Title
Reinfestation of Bandicota bengalensis (Gray) in irrigated field habitat

Permalink
https://escholarship.org/uc/item/2z5884sf

Journal
Proceedings of the Vertebrate Pest Conference, 15(15)

ISSN
0507-6773

Author
Guruprasad, B. K.

Publication Date
1992
REINFESTATION OF BANDICOTA BENGALENSIS (GRAY) IN IRRIGATED FIELD HABITAT

B. K. GURUPRASAD, AICP on Rodent Control, University of Agricultural Sciences, GKVK, Bangalore—560 065. India

ABSTRACT: Bandicota bengalensis, a predominant species inhabiting irrigated fields is a potential pest on agricultural crops and is known to live in extensive burrow systems. The burrow opening covered with mud which is an indicator of its activity seems to be discontinuous. An analysis of burrow systems and their occupations indicated reuse of abandoned burrow systems by new entrants. A study simulated in semi-natural conditions supported the view that there is occupation of old burrows by new immigrants. Non-effective barriers; and availability of Panicum repens on bunds, a food alternative may support the population influx. Availability of old burrow systems due to chemical control and natural predation often result in a ready made habitat for the immigrants, and new recruits to reinfect the irrigated fields. Total dismantling of the burrow system and agricultural practices in irrigated field retards the reinfection.

INTRODUCTION

Rodent infestation in irrigated agricultural crop fields result in damage from tillering stage to harvest. Among the rodent pest species, Bandicota bengalensis (Gray) is known to be predominant pest in irrigated fields (Roy 1974). The lesser bandicoot rat (Bandicota bengalensis) is a solitary rat and occupies a single burrow system (Greaves et al. 1975). Its agonistic behaviour help in spatial distribution in irrigated fields. The burrow systems are complex and usually on the bunds. Burrow openings are closed with a heap of mud except during the harvest season (Chakraborothy 1975). Bandicoot rat is known to have adopted to its habitat by feeding on alien grass (Panicum repens) present extensively on bunds during non-availability of food in the crop fields (Guruprasad 1984).

The control measures adopted against this Bandicoot rat include traditional catching by digging the burrows. But the most recommended method is chemical control using rodenticides, based on feasibility of adoption by farmers. Immature of the rodenticide used methodology involve baiting at the burrow opening and closing after baiting. To achieve satisfactory control of Bandicoot rat population, recommendations are based on breeding potential and population level so as to minimize the crop losses. Such control measures lead to unaltering of the habitat with burrow system intact killing only its occupant resulting in readily available burrow systems for new immigrants.

Impact of availability of unoccupied burrow systems on the rate of reinfestation of Bandicoot rat population in irrigated field has not been worked out. Though habitat alteration is recommended to achieve effective control (Barnett and Prakash 1975) and in ground squirrel total destroying burrows would increase effectiveness of control (Storer 1945) and slower the recolonisation (Linsdale 1945).

With this background, pilot studies were aimed at testing reutilization of unoccupied/deserted burrow systems by Bandicoot rats and its influence on recolonization from adjacent fields in irrigated field habitat after chemical control.

MATERIAL AND METHODS

Study area—Rattary

Burrow reoccupation was studied in a rattary at Agricultural Research Station belonging to the University of Agricultural Sciences, Nagenahalli, Mysore District, Karnataka, South India. Bottom of the rattary was covered with 30 cm soil. One Bandicoot rat of each sex was released for a month into the rattary and were allowed to dig extensive burrow systems. Without disturbing burrow system, the residents were removed by trapping. Ten Bandicoot rats of each sex were released individually. Observations were then recorded whether the released rats would reuse the unoccupied burrow system or make their own fresh burrow system/s.

Field Study

Ten acres of experimental plot in irrigated fields in the Regional Research Station, Mandya, Karnataka, were selected for mapping the burrow loci. Paddy, Ragi and Groundnut in Kariff and Sugarcane through out the year were grown in experimental plots. For recording continuity of activity, individual burrows were numbered 1 to 20 and active burrows were continuously mapped for three days in a month for a period of eight months. Active burrows close to one meter from the numbered burrows were considered as the same old active ones. Since Bandicoot rats attain sexual maturity in about three months, percent of burrows active consistent for three months were recorded before their burrow excavation.

Next month (March 1987) after eight months of mapping, the active burrows were excavated and animals were caught. Based on the data on burrow dimension, activity consistence, sexual status, tail length and body weight, the captured rat occupants were classified as new immigrants and old residents.

Adjacent to the experimental plot of burrow destruction, another 10 acres of similar irrigated fields with active burrows were utilized for chemical control by zinc phosphide followed by aluminium phosphide fumigation. Active burrows were counted(mapped in both experimental and chemically controlled fields for a further period of eight months continuously for population invasion from adjacent plots. The data were analysed by student 't' test with regard to population growth in an unaltered and altered habitats, respectively.

RESULTS

The introduced Bandicoot rat in absence of resident one always used the deserted burrow system initially in both the simulated study, indicating reuse of deserted burrow system by new entrant into the rattary. Nineteen percent of the new
2 3 ::>

ID 3;

::>
a:

z

ID

0

::>

a:

z

200

z

CXI

w

15 ID

u

of excavation. Thus showing that deserted burrows are re­

immigrants

Bandicoot rat

and

consistantly during last three months of observations period

intennittently indicating high percent of utilization of burrow

entrants made new burrow later.

Mapping active burrows indicated both continuous and

discontinuous activity at the same burrow loci (Fig. 1). Ten

percent of the burrows were active consisstently during the

observation period and 90 percent of the burrows were active

intermittently indicating high percent of utilization of burrow

systems. Out of 90%, 50% of the burrows were active

consistantly during last three months of observations period

and 40 percent of burrows were active only during the month

of excavation. Thus showing that deserted burrows are re­

used immaterial of the duration of unoccupancy by earlier

Bandicoot rat.

Out of 90% of the reinfesting population, 30% of the

immigrants were sub adult and 60% were adults at the time

of capture (Table 1). 45% of the immigrants had settled in

the experimental plot during the study and 15% of the adult

population had reoccupied burrows during the month of

excavation. The burrow having consistent activity through­

out the surveillance period were adults. Capture of higher

percent of sub adults in higher ramified burrows with inter­

mittent activity period indicated that the infesting population

was mainly by sub adults.

Population build up in chemically controlled plot com­

pared to burrow destroyed plot was significantly higher

(P > 0.1). In the observation period of eight months, the popu­

lation in chemically controlled plot with old burrow intact

was rebuilt to the extent of 86.67 percent, but in the plot with

destroyed burrow system, it was only 45 percent indicating

the importance of old burrows in reinfestation of Bandicoot

rats in irrigated fields (Fig. 2).

The rate of rebuilding was significantly higher in the

initial three months (P > 0.1) in control plot with intact bur­

rows but from fourth month onwards, recolonisation in the

experimental plot and control plots were almost similar. Ab­

sence of burrow system could retard reinfestation of Bandi­

coot rat in irrigated field to the extent of 41.67% compared to

that of chemical controlled field with intact burrows.

DISCUSSION

In managing the rat population to non-infestation level,

habitat management suggested to reduce carrying capacity

which in turn also check population inflow into a crop field

has met with little success (Southwood 1977, Barnett and

Prakash 1975). For example reduction of the bund height, as

this totally depends on contour of the area. The habitat in

irrigated fields also has ginger grass (Pancium rep­ens) as an

alternative food supply for sustenance of Bandicoot rat popu­

lation (Guruprasad 1984), has hampered habitat management

in checking population reinfestation. Present study has indi­

cated the reuse of unoccupied burrow systems in irrigated

field habit. Such reoccurrence of burrows has been a major

factor in the ground squirrel population (Linsdale 1946). Due

to lack of effective barrier system in irrigated fields

movement of Bandicoot rat is not restricted. The induction of sub

adult Bandicoot rat population, the major factor in

reinfestation may be due to breeding potential and availability

of food (Montgomery et al. 1991). Chemical control sug­

gested to farmers has led to unaltered habitat with presence

of unoccupied burrow systems is one of the major factors

responsible for a quicker reinfestation of rats in irrigated habi­

tat from adjoining fields.

Absence of burrow systems retard population reestab­

lishment as the requirement of energy is more to install com­

plicated burrow systems. Partial destruction of burrow

systems done during agricultural practice of trimming bund

will not retard as in the case of ground squirrel (Salmon et al.

1987). Burrow destruction used in combination after chemi­

cal control may prove more successful as it involved alter­

ation of habitat and carrying capacity after a control operation

is carried out as in European rabbit (Oryctolagus cuniculus)

control in Australia (Cooke 1981, Foran et al. 1985). The

present study has indicated that complete burrow distruction

retard Bandicoot rat population reinfestation as reported by

Storer (1945) for an effective ground squirrel management.

Burrow distruction may be cost effective as burrow system

are mostly on bunds in irrigated fields. Total reconstruction of

bund instead of partial reconstruction by way of trimming

undertaken by farmers can be recommended as it involves

marginal increase in the cost of labour input.
Table 1. Percent reoccupancy of Bandicota bengalensis and its burrow systems in study area at Regional Research Station, Mandya, Karnataka, during 1986-87.

<table>
<thead>
<tr>
<th>Burrow No.</th>
<th>Total length of burrow system (mts)</th>
<th>Duration of continuous activity before excavation (in months)</th>
<th>Sex</th>
<th>Weight (gm)</th>
<th>Tail length (cms)</th>
<th>Sexual status</th>
<th>% reoccupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.65</td>
<td>1</td>
<td>F</td>
<td>74</td>
<td>8.3</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9.40</td>
<td>2</td>
<td>F</td>
<td>80</td>
<td>8.8</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11.27</td>
<td>1</td>
<td>F</td>
<td>87</td>
<td>9.5</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>13.65</td>
<td>1</td>
<td>F</td>
<td>80</td>
<td>8.4</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6.37</td>
<td>1</td>
<td>M</td>
<td>100</td>
<td>8.9</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0.90</td>
<td>1</td>
<td>M</td>
<td>80</td>
<td>9.3</td>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.85</td>
<td>1</td>
<td>F</td>
<td>192</td>
<td>11.5</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3.68</td>
<td>1</td>
<td>M</td>
<td>211</td>
<td>12.7</td>
<td>adult</td>
<td>15</td>
</tr>
<tr>
<td>19</td>
<td>10.50</td>
<td>1</td>
<td>M</td>
<td>200</td>
<td>12.5</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.72</td>
<td>6</td>
<td>F</td>
<td>180</td>
<td>12.1</td>
<td>adult*</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>11.40</td>
<td>2</td>
<td>F</td>
<td>227</td>
<td>12.5</td>
<td>adult*</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.40</td>
<td>3</td>
<td>M</td>
<td>192</td>
<td>11.7</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>14.48</td>
<td>5</td>
<td>F</td>
<td>240</td>
<td>12.3</td>
<td>adult*</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>13.65</td>
<td>5</td>
<td>F</td>
<td>198</td>
<td>12.1</td>
<td>adult*</td>
<td>45</td>
</tr>
<tr>
<td>14</td>
<td>15.10</td>
<td>4</td>
<td>F</td>
<td>210</td>
<td>12.6</td>
<td>adult*</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>13.20</td>
<td>3</td>
<td>M</td>
<td>240</td>
<td>12.8</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>19.20</td>
<td>7</td>
<td>F</td>
<td>243</td>
<td>12.3</td>
<td>adult**</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>16.54</td>
<td>3</td>
<td>F</td>
<td>205</td>
<td>12.7</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>14.70</td>
<td>9</td>
<td>M</td>
<td>289</td>
<td>15.3</td>
<td>adult</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>15.28</td>
<td>9</td>
<td>M</td>
<td>273</td>
<td>14.5</td>
<td>adult</td>
<td></td>
</tr>
</tbody>
</table>

*Lactating **Pregnant

ACKNOWLEDGMENT

The support and facilities provided by the All India Coordinated Research Project on Rodent Control, Indian Council of Agricultural Research, New Delhi and the University of Agricultural Sciences, GKVK for the study are gratefully acknowledged.

LITERATURE CITED


