 5 hours before keeping it for host preference and percent seed infestation.

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b) Host Preference and Percent seed damage under free choice condition :

To study on host preference was carried out under free choice condition. In order to study the host, feeding preference and damage potential test insect culture was collected from local stores of Prayagraj and later it was acclimatized to laboratory conditions. Seed samples were collected from market of Prayagraj.

Under Free Choice Test, 100g seed of each millet was kept in a round plastic container which is equally partitioned in trough equidistance from centre. Approximately 50 pair of rice weevil were released in the centre of container giving free choice to the adult for orientation and then container covered with muslin cloth. The Experiment was replicated 3 times.

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c) Observations :

For the study of host preference, the number of weevils present in each millets was counted on 3, 5, 7, 9, 12 and 15 days. Host preference was determined by taking the average number of weevil present on each above mentioned days on each millets.

The Observations as percent seed damage were recorded at 10, 20 and 30 days after released of rice weevil. The amount of damage was converted into percentage with help of following formula:

$$\text{Seed damage \%} = \frac{\text{Number of seed damage}}{\text{Total number of seed}} \times 100$$

d) Statistical analysis

The data obtained from different treatments were subjected to statistical analysis as per the statistical guidelines by **Gomez and Gomez (1984)**. The experiment was carried out in completely Randomized Design with three replication of each treatment. Data were tabulated and statistically analyzed as per the standard procedure for analysis of variance. The comparison in the treatment means was tested by critical difference (CD) at a 5 percent level of significance.

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UNDER PEER REVIEW

RESULTS AND DISCUSSION

Host preference of rice weevil (*S. oryzae*) in major millets

The host preference and damage potential of rice weevil were evaluated on sorghum, pearl millet, kodo millet, foxtail millet and finger millet. Host preference were evaluated based on orientation of weevils towards each millets. Among different millets, sorghum was found as the most preferred host with (30.44) number of weevils (mean number of weevils attracted towards millets after 15 days of release). This was followed by pearl millet (26.17), kodo millet (22.50) and finger millet (11.61), respectively. Foxtail millet was observed as the least preferred host with (8.17) number of weevils presented in Table 1 and depicted in Fig. 1

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The damage potential were determined in free choice condition based on percentage seed damage. Under free choice condition maximum percentage seed damage were recorded in sorghum (6.56%), this was followed by pearl millet, kodo millet, finger millet and foxtail millet, which encountered minimum percentage seed damage (1.61%) presented in Table 1 and depicted in Fig. 1.

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Similar results imputed by **Swamy and Wesley (2021)**, who observed that sorghum was the most preferred host followed by pearl millet.

In contrary **Bhargudeet al., (2021)** the maximum seed damage was recorded in pearl millet followed by sorghum.

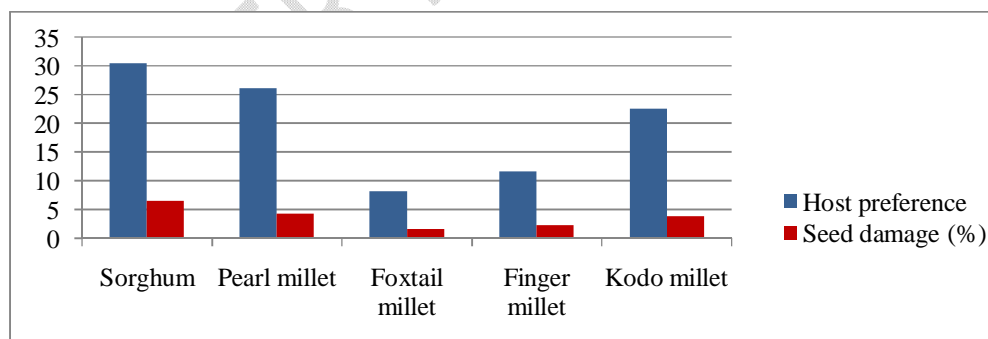
The physical characteristics of groundnut pods, such as pod size, shell thickness, and reticulations, influence their susceptibility or tolerance to bruchids **Rekha et al., (2017)**.

Murad and Batool (2017) demonstrated that wheat varieties with higher protein and carbohydrate content, higher grain weight, and lower grain hardness are more susceptible to grain moth.

Table 1 : Host preference and percent seed damage by rice weevil on different millets

Tr. No.	Treatments	Number of weevil Present/Millet sample						Mean	Percent seed damage			Mean
		3 rd DAR	5 th DAR	7 th DAR	9 th DAR	12 th DAR	15 th DAR		10 th DAR	20 th DAR	30 th DAR	
T ₁	Sorghum	30.67	29.33	30.00	29.67	31.33	31.67	30.44	5.36	6.69	7.63	6.56
T ₂	Pearl Millet	25.67	26.00	26.33	26.67	25.00	27.33	26.17	3.24	4.53	5.40	4.39
T ₃	Foxtail Millet	8.00	7.33	7.67	8.67	9.00	8.33	8.17	1.18	1.40	2.27	1.61
T ₄	Finger Millet	10.33	11.00	11.33	12.00	12.67	12.33	11.61	1.53	2.37	3.03	2.31
T ₅	Kodo Millet	22.00	23.33	23.67	22.67	22.33	21.00	22.50	2.94	3.71	4.73	3.79
S.Em (±)		1.73	1.69	2.27	1.66	1.89	1.35	0.34	0.19	0.24	0.36	0.52
C.D. (p=0.05)		5.45	5.33	7.15	5.23	5.97	4.25	1.01	0.62	0.76	1.14	1.66
C.V. (%)		15.51	15.11	19.86	14.24	16.37	11.61	4.30	11.99	11.26	13.65	24.50

Fig.1 : Host preference and percent seed damage by rice weevil on different millets



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Comment [DC15]: Please add a good conclusion and recommendations. Also acknowledgement stating funding source

REFERENCES

Anonymous (2022) Agricultural and Processed Food Products Export development Authority (APEDA).

Comment [DC16]: Anonymous wasn't cited in the work, rather use APEDA that was cited and state the full meaning of the acronym

Anonymous (2023) National Bank For Agriculture And Rural Development (NABARD).

Comment [DC17]: Same as above

Bhargude, A. R., Patil, S. K. and Bhede, B. V. (2021). Susceptibility of selected cereal crops in storage to rice weevil, *Sitophilus oryzae* (Linnaeus). *The Pharma Innovation Journal*, 10(1): 570-575.

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