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INTEGRATED RODENTS MANAGEMENT IN INDIA

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Eighteen species of rodents are pests in agriculture, horticulture, forestry, animal and human dwellings and rural and urban storage facilities in India and vector of numerous zoonotic diseases, including the devastating plague. Despite the global scale and inestimable cost of their impacts on both human livelihoods and natural ecosystems, little is known of the global genetic diversity of rodents the timing and directions of their historical dispersals and the risks associated with contemporary movements. In the present scenario, the need of the day is to prevent and control the rodents in coaches, agriculture field and godown. Rodents are nuisance to travelling passengers and potential health hazard.

Introduction

Rodents are the largest and one of the most interesting groups of mammals. During these four decades Indian agriculture has shifted from a natural, subsistence type farming to a managed, intensive agricultural practice involving remarkable changes in the pattern of land use, the development of an infrastructure for the production and storage of agricultural produce, the adoption of improved crop production and protection technologies and changes in the socio-economic perceptions of farmers (Sidhu and Sidhu 1994). One of the important reasons for this change in the balance of the mammalian fauna is the high rate of reproduction and population growth of rodents combined with a high degree of adaptability in the agro-ecosystem, in contrast to the low rate of fertility and lower degree of adaptability to a changed habitat of other wild mammals. Hart (2001) reported that the overall losses of grain to rodents in India were approximately 25% in pre harvest and 25-30% in post harvest situations bringing the loss to at least US$ 5 billion annually in stored food and seed grain in India. Studies of chromosomes and blood proteins during the 1960s and 70s identified patterns of geographic variation in the species (Yosida 1980) and subsequent genetic (Baverstock et al 1983) and morphological work (Niethammer 1975) encouraged discrimination of two weakly differentiated species–R. Rattus for European and Indian populations with a karyotype of 2n□=□38–40 and R. Tanezumi for Asian populations with a 2n□=□42 karyotype Musser and Carleton (2005).

Habits of Rats- Rats must be understood to be controlled. Knowledge of their life histories, habitat and food requirements, and patterns of behaviour, range and other factors is essential to their management.

Life Ccle- A mature female rat can give birth to about 20 young in a year (four to six at a time), if she lives that long. The average life span of a rat in the field is less than one year; females live longer than males. The young are born in a nest. They are hairless, and their eyes and ears are closed. Within two weeks their eyes and ears open, they become furry and rat-like, and they begin exploring the nest area. In the third week, they begin to eat solid food, and imitate their mother to forage, escape, and watch for danger. If the mother rat has become wary of rodenticides or traps, many of her young will learn to avoid them. This learning experience can make control difficult in sites where long-term rodent control programs have been unsuccessful in the past. Young are totally weaned at 4-or 5-weeks old. At 3 months, the young are independent of their mother. They will mate and continue the cycle in the same location or will migrate to a new, unoccupied nest area.

Senses of Rats- Rats have poor vision. They are nearly color-blind, and they react to shapes and movement rather than identifying objects by sight. The limit of their vision is 30 to 45 feet. Their eyes are adapted to dim light.

Social Behavior- Rats are aggressive and social conflicts are most common at feeding sites, prime resting areas and territorial boundaries. Females fiercely defend their nests and young from other rats.

Fig: 1 Rodent damage in storage

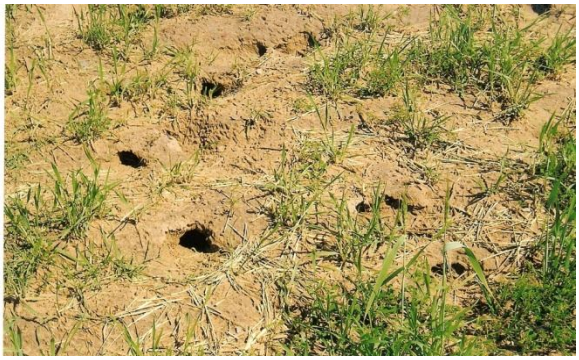

Fig: 2 Rodent damage in rice field

Range- Rats usually begin foraging just after dark. Most of their food gathering occurs between dusk and midnight but short bursts of restlessness and activity can occur anytime, day or night. Rats commonly travel 100 to 150 feet from their nest looking for food and water and patrolling their territory. It is not unusual for a colony of rats that nests outdoors to forage inside a building 100 feet away.

Nests- Outdoors rats usually nest in burrows dug into the ground. The burrows are shallow (less than 18 inches) and usually short (less than 3 feet), with a central nest. Extra"bolt holes" are used for emergency escapes. They are hidden under grass or boards or lightly plugged with dirt. Burrow openings are 2 to 4 inches in diameter. Indoors, rats nest inside walls, in the space between floors and ceilings, underneath equipment, between and under pallets and in crawl spaces, storage rooms, and any clutteredarea that is normally unoccupied.

NEW DIMENSIONS OF RODENT PROBLEM

Soil conservation, Hospitals, Railways, Telecom and Aviation

RODENT MANAGEMENT TECHNOLOGIES

A. CULTURAL CONTROL

1. Sanitation: Good sanitation makes it easier to detect signs of mouse infestation. It also increases the effectiveness of baits and traps by reducing competing food. However, the best sanitation will not eliminate house mice. They require very little space and small amounts of food to flourish. Store bulk foods in mouse-proof containers or rooms. In warehouses, restaurants and food plants stack packaged foods in orderly rows on pallets so that they can be inspected easily. A family of mice can happily live in a pallet of food without ever having to leave the immediate area.

2.Deep ploughing: It destroys the burrows and helps in migration of rodents from fields.

3.Reduction in bund size: Discourages the rodents to burrows and inhabit the bunds.

4.Weed control: Weeds provide food and shelter. Regular weed control practices may minimize the rodent infestation considerably.

B. MECHANICAL CONTROL

1. Traping- If used correctly snap traps are very effective in controlling mice. They must be set in the right places in high numbers and in the right position or mice will miss them entirely. It is extremely useful if integrated with chemical control for management of residual pest population surviving after poison baiting.

It is essentially required for identification, survey and monitoring of the pest species.

2. Kill traps: Snap or break back Traps, Glue Trap.

3. Live traps: Sherman Traps, Wonder traps and Box traps.

C. BIOLOGICAL CONTROL

Bacteria, viruses, protozoan as microbes and helminth-nematode and arthropods as macroparasites possess biocontrol potential. Least studied for rodent control. *Salmonella* has been effective against rodents but possesses a potential risk to man. *S. typhimurium* and *S. enteritis* have proved ineffective against *R. rattus* and *B. bengalensis* in India due to poor mortality (15-20%). *Trypanosoma evansi* (protozoan) has proved effective against *R. rattus* and *B. bengalensis. Capillaria*, a nematode has proved effective in Australia against mouse plague. Role of microbes in rodent management is doubted due to possible health risk to man and his live stock.

D. Chemical Control - Compounds, which kill the rats by their chemical action, are known as 'rodenticides'.

1.Acute/ Single dose poison: Zinc phosphide, Barium chloride, Red squill, Thallium sulphate are some of the compounds which have been used as rat poisons. These are called as 'acute poison' as these are highly toxic in nature i.e. they show immediate fatal results. The defect of acute poisons is that these create poison shyness and bait aversion in rodents. For instance: Zinc phosphide 2 parts, food grains 96 parts and any edible oil 2 parts.

2.Chronic/ Multiple dose poison: The modern way to kill rodents in houses or godowns is by using anticoagulants. If consumed regularly in sufficient quantity for a prolonged period causes blood hemorrhage in mammals. These are easy to handle and involve no health hazard to man. These do not create bait shyness.

(i) Ready to feed: Rodents can be fed directly when the bait is of ready to use type.

(ii) Dry baits: In case of dry concentrate form, the bait is to be prepared in the following manner. Anticoagulant 25 gm (5 tea spoonfuls), flour 450 gm (4 tea cup fulls), sugar or jaggery (in powder form) 15 gm (3 tea spoonfuls), any edible oil 10 gm (2 tea spoonfuls).

It should place in rat runs, dark places, where rats can consume bait without disturbance even during day-time. Consumed baits should be replaced daily. Rats start drying after a period 6-7 days. Baiting should continue for 21 days to get an effective kill.

3.Fumigation of rat burrows: It gives quick results as problems like new object reaction and bait shyness do not arise.

(i) Cyanogas fumigation: Calcium cyanide was used as a fumigant. Before starting fumigation work all rat burrows should be closed by loose earth. The following day, freshly opened (live burrows) should be cleared and 10-20 gms (3-4 tea spoonfuls) of fumigant applied with the pump-applicator (6-10 strokes of the pump).The burrows should be immediately closed tightly after removal of pump hose to avoid any leakage of poisonous gas. Next day the fumigated burrows are again examined and any reopened burrows are refumigated.

(ii) Phosphine gas fumigation: Aluminium phosphide pellets of 0.6 gms are utilized for carrying out burrow fumigation exactly in the same manner as discussed above for cyano gas. Since the pellets are to be utilized, no pumping is necessary.

Conclusion:

The rodent is the most successful pest in adapting to live with people. It is found almost anywhere people are feeding on human food, sheltering in human structures, and reproducing at a remarkable rat. It is the most troublesome and economically important vertebrate, contaminating untold millions of dollars worth of food, damaging possessions, and causing electrical fires with its constant gnawing. On the plus side, rodents are curious and investigate new objects in their territory, so control measures can work fast when done correctly. Control of house rat is best when it is a three-part process: sanitation, rate-proofing and population reduction with traps and toxicants.

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