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Assessment of Bait Attractiveness and Trapping Potential against Giant African Snail, *Achatina fulica Bowdich*

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A B S T R A C T

The present investigation was carried out to evaluate the attractiveness and trapping potential of different bait materials against giant African snail, *Achatina fulica* Bowdich at Department of Entomology, College of Agriculture, VNMKV, Parbhani during 2025 *kharif* in cafeteria. Among the treatments evaluated, papaya fruit pulp (250 g) + jaggery syrup was found to be the most effective bait attractant, attracting the maximum number of snails (31.4) and recording the highest attraction (26.67%) after 12 hrs of treatment. And least effective bait attractant was Marigold waste (250g)+ Jaggery syrup were attracted minimum number of snails (5.0) and least percent of (4.16) after 12hrs of treatment. The overall findings revealed that papaya fruit pulp (250 g) + jaggery syrup exhibited superior bait attractiveness and the highest trapping potential against the giant African snail, *Achatina fulica* Bowdich.

Introduction

Mollusca is a highly diverse phylum comprising marine, freshwater and terrestrial taxa exhibiting extensive morphological, physiological and ecological adaptations. The phylum includes major taxonomic groups such as bivalves, cephalopods and gastropods (Xu *et al.,* 2024). The giant African snail, *Achatina fulica* Bowdich is a terrestrial pulmonate gastropod belonging to Kingdom Animalia, Phylum Mollusca, Class Gastropoda, Family Achatinidae and Genus *Achatina* (FAO, 1989). Owing to its wide host range, high reproductive potential and adaptability to diverse environments, *Achatina fulica* is recognized as an economically important invasive pest of agricultural and horticultural crops. Molluscs cause serious yield losses worldwide, remain a major threat, causing up to 40% crop losses each year**,** leading to massive economic damage and reduced food availability. (Islam, S. 2025).

The Giant African Snail (*Achatina fulica* Bowdich), commonly referred to as “Ghonga” or “Harashankh,” is a major non-insect pest affecting agricultural and horticultural crops across various regions worldwide.

Due its economic, ecological, medical importance giant African snail, *Achatina fulica* Bowdich is one most extensively studied snail (Mead, A.R. 1979). The giant African Snail (*Achatina fulica*) is recognized by the IUCN as one of the world's 100 most invasive species due to its high adaptability across diverse ecosystems (IUCN). These are mainly active at night, feeding alone except during mating. They communicate through scents and vibrations, engaging in a brief courtship where they touch and sway their bodies.

During mating, the pair align side by side and exchange reproductive organs through their opposing genital openings. The average fecundity of giant African snail is about 200 eggs laid in soil, with each snail producing 5 to 6 clutches annually and about 90% of eggs hatching. Snails reach adulthood in roughly four months, and the full life cycle from egg, through a 7 to 10 day juvenile stage, to a five-month adult stage takes about 5 to 5.5 months (Upatham *et al.,* 1988).

Active adults typically stay buried up to three inches deep, whereas dormant individuals remain near the soil surface. It can aestivate for long periods without food or water, with this dormant phase strongly influenced by temperature. Its aestivation lasts about 5 to 10 months, while hibernation occurs during winter.

Snails thrive in the mild climates of southern-border and Pacific coast regions, with reproduction best at 15 to 25°C and an optimum of about 21°C (Smith & Fowler, 2003). They become inactive below 12°C, hibernate under 7°C, and aestivate when temperatures exceed 27°C.

The giant African snail is a polyphagous herbivore that feeds on a wide range of crops, fruits and vegetables, causing scraping, defoliation and considerable crop damage. In papaya, its feeding can lead to reduced yield and plant damage (Nelson, 2012). The giant African snail, *Achatina fulica*, has emerged as a major agricultural pest in the Marathwada region of Maharashtra, causing substantial damage to Kharif crops, particularly soybean and cotton.

During the 2022 outbreak, nearly 72,000 ha of cultivated area were reportedly affected across Latur, Beed and Dharashiv districts (Joshi, 2022). The snail's broad host range and high reproductive potential favour rapid population establishment and subsequent crop damage in the region (Neharkar *et al.,* 2025).

For giant African snail, most eradication attempts have failed, and existing control methods often raise environmental and health concerns. Using toxic baits against giant African snail can also harm native and other invasive snail species. Chemical options like metaldehyde are non-selective molluscicides, posing risks to many non-target organisms (Prasad *et al.,* 2004). In view of the increasing threat posed by *Achatina fulica* to agricultural crops, the present investigation was conducted to identify effective, economical and readily available bait materials with greater attractiveness and trapping potential against the giant African snail. And use of attractive and easily available bait materials can facilitate effective trapping and reduce snail populations in crop ecosystems and also can reduce the effect of damage. Therefore, the present investigation was undertaken to assess the attractiveness and trapping potential of different bait materials against *Achatina fulica* under cafeteria condition.

Materials and Methods

A cafeteria test was conducted to determine the attractiveness of different bait materials against giant African snail, *Achatina fulica* Bowdich. The experiment was conducted at the department of Entomology, College of Agriculture, VNMKV, Parbhani, with seven treatments and three replications during *kharif* 2025. A total of 120 active giant African snail individuals were introduced at the centre of the experimental arrangement at 7:00 PM. The experimental setup was surrounded by a nylon net to restrict the movement of snails outside the test area. The experiment was laid out with seven treatments and three replications as shown in table 1.

After 12 hours, the number of snails that reached each bait was counted and recorded. The attractiveness of each bait was expressed as the percentage of snails attracted relative to the total number released. The percentage attraction was calculated using the formula:

$$\text{Percent snails attracted} = \frac{\text{No. of snails attracted to individual bait}}{\text{Total no. of snails realesed}} x100$$

Results and Discussion

The number of snails attracted to each bait and percent snails attracted to each bait after 12hrs were presented under here:

Table.1 Details of Bait attractants used in the experiment

Treatment No	Bait materials	Quantity used
T1	Papaya fruit pulp + Jaggery syrup	**250 g + 50ml**
T2	Banana fruit pulp + Jaggery syrup	**250 g+ 50ml**
T3	Soybean waste + Jaggery syrup	**250 g+ 50ml**
T4	Moist gunny bag + Jaggery syrup	**1 bag+ 50ml**
T5	Cauliflower leaf waste + Cabbage leaf waste	**250 g+ 50ml**
T6	Marigold waste + Jaggery syrup	**250 g+ 50ml**
T7	**Rice bran + Jaggery syrup**	**250 g+ 50ml**

Table.2 Number of snails attracted to individual bait

Treatment No	Bait Materials	Quantity used	No. of snails released	No. of snails attracted to each bait
T1	Papaya fruit pulp + Jaggery syrup	250g+50ml	120	**31.4 (5.65)***
T2	Banana fruit pulp + Jaggery syrup	250g+50ml		**9.11 (3.10)**
T3	Soybean waste + Jaggery syrup	250g+50ml		**27.6(5.30)**
T4	Moist gunny bag + Jaggery syrup	1+50ml		**17.0 (4.18)**
T5	Cauliflower leaf waste + cabbage leaf waste	250g+50ml		**13.0 (3.67)**
T6	Marigold waste + Jaggery syrup	250g+50ml		**5.0 (2.35)**
T7	Rice bran + Jaggery syrup	250g+50ml		**16.67 (4.14)**
SE (m) ±				**0.310**
C.D @ 5%				**0.941**
C.V. (%)				**3.141**

*Figures in the parenthesis are $\sqrt{x} \pm 0.5$

Table.3 Per cent snails attracted to individual bait after 12hrs

Treatment No	Bait Materials	Quantity used	No. of snails released	Snails attracted to each bait after 12hrs (%)
T1	Papaya fruit pulp + Jaggery syrup	250g+50ml	120	**26.67 (31.09)****
T2	Banana fruit pulp + Jaggery syrup	250g+50ml		**7.59 (15.99)**
T3	Soybean waste + Jaggery syrup	250g+50ml		**23.0 (28.65)**
T4	Moist gunny bag + Jaggery syrup	1+50ml		**14.16 (22.10)**
T5	Cauliflower leaf waste + cabbage leaf waste	250g+50ml		**10.83 (19.21)**
T6	Marigold waste + Jaggery syrup	250g+50ml		**4.16 (11.76)**
T7	Rice bran + Jaggery syrup	250g+50ml		**13.89 (21.88)**
		SE (m) ±		**0.465**
C.D @ 5%				**1.410**
		C.V. (%)		**3.742**

Figures in the parenthesis are arcsine** transformed value

Fig.1 Number of snails attracted to individual bait after 12hours

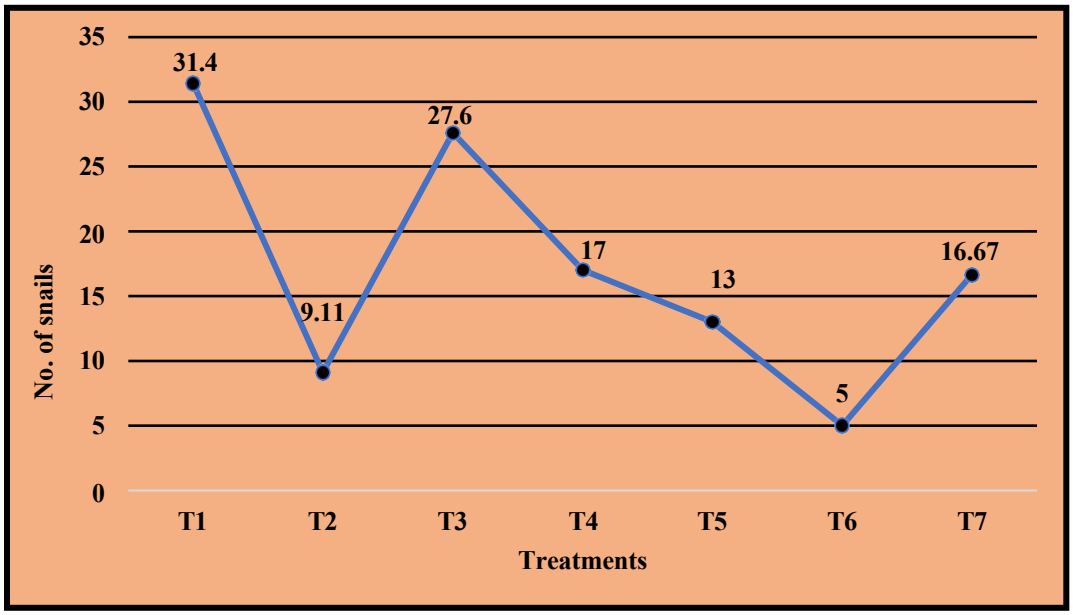
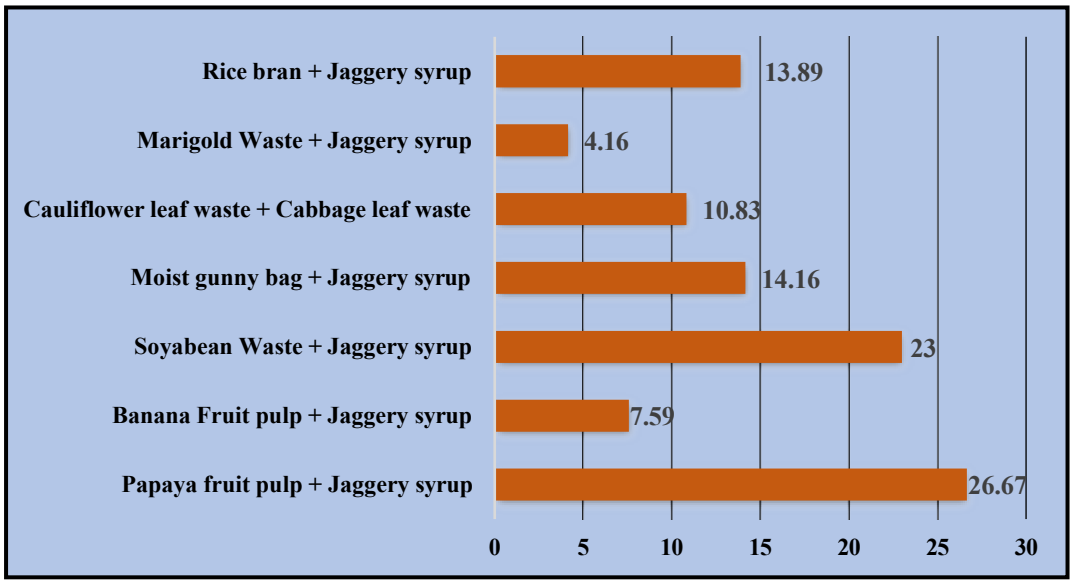


Fig.2 Percent snails attracted to individual bait after 12hours



Number of snails attracted to individual bait after 12hours

After 12hrs observations are Papaya fruit pulp (250 g) + jaggery syrup (50 ml) (T1) was the most attractive bait, and having highest trapping potential as recording the highest mean attraction of approximately 37.68 snails. It was followed by soybean waste (250 g) + jaggery syrup (50 ml) (T3), which attracted approximately 33.12 snails. The moist gunny bag + jaggery syrup (T4) attracted approximately 20.40 snails, while rice bran + jaggery syrup (T7) attracted about 20.00 snails. Cauliflower leaf waste + cabbage leaf waste (T5) attracted approximately 15.60 snails. Comparatively fewer snails were attracted to banana fruit pulp + jaggery syrup (T2), with approximately 10.93 snails. The lowest attraction was recorded with marigold waste + jaggery syrup (T6), which attracted approximately 6.00 snails. The number of snails attracted to the different bait treatments after 12 hours is presented in Table 2. The

highest attraction of *Achatina fulica* was recorded with papaya fruit pulp + jaggery syrup (37.68 snails), indicating a strong response of the snail towards this bait combination. The present finding is supported by earlier observations that *Achatina fulica* exhibits a preference for papaya and other succulent plant materials. Albuquerque *et al.,* (2008) identified *Carica papaya* among the preferred food plants of *A. fulica*, while Minott *et al.,* (2018) demonstrated the effectiveness of papaya as a food bait for attracting *Achatina fulica* in bucket traps.

The highest attraction recorded with papaya fruit pulp + jaggery syrup (37.68 snails) may be associated with the strong feeding preference of *Achatina fulica* for papaya-derived plant material. Recent laboratory studies have reported papaya among the preferred host plants of *Achatina fulica* Bhondave *et al.,* (2024). Similarly, D'Souza (2025) reported substantial feeding on *Carica papaya* by *Achatina fulica*. Differences in nutritional composition among plant materials may also contribute to variation in feeding preference, as demonstrated by Tang *et al.,* (2025).

Percent snails attracted to individual bait after 12hr

The attractiveness of different bait materials against giant African snail after 12 hours of exposure varied considerably among the treatments. The highest attraction was recorded in papaya fruit pulp + jaggery syrup (T1), with 26.67 per cent of the released snails being attracted to the bait.Followed by soybean waste + jaggery syrup (T3), which attracted 23.00 per cent of the snails. Moist gunny bag + jaggery syrup (T4) and rice bran + jaggery syrup (T7) recorded 14.16 and 13.89 per cent attraction, respectively, whereas cauliflower leaf waste + cabbage leaf waste (T5) attracted 10.83 per cent of the snails. Banana fruit pulp + jaggery syrup (T2) and marigold waste + jaggery syrup (T6) recorded comparatively lower attraction of 7.59 and 4.16 per cent, respectively.

The treatments were arranged in descending order based on the percent snails attracted to each bait material Papaya fruit pulp + Jaggery syrup > soybean waste + Jaggery syrup > Moist gunny bag + Jaggery syrup > Rice bran + Jaggery syrup > Banana fruit pulp + Jaggery syrup > Cauliflower leaf waste + cabbage leaf waste > Marigold waste + Jaggery syrup

Similar observations on the attractiveness of papaya and other plant-derived materials to giant African snails have been reported by Ravikumara *et al.,* (2007), Kumar *et al.,* (2018), Minott *et al.,* (2018), Narayanan and Joseph (2026), and Kale *et al.,* (2026). These studies indicated that fruit-based and carbohydrate-rich baits are generally more attractive to *Achatina fulica* than less palatable plant materials.

In conclusion, among the different bait materials evaluated for their affectiveness, papaya fruit pulp + jaggery syrup (T1) was found to be the most effective bait, recording the highest snail attraction of 31.40 and 26.67 per cent snails attracted after 12hrs.

This was followed by soybean waste + jaggery syrup (T3), which recorded 27.60 and 23.00 per cent attraction, respectively. In contrast, marigold waste + jaggery syrup (T6) recorded the lowest snail attraction (5.00 and 4.16 per cent). Thus, papaya fruit pulp + jaggery syrup showed considerable potential as an effective bait for attracting snails.

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Authors Contribution

Leela Prasanna M. designed and conducted the study, collected the data, performed the analysis, Dr. P. S. Neharkar and Dr. A. G. Lad provided scientific guidance, supervised the study, and Dr. S. S. Dhurgude critically reviewed the manuscript. Sriram and Lahari assisted in field observations, data collection, and experimental work. All authors read and approved the final manuscript.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding

author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

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