

Rodent Problems in Construction Sites

Introduction

Improper handling of food debris, accumulation of construction wastes, improper storage of construction materials and the presence of flimsy structures provided rodents with handy food sources and harbourages. Besides, the presence of dining areas, probably with food-preparation facilities, further increases the susceptibility of construction sites for rodent intrusion and proliferation.

Rodent Prevention and Control Measures

2. Generally, rodent control measures can be classified into fundamental measures and supplementary measures. Fundamental measures include depletion of food sources, elimination of harbourages and blockage of passages of rodents, while supplementary measures include trapping and poisonous baiting.

A. Fundamental Measures

Food and Harbourage

3. Whenever the problem of domestic (commensal) rats or mice is considered, it should always be remembered that 'Prevention is better than Cure'. If the general standard of environmental sanitation is maintained at a high level and rodent harbourage is either eliminated or kept to the minimum, such will always prove the greatest value in preventing infestation. Particular attention should be paid to the storage and disposal of anything which could be taken by rodents as food. Rodents are omnivorous and will consume any substance, that could be in the form of food for human consumption and food residues, as their food. Food for human consumption should be kept in metal or glass containers with well-fitted covers, etc. Correct disposal of all putrescible waste (garbage) is of the greatest importance, and far too frequently such refuse is left lying about or is not deposited in metal or plastic refuse bins or receptacles with well-fitted covers.

4. With reference to construction sites, the management should pay particularly attention to the following:

- (a) Proper handling of wastes and food debris

Rodent thrive in whenever there are ample food attractions. Construction sites are concentrated with large number of workers and they would produce considerable amount of food wastes, such as lunch boxes, cans, bottles, food packings, etc. These would provide rodents with ample and handy food sources for speedy proliferation. It is recommended that all wastes/food debris should be properly disposed of in rodent-proof refuse receptacles constructed with strong impervious material and with close-fitting lids. Refuse receptacles must be placed on concrete floor or slabs with size larger than the area covered by the refuse receptacles. Refuse should be cleared regularly and should not stay overnight inside the construction sites. Construction wastes should be stored separately from food and food-related litter. It is also recommended that eating should only be allowed in designated areas particularly in lunch hour and sufficient number of refuse receptacles should be available.

(b) Food preparation and storage facilities

Food preparation facilities might be presence in some large size construction sites. In additional to storage of food materials, a lot of food wastes/remnant would also be produced during the course of preparation. Rodent would thrive in whenever there is food attraction and the presence of food preparation facilities may provide rodents with constant and ample food supplies. It is recommended that the food preparation area should be situated inside a rodent-proofed environment to avoid easy access of rodents (for details in rodent proofing measures, please refer to paras. 5 – 7 below). Store bulk foods in rodent-proof containers or rooms. Stack sacked or boxed foods in orderly rows on pallets in a way that allows thorough inspection for evidence of rodents.

(c) Designated dining areas

Designated dining areas should be assigned to staff of construction sites for easy management of wastes disposal. If food preparation facilities are available, dining areas should be located near to the facilities. Proper refuse collection facilities should be provided for collection of food debris/utensils/lunch boxes/cans. Wastes and food debris should not be packed with plastic bags only but should be contained in refuse receptacles with tight cover and constructed with strong impervious material. Refuse should be removed immediately after dining hours and should never be allowed to stay inside the construction site overnight. If no food preparation facility is provided, it is still recommended to have designed areas provided with proper refuse collection

facilities for staff's dining.

(d) *Storage of construction materials*

Prolonged and improper storage of construction materials could provide rodents with favorable harbourages. Materials such as lumber, plastic, paper, or hessian sacks and fiber-board cartons are easily penetrated by rodents. Construction materials should be stored in rodent-proofed environment with concrete floor to prevent burrowing of rodents. Lumber and other materials or articles should be stacked on racks at least 45 cm above ground level. The stacks should be of a size and tidiness that any signs of rodent intrusion can be easily noticed by regular visual inspections. This is also critical to ensure an adequate aisle space between stacks and the walls to allow easy movement for inspections between and behind the stacks of construction materials. A 30 cm band should be left between stacks and adjacent side wall, preferably painted in white for easy detection of rodent droppings and other rat signs. Besides, construction wastes should be disposed of in skips at designated locations. The skips should be landed on concrete floor and their doors should be kept tightly closed without any gap of size greater than 6 mm to prevent intrusion of rodents. Woodpiles, bamboo poles and other similar wastes should be cleared as frequent as possible.

(e) *Temporary office containers*

Container offices are commonly found in construction sites. The void underneath the container offices are frequently found to be encroached by rodents as harbourages. It is recommended that the container offices should land on concrete floor surface and the void underneath should be sealed with rodent-proof materials such as galvanized metal plates or concrete.

Rodent-proofing

5. Rodent-proofing of buildings, or parts of buildings, is another important method of prevention which should be applied whenever it is possible and practicable to do so. This is particularly important for places where quantities of food are kept.

6. There are many ways by which rats and mice may enter buildings, and a very thorough search is necessary to locate all possible means of entry. Rat-holes and other small openings can be blocked by filling or covering them with appropriate materials

(e.g. fine concrete, cement mortar, 20 gauge sheet or 22 Standard Wire Gauge (S.W.G.) barbed wire balls etc.). Broken or missing gratings should be replaced. Ventilation grids and other similar openings may be proofed externally either with 24-gauge expanded metal with 6 mm (1/4 in.) mesh, or with galvanized steel woven wire cloth of 22 S.W.G. with about seven meshes to the inch (25.4 mm); these materials will exclude both rats and mice. Space beneath doorways resulted from worn steps should be repaired or renewed. Wooden doors may have to be protected at the bottom by fitting a 20 gauge metal 'kicking-plate' of at least 300 mm high on the outside. This should have a maximum clearance of 6 mm (1/4 in). A similar plate should be fixed to the door frames to form a continuous band of metal.

Rodent Proofing Principles

7. A few examples to demonstrate the fundamental principles which should be applied for the prevention of rodent infestation are listed below:

- (a) Openings and passing for pipes, wires, and ducts through walls should be completely sealed, etc.
- (b) Voids or 'dead' spaces are sometimes inevitable and in some parts of a building (e.g. the space above a suspended ceiling) may in fact have been designed as a void with the intention of using it for plumbing, electrical conduits, or air-conditioning ducts. Nevertheless, these voids should be made inaccessible to vermin and the materials and decorative finishes used should be resistant to gnawing by rodents. There should be no voids between the sides, backs, or bottoms of built-in furniture and the adjacent walls or floors. There should be no voids greater than 6 mm (1/4 in) wide behind wooden skirting. Voids caused by fixing battens behind panel should be kept to a minimum and the voids made inaccessible to vermin; the materials used should be resistant to gnawing (such as 20-gauge metal or cement motor, etc. as mentioned in paragraph 6).
- (c) Places such as kitchens, food-preparation rooms, and food stores should NOT have false ceilings. However much one dislikes the appearance of the mass of piping which must often be left exposed if there is no false ceilings, it is important to remember that the warmth of a kitchen and scent of food will attract rats, and that a false ceiling provides an ideal harbourage and nesting place for rats. A real case of infestation due to this specific cause, and which proved most difficult to eradicate, was found in the kitchen of a

local building not more than four years old. These rooms should therefore leave no access, even the very small one, to rodent.

- (d) Vertical pipes may be used by rats to reach entry points or harbourage places. A rat would find it difficult to climb (by wedging itself) between a pipe and a wall/vertical surface or between adjacent pipes, if the space between these structures is too big. Vertical pipes should, therefore, be spaced at least 100 mm apart, and be at least 100 mm from wall/vertical surface. Circular rat guard made of 20-gauge metal with diameter of at least 550 mm should be deployed if necessary. The gap between the rat guard and the pipe should not be larger than 6 mm. The rat guard should be installed in height of at least 100 cm above ground or the nearest object that cannot be reached by rodent. Besides, there should be no shortcut or any other structure nearby letting the rodent by-pass the rat guard easily.

B. Supplementary Measures

Trapping

8. Trapping is one of the control methods for rodents, and is the preferred method of capturing rodents in situations where the use of rodenticides is considered undesirable, e.g. where poisoned rodents dying in inaccessible areas could cause unwanted odour problems or where rodents are specifically required for disease or other biological studies. Break-back traps are used to instantly kill rats and mice; to capture live rodents, wire cage traps/Multiple-catch traps are used. Wire cage traps/Multiple-catch traps for rats and mice should be baited and set on the first day that they are laid. In general, wire cage traps found in the local markets are not designed for trapping mice. The size of the cage/multiple-catch traps must be smaller than 331 mm in length, 181 mm in width or 156 mm in height.

9. Only when countering heavy rodent infestation where other rodent control methods have been exhausted without satisfactory results, sticky traps/glue traps may be considered as a tool to supplement the rodent control programme. They should not be set outdoor or in areas with possible activities of other non-target animals, e.g. birds, cats and reptiles, etc. Consideration may be given to enclosing the sticky trap/glue trap in a lockable, temper-resistant rodent station or dedicated rodent sticky trap/glue trap tunnel for complete protection against non-target animals. Frequent inspections should be arranged to each sticky trap/glue trap laid and any trapped rodent shall be handled of immediately in a humane manner. The carcass should be properly handled

as soon as possible. The use of sticky traps/glue traps should be suspended as soon as the situation of rodent infestation is alleviated. When sticky traps/glue traps are used, the frequency of inspection should be increased. Internationally recommended inspection interval range from hourly to every 12-hour. (added in June 2023)

10. Rats and mice feel safe by moving close to vertical surface such as wall, rather than across open areas. Break-back traps should therefore be placed at right angle to the vertical surface against which rodents are known or suspected to run. Traps should extend from a vertical surface at a right angle, with the trigger end nearly touching the vertical surface (Fig 1). If traps are set parallel to the vertical surface, set them in pairs, with the triggers situated to intercept rodents coming from either direction (Fig 2). When cage traps are used, they should also be placed similarly at right angles with the open of the trap facing the vertical surface. Whenever possible, set rat cages firmly on ground. The position for traps should be carefully chosen, and traps should remain in the same position throughout each trapping period. **For best results, traps should be placed 2-3 m apart for mice and 3-5 m apart for rats.**



Fig 1 Method of laying break-back trap



Fig 2 Method of setting traps parallel to the vertical surface

11. If the captured non-target animal is or suspected to be injured, contact Society for the Prevention of Cruelty to Animals (SPCA) at their emergency hotline 2711 1000 for assistance. (added in June 2023)

12. A very common cause of unsuccessful trapping is the laying of insufficient number of traps. For the best results, a thorough survey is needed to ascertain the locations of rodent harbourages and movement. Based on the result of the survey, as many traps as possible and reasonably are to be laid. **It is suggested that at least six traps should be laid for one or two rodents.**

13. Rats are omnivorous, consuming a great variety of food but are very sensitive to the freshness of food. Fresh baits should be used as far as possible. Mixed baits, to a certain extent, can minimise the impacts of environmental factors, human practices or variations in rodent behavior on the efficiency of traps during the rodent trapping programmes. As food preference of rodents varies from time to time and from place to place, it is necessary to find out the best combination of food baits for a particular location with rodent infestation. A combination of food baits could be selected from three or four different food baits to be placed inside the cage traps for the first few days of the trapping programme and be observed for their attractiveness to rodents (base on the trapping result). Once the more attractive food baits under such circumstances were found, the most and the second most attractive food baits could be used together for the subsequent trapping periods in that particular area. However, the list of food baits preferred in a location does not guarantee similar attractiveness to rodents in another location. Trials on different food baits should be conducted in any trapping operation at individual location to find out the preferred combination of food baits. Based on previous field test results, bread with peanut butter, barbequed pork (char siu) and sweet corn could be good choices for rodent trapping. Other appropriate food baits could also be included whenever applicable.

14. For both rats and mice, it is better to carry out repeated trapping programmes with a large number of traps laid for a few days, rather than distributing scattered traps over a wide area for a longer period. For a single trapping programme, traps should be laid for at least five consecutive nights.

Poisonous Baiting

15. The most commonly used rodenticides are anti-coagulant but different kinds of rodenticides have different application methods. Information stated on the product label should be strictly followed to ensure the effectiveness and safety. Generally

speaking, there are two major kinds of anti-coagulants, the multiple-dose and the single-dose.

16. Multiple-dose anticoagulants are effective against all species of local commensal rodents and it would not induce bait shyness. The master mix of rodenticide should be added to other bait base, such as uncooked rice, oil and sugar and all the ingredients should be mixed well.

17. Single-dose anti-coagulants are also cost-effective against all rodent pests. They are formulated into different ready-to-use form, such as pellets, wax blocks, etc. The bait packs are to be evenly distributed in the target area with application rate as stated in the product labels. Bait pellets should be pushed into rat burrows, thrown into places not readily accessible to humans and domestic animals, placed in protected positions and other infested places such as junk accumulation points. It is not advisable to hang the poisoned bait too high above the ground. It takes a few days for the bait to effect and most poisoned rodents will die within two weeks after baits were laid.

18. Anti-coagulants are also toxic to humans and should be handled with great care. Adequate verbal and written warnings must be given to construction workers, the supportive staff and relevant parties to avoid any accidental poisoning.

C. Rodent Control Programmes



19. Effective rodent control operations require trained personnel with knowledges in rodent behavioural biology as well as various prevention and control methodologies. Proper implementation of rodent inspection programmes and control operations are of paramount importance in yielding satisfactory control effect. As such, it is recommended to engage professional pest control contractors to perform routine rodent control operations. The contract specifications should contain essential tasks to be performed by the contractor. These tasks should include, e.g. weekly rodent inspection plan, provision of rodent exclusion and proofing recommendations, prevention of rodent migration between the construction site and surrounding areas, detailed rodent control programmes, regular reports of progress and results of rodent control, etc. A specific team of staff should be appointed for rodent control of the site to follow up suggestions/recommendations provided by the pest control contractors and also monitor the contractors' performance.




20. The presence of food attractions and numerous potential harbouraging places



rendering construction site a favourable biotope for proliferation of rodents. Rodent control operations should be conducted as a routine to suppress rodent population so as to minimise the emigration of rodent population to nearby environment. Particular attention should be given when the construction work is close to completion. Depletion in food sources (due to the decrease in number of staff working in the construction site) would drive rodents to neighbouring areas for food and harbourages. Residual population staying in the site would encroach hidden space and voids and the population would surge quickly once the human activities resume. Rodent control operations should be intensified at least three months before the construction work complete to suppress the rodent population as far as possible to prevent emigration of rodents as well as occupying the site causing subsequent rodent infestation once occupiers move in. Similarly, rodent control operations should also be strengthened at least three months before demolition work starts to prevent the established rodent population from intruding neighbouring areas when demolition takes place.

Food and Environmental Hygiene Department
June 2023

**Problems Commonly Observed in
Construction Sites and Corresponding Measures**

Item	Problem found	Possible improvement works
Food for Guard Dogs		
1	Unattended food for guard dogs provides rodents with handy food source	<ul style="list-style-type: none"> ● Food for guard dogs should not be left unattended overnight
2	Underneath of temporary site office provide harbourage for rodent 	<ul style="list-style-type: none"> ● A buffer zone at least 30 cm made of rodent proof material, such as concrete or small boulders, are suggested to be fitted around the base of temporary site office, or ● Screened with 6 mm. (1/4 in.) mesh, 24-gauge, expanded metal or with galvanized steel woven wire cloth of 22 S.W.G. at about seven meshes to the inch (25.4 mm) 
3	Refuse collection point provides food or harbourages for rodents	<ul style="list-style-type: none"> ● The basin for the refuse should be cleared timely and no food ruminant left unattended overnight

		
<p>4</p>	<p>Soft soil surface provides borrowing gound for rodent.</p> 	<ul style="list-style-type: none"> ●Pave the ground with concrete whenever possible ●Conduct regular inspection and conduct rodent control measure whenever rodent infestation found
<p>5</p>	<p>Rodent could access through door gap greater than 6mm.</p> 	<ul style="list-style-type: none"> ●Door should be fit to the ground leaving the door gap not greater than 6mm

Others		
<p>6</p>	<p>Accumulation of disused articles/construction materials</p> 	<ul style="list-style-type: none"> ● Promptly remove all disused articles/construction materials.
<p>7</p>	<p>Imporper storage of construction materials provide harbourages for rodents.</p> 	<ul style="list-style-type: none"> ● Construction materials should be properly stored in rodent proofed environment. Hoarding boards should be closely placed to avoid any gap of side greater than 6mm allowing passage of rodents. ● Storage of construction materials should not be located at close proximity to refuse collection facilities. ● Construction materials should be removed or moved regularly to avoid prolonged storage.