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Importance of the presence of Jungle Cats (*Felis chaus* Schreber, 1777) in the Agricultural Fields of Belun Village, West Bengal, India

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ABSTRACT

This study was conducted to determine the importance of jungle cats in Belun agricultural village. The fields in the Belun village produced paddy, mustard and potato. The paddy and potato crops were destroyed by the Indian mole rats. The Indian mole rat caused destruction of 3732.4 kg of paddy per production cycle. The paddy was found at a depth of 36 ± 12cm. 1.10 ± 1.0 kg of paddy was collected per rodent burrow. 1538.47 kg of potato was also lost from Indian mole rat activity. The farmers lost an amount of ₹25,089.1 from the rodents' activities. A market revenue of ₹150,206.9 was lost due to the rodents' activities. The villagers lost 1.3± 1.9 chickens/ 1.9 ± 2.5 ducks per household annually due to the jungle cats. The jungle cats are a major predator of the Indian mole rats. Since the jungle cats cause less economic loss to villagers and help to reduce the rodent population in the area, their presence in village is beneficial to the villagers.

Key words *: Jungle cat, Indian mole rat, Crop damage, Economic loss*

Introduction

Jungle cats (*Felis chaus*) are the most common type of wild cat in the Indian subcontinent. Jungle cats are buff or grey-brown in colour with two black stripes on its forelegs and tail. Tufts of blackish hair are present at the tips of the ear. Melanistic individuals have been found in Indian subcontinent (Chakraborty *et al.,* 1988). The face is slim with dark tear stripes running down the cheeks. The jungle cats are on an average 4kg in weight in the Indian subcontinent (Prater, 1971; Menon, 2014). Jungle cats are found either singly or in pairs. Mating takes place in the months January-February in the Middle- East (Allayarov, 1964) and in October in the South western part of India (Ogurlu *et al.,* 2010). The litter usually consists of 3-5 kittens (Prater, 1971). Sexual maturity usually takes place at 11-18 months (Petzsch, 1968). Jungle cats are Least Concern (LC) in the IUCN Red List Category (Gray *et al.,* 2016).

There are four subspecies of jungle cats in the Indian subcontinent:-

- *Felis chaus kutas* (Pearson, 1832)
- *Felis chaus kelaarti* (Pocock, 1939)
- *Felis chaus prateri* (Pocock, 1939)
- *Felis chaus affinis* (Gray, 1830)

Jungle cats are found distributed from the Nile river valley in Africa to South-east Asia (Abu-Baker *et al*., 2003). Jungle cats have been recorded at high elevations of 3000-3300m in the Annapura Conservation Area, Nepal (Bikram *et al.,* 2020). Jungle cats

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are mainly found in the protected areas in Pakistan. In 2019, jungle cats have been recorded through camera traps in the unprotected area of Haripur district of Pakistan (Anjum *et al*., 2020). *Felis chaus kutas* are found in the peninsular India up to the north of the river Krishna, *Felis chaus kelaarti* are found in South India, *Felis chaus prateri* are found in Western India and *Felis chaus affinis* are found in the Himalayas and North-east India.

The habitat of the jungle cats are mainly grasslands, scrublands, reedy banks of rivers and marshes (Menon, 2014). Jungle cats have been observed to adapt well to agricultural areas that are distributed throughout their habitat. Jungle cats have been found in plantations, distributed throughout their natural habitats, in the tropical regions of Asia (Tikader, 1983).

Jungle cats have both positive and negative impacts on the lives of farmers in the villages. Jungle cats have been observed to feed on rodents that destroy crops in the agricultural fields (Mukherjee, 2008; Ogurlu *et al.,* 2010). So, the jungle cats reduce crop loss due to rodent activity. Jungle cats have been observed to prey on poultry birds in the agricultural villages (Pocock, 1939; Khan and Beg, 1986).

Materials and Methods

Study area

The study area was Belun, Ketugram (23^0 38′24" N, 88^0 07′27"E), Purba Burdwan district, West Bengal, India. Belun is an agricultural village which cultivates paddy twice per year. Potatoes were also cultivated in the winter. Mustard was also produced in that area but we did not get permission from the villagers to dig the mustard fields. The study was conducted from 1st November, 2019 to 9th March 2021. *Felis chaus kutas* (Pearson, 1832) is the subspecies of jungle cat found in the area.

Objective and procedure

1) ***Capture and identification of the rodents destroying the crops:*** First rat cages (27 × 20 × 15) cu.cm with roti, potato, red chilli etc. as bait were left for 3 days in the agricultural fields to capture the rodents. This method was unsuccessful. After that the rat burrows were dug to capture the rodents.
2) ***Paddy and potato collection:*** The rat burrows were dug and the paddy present in them were collected and weighted to estimate the paddy lost due to rodent activity. The rodent eaten potatoes were also collected in March during the potato harvesting time and weighted to estimate the total amount of potatoes lost due to rodent activity.
3) ***Estimation of the approximate number of poultry birds lost annually due to jungle cat activity:*** Questionnaire surveys were conducted to estimate the number of poultry birds lost annually due to jungle cat activity
4) ***Overall impact of jungle cat activity:*** Determination of the potential financial loss caused by the rodents that the jungle cats consume and estimation of poultry birds killed by jungle cats would give us the overall impact of jungle cats on the lives of the farmers.

Results

Impact of rodents on crops

Four species of rodents -Indian house rat (*Rattus rattus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and Indian mole rat (*Bandicota bengalensis*) are found in the Purba Burdwan district, West Bengal, India. Only the Indian mole rat was found in the area (Fig. 1.)

Fig. 1. Indian mole rat caught during the study

Indian mole rat was found at a depth of 40±2.413 cm. Indian mole rats were recorded to store 1.7 kg of paddy in their burrow systems (Brown *et al.,* 2017). The present study recorded 1.103 ± 1.014 kg of paddy in the rodent burrows. The paddy was found at a depth of 36.06 ± 12.01 cm. Presence of nests was also detected at a depth of 41.27± 9.37 cm (Fig. 2 and 3).

The study revealed that the rat burrows with nests contained more paddy than the rat burrows

Fig. 2. Paddy collected in rodent burrow

Fig. 3. Indian mole rat nest

without nests (t test: t=3.474, df=17, p< 0.0029). An average of 9 g of paddy was lost per sq.m due to rodent activity. The study revealed that 10% of the total paddy lost occurred due to the activity of the Indian mole rat (Fig. 4).

Paddy lost due to rodent activity:

Total cultivated land- 414718 sq.m

9 g of paddy was found to be lost per sq.m due to rodent activity

Assuming the damage done by rodents was the same throughout the cultivated land then

Total paddy lost due to rodent activity- (414718 × 9)g = 3732462 g

= 3732.462 kg

The paddy was bought from the farmers with a price of ₹1.3 per kg

Total amount lost due to rodent activity- (3732.462 × 1.3) = ₹4852.2

₹4852.2 ($ 66.98) was potentially lost due to the Indian mole rat

Since paddy was cultivated twice per year so the total amount lost per year- (₹4852.2 × 2)

= ₹9704.4

₹9704.4 ($ 133.95) was potentially lost due to rodent activity

Studies had revealed that only 64% of the paddy was converted into rice in the Indian mills (Singha, 2013).

Total rice potentially lost= [{(3732.462 × 2) × 64}/100]

= 4777.5 kg

The market price of rice that time was ₹ 25 per kg

Total revenue lost due to rodent activity = (4777.5 × 25)

= ₹119,437.5

Rodents cause crop damage to other crops like maize etc. (Stenseth *et al.*, 2003). The study revealed that 230g of potato were lost per sq.m due to the activity of the Indian mole rat. 49% of the total potato

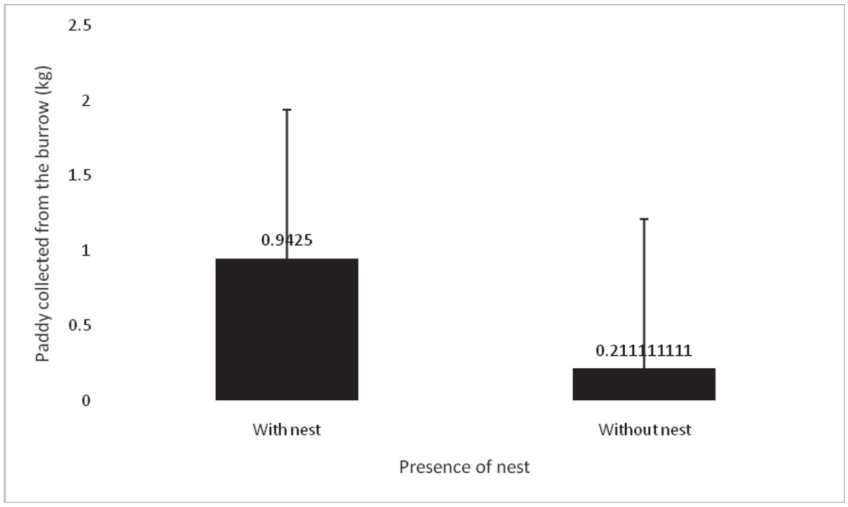

Fig. 4. Graph representing the paddy storage in rodent burrows with/without ness

lost occurred due to the Indian mole rat activity.

Potato lost due to rodent activity:

Total cultivated land- 6689 sq.m

230 g (0.23 kg) of potato was found to be lost per sq.m due to rodent activity

Assuming that the loss due to rodent activity was the same throughout the entire cultivated land then:-

Total potato lost due to rodent activity = (6689 × 0.23) kg

= 1538.47 kg

The potato was bought from farmers with a price of ₹ 10 per kg

The total amount lost due to rodent activity- (1538.47 × 10) = ₹ 15384.7

₹15384.7 ($ 212. 37) was potentially lost due to the Indian mole rat.

The market price of potato at that time was ₹ 20 per kg

Total revenue lost due to rodent activity = (15384.7 × 20)

= ₹30,769.4

Total amount potentially lost due to Indian mole rat

In case of farmers:-

Amount lost from paddy- ₹9704.4

Amount lost from potato- ₹15384.7

Total amount lost- ₹(9704.4 + 15384.7) = ₹25089.1

₹25089.1 ($ 346.31) was potentially lost due to Indian mole rat activity.

In case of market revenue:-

Amount lost from rice- ₹119,437.5

Amount lost from potato-₹30,769.4

Total amount lost- ₹(119437.5+30769.4)

= ₹150,206.9

A potential market revenue of ₹150,206.9 ($ 2073.32) was lost due to the Indian mole rat activity (Fig. 5).

Fig. 5. Potatoes eaten by Indian mole rat

Poultry birds lost due to the jungle cats

Jungle cats have been recorded to kill poultry birds in villages (Mukherjee, 2008; Ogurlu *et al.,* 2010) (Fig. 6). Questionnaire surveys were conducted in 140 households. The survey revealed that 14 households lost chicken. Each household lost 1.3 ± 1.94 chickens (1 chicken approx.). The survey revealed that 34 household ducks lost. Each household lost 1.97± 2.52 ducks (2 ducks approx.) per household annually due to jungle cat activity.

Fig. 6. Jungle cat in mustard plantation

Calculation of the negative impact of jungle cat:-

Price of each duck - ₹300

Price of 2 ducks - ₹600

Price of 1 chicken - ₹250

Total amount lost from killed chicken- (14 × 250) = ₹3500

Total amount lost from killed ducks- (34 × 300) = ₹10,200

Total amount lost due to poultry birds killed- (3500 +10200) = ₹13700

So, approximately ₹13,700 ($ 189.12) on an average is lost due to the poultry birds killed by jungle cats per year

The poultry birds are kept as supplementary income and they are sold within the village only. They are not transported outside of the village like the crops.

Difference in the amounts lost from Indian mole rat and jungle cat activities respectively-

(25089.1- 13700)

= ₹11,389.1

Studies have shown that 70% of the daily diet of jungle cats consist of rodents (Mukherjee, 2004). So,

jungle cats play an important role in rodent population control.

Overall impact

The economic loss incurred by the farmers as a result of jungle cat activity was ₹11,389.1($ 157.21) less than the economic loss incurred due to the Indian mole rat activity. The presence of jungle cats which consumed rodents as one of their main preys seemed to be beneficial to the farmers that resided in that area.

Discussion

Studies have shown that the mean yield loss as a result of rodent activity was 12.4% (Brown *et al.*, 2007). In the Asian continent 5-10% of the total paddy cultivated are lost due to the activity of the rodents (Singleton, 2003). In Asia rodents destroy enough crops to feed 200 million people on a yearly basis (Singleton, 2003). In Tanzania the estimated loss due to rodent activity was $45 million (₹325.9 crore) annually (Stenseth *et al.,* 2003). In this study it was found that the rough estimation of the market revenue lost due to rodent activities was ₹ 150,206.9 ($ 2073.32). The rough estimation of the loss incurred by the farmers due to the rodent activities was ₹25,089.1($ 346.31) which was 1.8 times the annual loss of ₹13,700 ($ 189.1) incurred by the farmers because of the poultry lost due to the jungle cats. The farmers in Belun village do not use pesticides to kill the rodents. They rely on the wild animals to reduce the overall population of the rodents. The major predators of Indian mole rats in that area are jungle cats and jackals. Of the two predators, jungle cats are more numerous in that area according to the villagers. So, despite the economic loss caused by the jungle cats their presence in that area is essential for controlling the rodent population. The jungle cats potentially reduce the amount of crops lost due to rodent activities by consuming the rodents and reducing the rodent population.

Conclusion

Indian mole rats potentially caused more damage than the jungle cats. The potatoes were more badly affected than the paddy per sq.m due to the rodent activity. Considering the potential financial losses caused to the farmers by the jungle cats and the Indian mole rats respectively and also the fact that jungle cats eat rodents then in the village environment the presence of jungle cats could be economically beneficial for the farmers.

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