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# Diversity and Utility of Toads (Amphibia: Anura) in Biological insect pest control in Satara, India.

KEYWORDS: Toad diversity, utilization, insect pest control

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**ABSTRACT** *Toads (Amphibia : Anura) show the highest diversity among Indian amphibians inhabiting aquatic, semi aquatic, terrestrial, arboreal, semiarboreal and fossorial ecosystems. There are about 219 species of amphibians in India, out of which toads are common throughout India. In last few decades a large number of frogs were exported as part of frog-leg industry to gain foreign exchange resulting 61% endemism. The toads have very important role in insect pest control. Therefore, biodiversity and utility of toads have been studied from Satara, India. In all, 10 species of toads Bufo have been reported from Satara region. They have tremendous potential for control of insect pests. Their diversity and role in biological pest control have been reported in this paper.*

## INTRODUCTION

The status of most of the Indian amphibian species with respect to diversity, population, conservation, protection and utility is unknown. According to IUCN (1997) out of 219 species of amphibian species 9 were critically endangered, 42 endangered, 39 vulnerable and 74 are in the lower rick category. The toads will be well conserved, protected and sustainably used in biological pest control programmes by mass propagation (Sathe, 2014). Review of literature indicates that Daniel (1963, 1975, 1989) provided field guide to amphibians. Datta (1992, 1997) updated the list of amphibians from Western India while, Chandra and Deuti (1997) studied endemic species of Indian amphibians. Very recently, Sathe & Bhoje (2014) reported amphibians of economic importance for use in biological control of insect pests. However, very little attention is paid on the diversity, conservation, protection and utility of amphibians in India. Keeping in view all above facts, present work was carried out.

## MATERIALS AND METHODS :

Diversity of toads was studied by either spot observation or by time being collecting toads from study spots of Satara district, India by one man one hour search / collection method. The utility and biocontrol potential of toads was also studied by spot observations, insect feeding behaviour of toads by one man one hour observation method. Insect feeding potential was also studied in the laboratory (27±1°C, 65-70% RH and 12 hr photoperiod) by caging individual toads in glass cages of size 25 x 25 x 25 cm and providing 20 insects every time of each type for 12 hour. The experiment was replicated for 10 times. After experiments / observations toads were released from which they were collected. The toads and insects were identified by consulting appropriate literature cited in references.

## RESULTS:

Results are recorded in table 1. In all, 10 species of toads of the genus Bufo have been reported from Satara district of Maharashtra. B. stomaticus and B. melanostictus were recorded for the first time from Satara region. Rests of the 8 species reported from Western Ghats by other workers were also prevalent in the region.

The results indicated that B. marinus showed highest potential of insect consumption both by number and type. Almost every Bufo species showed tremendous potential for feeding on various types of insect pests (Table-1).

## DISCUSSION :

Diversity of amphibians has been studied by Nelson (1905-1924). He published a series of papers on various genera of amphibians under which he described several Indian species. From South India, Rao (1937) described 20 new species. Thereafter, Pillai (1973-1990) described 5 new species and Ray (1992) 4 new species from north India. Later, 6 new species have been described by Das (1995-1999) and Dutta (1997-2000). However, very little attention is paid on insectivorous potential of toads in India. This is first attempt from Satara district of India on insectivorous toads.

Most frogs identify prey by movement and vision appears to be the primary method of detection of prey by B. marinus in sugarcane ecosystem. According to some workers B. marinus can also locate food using its sense of smell. Predator prey relationship in B. marinus indicated that parotid glands behind the eyes secrete a milky white fluid as bufotoxin which is toxic to many animals including human beings. Hence, there is need to investigate predator prey relationships in other Bufo species as they are very good biocontrol agents of insect pests.

B. marinus has been introduced to may regions of the world as biocontrol agent of agricultural pests in control programmes. The review of literature indicates that before the early 1840s, B. marinus had been introduced into Martinique and Barbados from French Guiana and Guyana. Later, it was introduced to Jamaica in 1844 for control of rat population. However, in Puerto Rica in the early 20th century it was found very good biocontrol agent of beetles damaging sugarcane. The programme was successfully end in 1930s. In Australia B. marinus is mass reared and released in the field for control of several insect pests of agricultural importance. Similarly, it has been used for insect pest control in Florida, Papua New Guinea, Philippines, Fiji and several other countries. In India, no attempts have been made on its mass production and utilization in integrated insect pest management. In fact, frogs are banned for experimental use in India. In situ and ex situ conservation and their utility in biological control of insects may encourage colonization of toads in natural ecosystems. Almost every species of Bufo reported from Satara district have tremendous potential as biocontrol agents of insect pests. Therefore, they should be mass reared and utilized in biological insect pest management as ecofriendly approach.

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**Table - 1 : Diversity, occurrence and utility of Toads in Kolhapur region**

| Sr. No. | Species | Features | Occurrence | Utility / control of insects |
|---|---|---|---|---|
| 1 | Bufo marinus (Bufonidae) | 12-14 cm long, skin poison glands present, ridges above eyes, skin dry & warty. Pupil horizontal and golden | Average life expectancy 13.5 years, breed throughout year | Paddy pests, moths, bugs, beetles, jassids, caterpillars, borers, crickets, light insects. |
| 2. | Bufo beddomi Gunther | Fat body, broad waist | Breeding period monsoon | Termites, moths, spring tails, crickets, grass hoppers |
| 3. | Bufo hololius Gunther | Short legs, skin thick, glandular and warty | Breeding period monsoon | Termites, moths, spring tails, crickets, grass hoppers |
| 4. | Bufo brevirostris Rao | Toothless, fat bodied, warty skinned | Breeding period monsoon, found throughout the year | Caterpillars, termites, ants, crickets, grasshoppers, jassids, beetles. |
| 5. | Bufo koynayensis Soman | Fat bodied, terrestrial or fossorial | Breeding period monsoon, found throughout the year | Caterpillars, termites, ants, crickets, grasshoppers, jassids, beetles. |
| 6. | Bufo parietalis Boulenger | Prolific breeder, tadpoles with beak & teeth | Breeding period monsoon, found throughout the year | Ants, earwigs, mole crickets, flies, mosquitoes, moths, jassids, spiders, centipedes. |
| 7. | Bufo microtympanum Boulenger | Tympanum very small. | Breeding period monsoon | Ants, jassids, termites |
| 8. | Bufo silentvalleycnsis Pillai | Warty skinned. | Breeding period monsoon | Whiteflies, jassids, caterpillars, termites, flies, cockroaches, spiders. |
| 9. | Bufo stomaticus Lutken | Head with bony ridges, parotid glands bean shaped, larva black with silvery spots | Throughout the year. Breeding period June-Sept. | Beetles, termites, grasshoppers, cockroaches, ants, mosquitoes, spiders |
| 10. | Bufo melanostictus Schneider | Head without bony ridges, parotid glands, not bean shaped, 50-125 mm long, larvae black. | Throughout the year. Breeding period May-Sept. | Earwigs, flies, Grasshoppers, crickets, caterpillars, beetles, termites, ants, mosquitoes, jassids, cicadas. |

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