



Field inspection of rodent activities following transect lines

INSPECTION, SURVEY AND MONITORING

METHODS FOR INSPECTION AND UNDERSTANDING OF THE RODENT PROBLEMS

One of the most important rodent pest management activities involves regular inspection of rodent presence and activities in crop fields and storage areas before embarking on any type of rodent management program. Firstly, it is crucial to know the rodent species' and their key behavioural and biological characteristics for targeted management. Additionally, we do damage assessment and impact monitoring to compare the effectiveness of the measures applied. Lastly, in-depth interviews with client and stakeholder are conducted to fully understand the needs. With this set of methods, we fully map the scale and nature of the rodent problem as the foundation for optimal management. We provide each of the methods explained in this sheet and fine-tune the set of methods based on your needs.

1. Identification and understanding of rodent populations

In setting up the field for the inspection of rodents, one may choose among the following three methods:

Grid method, where the area in question is divided into equal squares on a map, is preferred when the objective of the inspection (study) is to undertake a general survey of the rodents (e.g., species, abundance, damage) in an area.

In a **Transect method**, lines are drawn across representative habitats of area under investigation and traps and/or cameras would be placed at pre-determined intervals along the lines.

Point method is used for monitoring behaviour of rodents at specific points (e.g., responses to differing vegetation, specific landscape parameters, rodenticide bait, or monitoring rodents in shelter, feeding spot, trails, holes, burrows, and other places of activity or gathering points).

1. DIRECT AND INDIRECT RODENT ASSESSMENT APPROACHES:

1.1 Direct inspection methods

a. Capture-Mark-Recapture (CMR) method

To establish solid knowledge of locally occurring rodent species, population dynamics, reproduction, and some behaviour activities, the CMR method is the gold standard method out there. CMR follows the grid method, and it provides the most reliable data on these population parameters in spatial and temporal scales.

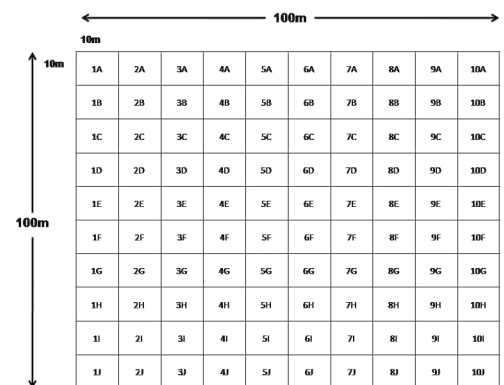


Illustration of a CMR grid layout for 1 ha (100 traps) setup

b. Pitfall traps

Pitfall trapping is widely used to examine species occurrence during surveys and inspection, assess spatial distribution patterns, compare relative abundance in different micro-habitats, study daily activity rhythms, and seasonal occurrences. It follows the transect method.



A bucket pitfall trapping line for rodent assessment

DIRECT AND INDIRECT RODENT ASSESSMENT APPROACHES:

1.2 Indirect rodent assessment methods

a. Camera trapping

Camera traps are effective non-invasive sensory methods used for rodent assessment for collecting vital data on taxonomy, biology, behaviour, and ecology. These motion-detection cameras will detect rodents as they move and capture the animals in video/picture with infrared vision for night activity.



Infrared motion detector camera trap set in wheat field

b. Tracking tiles

Rodent tracking tiles made of ash/ink/powder spread on acetate sheets (transparency films) or inked or vinyl floor tiles (~ 23 × 23 cm) would be set on the floor inside houses, warehouses, storage areas, near rodent racks, burrows, etc. In addition to parameters on species assemblage, a tracking tile could provide insight into temporal and spatial distributions. In combination with camera traps, it can increase species' detectability and data accuracy.

c. Rhodamine dye

Rodent mobility (movement pattern) could be assessed using rhodamine B marked baits. Rhodamine is a fluorochrome metabolized by mammals and accumulates in hairs within a couple of weeks. It could be used to evaluate risk of dispersion of rodent-associated diseases, areas of higher risk in the study area, and areas of quick control action. Rhodamine B could last for 60 days in rat vibrissae and 180 days in rat hairs with no reported side effect on test animals.



Examples of locally made rodent tracking tiles

2. Habitat mapping

An essential feature in rodent management is reducing habitat options for pest species, we therefore do map of rodent suitable habitats and vegetation using satellite generated data and remote sensing tools, including drone based high resolution imageries. Examples of indicators include density of stone bunds in crop fields and biomass index.

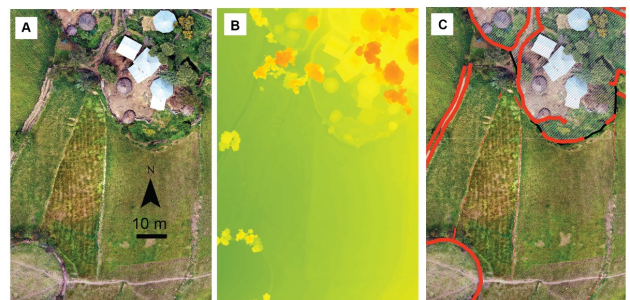


Illustration of identification of field stone bunds (rodent harbourage) in a high resolution (4 cm) orthophotograph. (A) Boundaries between a village and the surrounding arable fields including stone bunds. (B) Digital Elevation Model (DEM) with a spatial resolution of 3 cm and altitude of objects. (C) Stone bund (red lines) digitized in and outside the village



3. Damage assessment

To understand the magnitude of rodent inflicted damages to field crops (including large-scale plantations), we use multiple approaches, including the tiller-count method and active burrow count.



Inspection of rodent seedling damages

a. Tiller-count method

The tiller-count method aims to quantify the proportion of crop damaged by rodents and the extent of economic loss. It uses the grid method to lay-out quadrants in the field, after which for each quadrant the cut and uncut stems are counted, so as to record type and extent of damages. In crops such as wheat, barley and rice, this method is repeated at least 3 times over a growing season to cover the different growth stages of the crop.



Rodent damaged wheat tillers. Note the characteristic oblique tiller cut of rodents

b. Active burrow count

Counts of active burrow entrances have been positively correlated with most recent densities of burrowing rodents and used as a proxy to density assessment where CMR technique would be cost ineffective and/or challenging. To increase data accuracy on population density, burrow count method should be supplemented by other density estimation method/s. If censused across different habitat types, burrow count method can also provide useful data on species habitat use.



Rodent active burrows (top) and crop damage (bottom)

c. Desk review

Furthermore, we analyse secondary sources and do cross-referencing of published and local statistics on infestations, outbreaks, and historical population dynamics

d. Citizen-science

In addition, interviews with clients, stakeholders and citizens are deployed to gain in-depth understanding of Knowledge, Attitude and Perception (KAP) regarding rodents, creating ample space for the expression of personal and professional values and perspectives.