

## ***Puntius* spp. as a Potential Lure Against Gundhi Bug in North East Region of India**

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**Abstract** Some traditional lures used in north east region of India like fermented fish, *Puntius* spp., fermented paste made up of the same, rotten pineapple, rotten crab, rotten frog and a dry fish, *Harpadon nehereus* were evaluated for the trapping potential against gundhi bug. Maximum numbers of bugs were trapped with rotten frog (11.7) followed by the fermented paste prepared from *Puntius* spp. (11.4). The next best lures found were fermented fish, *Puntius* spp. and dry fish, *H. nehereus* with 7.6 bugs per trap in a week, for both the lures. The trapping potential of rotten crab showed 4.4 bugs per trap in a week whereas the rotten pineapple with 0.7 bugs per trap in a week was observed as poor as control (0.3 bugs per trap in a week). Therefore, it can be interpreted

from the study that the rotten frog and the fermented paste prepared from *Puntius* spp. had the maximum potential among the lures evaluated. Apart from this, more among the evaluated lures like fermented fish (*Puntius* spp.), dry fish (*H. nehereus*) and rotten crab can also be used for the purpose of mass trapping of gundhi bugs depending on their trapping potential and ease of availability.

**Keywords** Gundhi bug, Traditional lures, *Puntius* spp., Dead-rotten frog, Gundhi bug Trap.

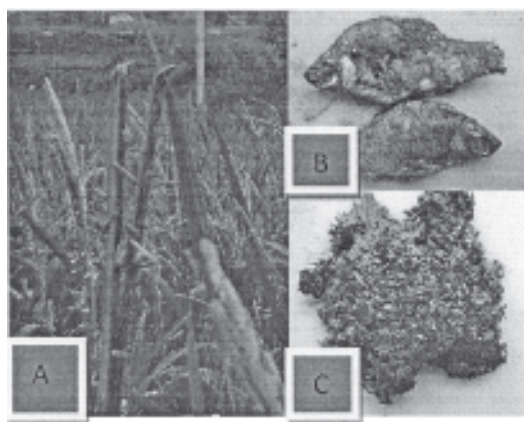
### **Introduction**

Gundhi bug, *Leptocorisa acuta*, *L. varicornis* are the major pests of rice particularly in north east region of India. The per cent of rice ear head damage has been assessed to a range of 68.7% to 98.7% [1]. Accessibility to the market of chemical insecticides is difficult in the remote areas of north east region. Also, uses of insecticides are generally discouraged in pro organic states of north east region. Repercussions of excessive usage of chemical insecticides

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**Fig. 1.** (a) Fixing of dead fish openly on a bamboo stick in a rice field against the gundhi bug, (b) *Puntius* spp. and (c) Fermented fish paste from *Puntius* spp.

are well known. In situations like these, traditional practices of pest management have grown strong over the time in the farmers' community of these regions. Traditional practices of using dead-rotten frogs, crabs, fishes to attract the gundhi bugs are popular among the farmers [2 and 3]. The impediment in the traditional method is fixing of these lures openly on bamboo sticks (Fig. 1 a). As the lures are placed openly, bugs are attracted towards it but are not getting trapped and killed and instead of protecting the main crop, attract its population. Although, con-

ceptually it is assumed that the bugs are diverted from the main crop but having additional food resources, their population goes on increasing, ultimately causing more damage to the crop which necessitates the use of traps.

*Puntius* spp. a barb fish, (Fig. 1 b) which is abundantly available during monsoon and post-monsoon seasons in the water bodies of the region are utilized as a means of preservation for future use when fresh fish are scanty [4]. Various species found in the region are *P. sophore*, *P. ticto*, *P. sarana* and *P. chola*. The fish, which is popularly known as *Shidal mash* in Arunachal Pradesh, *Ngari* in Manipur, *Puthi mash* in Tripura and Bengali, is one of the delicacies taken with rice and an important ethnic food of various tribes of north east region of India. The fermented form of it emits a strong smell which attracts gundhi bugs for it is utilized by farmers against the pest. Burying of *Puntius* spp. in the soil for 15–20 days and spraying water extract in the rice field is a traditional practice followed against the stem borer, *Scirpophaga incertulus* as the extract of fermented fish repels the pest [5]. In view of the knowledge of these traditional practices, the study was conducted with the objectives to evaluate the trapping potential of different locally available traditional lures, to evaluate the durability of the lures for their effective trapping and to design an efficient trap against the gundhi bug.



**Fig. 2.** Entry hole fitted with wire mesh and the trapped bugs inside.

## Materials and Methods

The study was conducted in the months of October–November of 2014 and 2015 in wet land rice cultivation field of the research farm, ICAR Research Complex for NEH Region, Arunachal Pradesh Center, Basar, West Siang District, Arunachal Pradesh situated between 93.57°–95.23° East Longitude and 27.69°–29.20° North Longitude. Traditionally used and locally available materials (lures) like fermented fish, *Puntius* spp. (T<sub>1</sub>), fermented paste made up from it (T<sub>2</sub>) (Fig.1 c) rotten pineapple (T<sub>3</sub>), dead-rotten crab (T<sub>4</sub>), dead-rotten frog (T<sub>5</sub>) and a dry fish *Harpadon nehereus* (Bombay duck) (T<sub>6</sub>) were selected as treatments and replicated as per complete randomized design. The lures selected were placed inside the plastic jars hanging from the top cover through a thin metallic binding wire. Empty jars, without any lure, were installed as control (T<sub>7</sub>). The jars containing the lures as well as control were then placed randomly in the wet rice cultivation field hanging on bamboo sticks at a level of height as of panicles. Two entry holes were made in each jars including the control and the holes were fitted with wire mesh in such a way that bugs once entered cannot pass out (Fig. 2). Data on number of bugs trapped in a week were recorded for four consecutive weeks which were then subjected to square root transformation followed by statistical analysis (ANOVA).

The fermented fish (*Puntius* spp.) and its paste were procured from the local market ; however, the traditional method of its preparation is well described [4–6]. The dry fish, *H. nehereus* was also procured from the local market whereas the crab (*Sartoriana spinigera*) was collected from the nearby water streams.

## Results and Discussion

### Trapping potential of lures

The statistical analysis revealed that the treatments were significant at 1% (CD 1.63) and 5% (CD 1.18) level of significance with 28.7% coefficient of variation. Maximum mean numbers of bugs were observed in the first week of installation of traps with 11.7 (Fig. 3) in case of rotten frog followed by the fer-

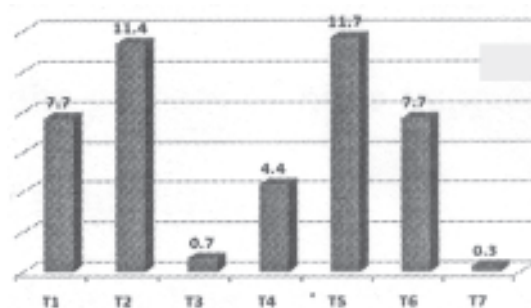
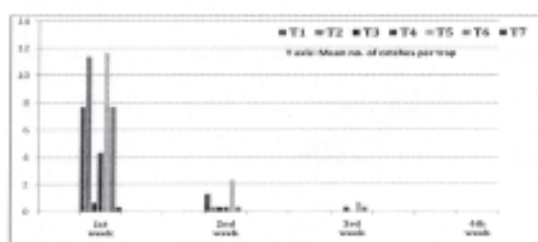


Fig. 3. Mean number of bugs trapped under different treatments in first week of installation.

mented paste prepared from *Puntius* spp. (11.4), both of which were recorded statistically at par with each other. The next best lures found were fermented fish, *Puntius* spp. (intact form) and dry fish, *H. nehereus* with 7.6 bugs per trap in the first week, for both the lures. The trapping potential of rotten crab showed 4.4 bugs per trap in the first week which was found at par with fermented fish (*Puntius* spp.), dry fish (*H. nehereus*) as well as with the control whereas the rotten pineapple (0.7 bugs per trap in the first week) was observed as poor as the control (0.3 bugs per trap in the first week). It is clear from the results that the rotten frog and the fermented fish paste prepared from *Puntius* spp. had the maximum attracting potential among the lures evaluated, the later may be recommended for management of gundhi bugs. It is better to use fish lures than to kill a frog. Moreover, rice-fish is a popular delicacy in most parts of the north east India where rice growers are also engaged in preparation of fermented fish; the maggot infested waste products may efficiently be utilized for trapping of gundhi-bugs. Management through mass trapping can be achieved by installation of as many numbers of traps per unit area as feasible, particularly in the peak season of infestation when the population is too high. All of the treatments (lures) were selected on the basis of the knowledge of their traditional utility for the purpose and ease of availability. Therefore, except for rotten pineapple which was as equal as control, any one or their combinations among the evaluated lures like fermented fish



**Fig. 4.** Mean number of catches per trap in the first and subsequent weeks of installation of traps.

(*Puntius* spp.) ; dry fish (*H. nehereus*) and rotten crab (*S. spinigera*) can also be used for the purpose depending on their trapping potential and ease of availability.

#### Effective durability of lures

The mean number of bugs trapped was observed still highest in the second (2.3 bugs per trap) and the third week (0.6 bugs per trap) with the rotten frog (Fig. 4) but showed statistically non-significant difference with any of the treatments and so were the observations in the fourth week. Overall, the mean number of bugs trapped in the second, third and fourth week was negligible. The smell of the lures was effective only up to the first week of installation of the traps where after it was lost in the second and subsequent weeks. The lures have to be replaced with a fresh one at weekly intervals during the peak season of infestation in order to achieve an effective catch. Protecting from the direct sunlight by providing a small shade over the traps may enhance their trapping durability.

#### Designing of the trap

Generally, in a trap, insecticides are used along with the lures to kill the trapped insects, but wire meshed entry holes of the traps showed too effective catch

to devoid the requirement of insecticides. The entry holes of the traps were fitted with thin wire mesh in such a way that the bugs once entered cannot pass-out, thereby killed inside the trap. The traditional practice of fixing a dead-rotten crab or frog openly on a bamboo stick can be slightly modified in to this particular type of trap. An alternate method, bucket trap can also be used. The lures are placed hanging from the cover of the bucket through a thin wire whereas the lower level is filled with kerosene mixed water. Longitudinal cuts are made on the side walls for entry of the bugs. Bucket trap would be more durable and voluminous for mass trapping.

#### Conclusion

Being a part of traditional delicacies of rice growers in north east region of India and its easy availability in the local markets, *Puntius* spp. has the potentiality to be utilized as lures for mass trapping of gundhi bugs. Other traditionally known lures like dead-rotten frog, crab and dry fish, *H. nehereus* also proved effective to be used for the purpose. The lures should be used inside the newly designed trap instead of fixing openly on a bamboo stick and has to be replaced at weekly interval to get an effective management of gundhi bugs.

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