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Insect Repellents

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rodents so successful in the
urban environment?*

Insect Repellents

Some insects and arthropods bite or sting us actively for taking our blood as their nutrients. Mosquitoes, fleas and ticks can be annoying and sometimes pose a serious risk to public health by transmitting arthropod-borne diseases. Mosquitoes are considered to be the most important vector for arthropod-borne diseases. They can transmit diseases such as dengue fever, Japanese encephalitis and malaria. Fleas can inflict a painful bite and may transmit a variety of diseases including plague and urban typhus. Infected ticks can transmit serious diseases including Lyme disease, Q fever and spotted fever.

Using insect repellent is one of the measures to help reduce bites of insects and arthropods as well as the chance of contracting the diseases transmitted by them. There are many different kinds of repellents on the market, such as DEET, lemon eucalyptus oil, soybean oil, etc. In general, higher concentrations of active ingredient provide longer duration of protection, regardless of the active ingredient. If you are planning to stay outdoors for a short time or for situations where exposure to arthropods is minimal, a lower concentration product will be adequate. A product with higher concentration is to be used for longer protection if you will be out all day or enjoy outdoor activities in areas with large populations of biting insects or arthropods. Applying a thin and even coating is adequate as more repellent does not make it work better. The instructions and precautions on the product label should always be read and followed when using repellents, especially regarding the use for children.



Aedes albopictus, vector of dengue fever



Rhipicephalus sanguineus (brown dog tick), vector of Q fever and spotted fever

DEET

DEET is acknowledged as the most effective repellent. It protects against broad spectrum of insects and arthropods including mosquitoes, ticks, biting flies, fleas, and chiggers. Products with 5-35% DEET provide adequate protection under most conditions.

Lemon Eucalyptus Oil

Lemon Eucalyptus Oil can be considered as a second-line alternative when use of DEET is not possible, e.g. persons allergic to DEET. It is an extract from the leaves and twigs of *Eucalyptus citriodora*. It is applied to skin or clothing to repel specific insects such as mosquitoes and biting flies.

Soybean Oil

Soybean oil is made from soybeans. It is considered as a third-line repellent. It has low toxicity, no age-associated used restrictions and is non-irritating. It is effective against mosquitoes and black flies.

Insect repellent is not 100% safe and is only a part of preventive measure against insect and arthropod bites. We should also consider non-chemical ways to reduce the risk of arthropod attack:

- Use screens and/or netting
- Wear light-coloured long-sleeved clothes and long trousers when going outdoors.
- Avoid contact with overgrown grass and scrub.
- Look for biting arthropods stay on the body before returning indoors.

Why are the commensal rodents so successful in the urban environment?

Introduction

The sewer rat (*Rattus norvegicus*), the roof rat (*Rattus rattus*) and the house mouse (*Mus musculus*) are the three commonly found commensal rodents in Hong Kong. These rodents are so excellent in exploiting the urban opportunity that they co-exist with us in many places we live, eat, or work in. To be effective in rodent control, we must understand why these rodents are so successful in the urban environment.

Omnivorous and Opportunistic Feeder

Rodents feed on a wide variety of food found around human dwellings. They consume most people and pet foods (Fig. 1). Although the sewer rat prefers sweet and oily food, roof rat prefers cereals and fruits, and house mouse prefers seed, they consume various kinds of insects such as cockroaches and beetles. In vegetated areas, rodents also feed on various kinds of seed, vegetation and invertebrates such as slugs and snails. When one kind of food disappears, they will readily switch to whatever is available.

High adaptability in nesting

Rodents are capable of inhabiting many different kinds of environments especially those warm, well-concealed, and close to food and water sources (Fig. 2). The house mouse can nest in structural nooks and crannies inside buildings, as well as within congested areas such as storage areas with stationary items and objects. The roof rat usually nests in structural voids, above false ceilings and thick bush cavities. The sewer rat digs and constructs its nest near the areas that offer some protection, such as dense vegetation and alongside building foundations. It can also nest in wall voids, ground voids and equipment voids. Obviously, the urban environment provides plenty of nesting opportunities to rodents.

High reproductive potential

A female rodent can produce between 5-8 litters per year, and each litter can number between 5-14 pups. In general, a female rodent is able to produce 25-112 offspring in a year, although variations in food supply and competition amongst neighbours as well as diseases can all reduce the reproduction potential. Whenever conditions are favourable, rodents have an impressive ability to produce a large number of offspring in a relatively short time.

Secretive and Neophobic Behaviours

Rodents always move quickly and quietly. They are most active when the activity of people is low. Owing to this secretive behaviour and their small body size, rodents often go undetected until becoming numerous. The neophobic behaviour (fear of new things) makes rodents



Fig.1 Food preparation and improper disposal of food remnants in the rear lane provide food and water for rodents.



Fig.2 Accumulation of articles in the rear lane provides shelter for rodents.

avoid strange objects, new baits, and even a new hole (e.g. a bait station), which suddenly appear in the rodent's runway. Thus, it is sometimes very difficult to detect and control rodent infestation. However, their neophobic behaviour is balanced by their exploratory behaviour. Rodents carefully explore the areas around and actively expand their territories. Therefore, the rodent infested area could expand rapidly if rodent activities have not been controlled.

Conclusion

The above paragraphs covered only the major survival strategies that allow commensal rodents to thrive in the urban environment. As the rodents can reproduce and infest rapidly, they must be controlled even if the infestation is minor. Some people may look for "super" rodent traps or poisons in rodent control. In fact, the most effective way is to deprive rodents of food source and shelters by improving the sanitation.