



EXPERT COMMITTEE ON VECTOR CONTROL IN URBAN AREAS

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PEST CONTROL IN URBAN AREAS

by

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1. INTRODUCTION

Pest control in urban areas can be successful and cost-effective only when applied properly. The organization of the control is of particular importance if the fact is taken into consideration that a large number of arthropod species infest the urban areas and only some are vectors or reservoirs of diseases or a nuisance to people in their homes or offices. The control should be based on a good knowledge of the biological and ecological peculiarities of each pest species and their typical habitats during the different stages of their development, the methods and means, etc. Success will depend to a large degree on the availability of well organised, highly trained and equipped specialized groups to carry out the pest control activities. The second important point is the susceptibility status of pests to the different chemical compounds or the biological control agents. The objective should not only be the reduction in pest populations, but also the protection of the environment and prevention of toxic exposure of people and animals. All this is related to the economical side of the problem and diseases may increase if finances are not enough to carry out proper vector control. It is clear that various factors are closely related and that in order to solve the problems it is necessary to carry out control measures based on proper investigations and ensure intersector and intrasector collaboration(1,2).

Integrated pest control strategy is most suitable and effective in urban areas. Two types of approaches could be considered viz.

- (a) Preventive measures.
- (b) Destructive (extermination) measures.

2. PREVENTIVE MEASURES FOR PEST CONTROL IN URBAN AREAS

In order to obtain long-term pest control in urban areas it is absolutely necessary to improve environmental sanitation and thus reduce the number of breeding places and habitats of pests. This environmental management usually requires a large amount of capital and its results are often manifested after years of work. Especially good results are achieved by elimination of the breeding places of arthropods such as mosquitos, ticks, etc., which in turn would lead to the reduction of disease transmission. In such cases active control measures are not necessary, and the ecosystems and environment are not adversely affected. A better economical efficiency is attained in this way too.

2.1 Environmental Management

In urban areas environmental management and manipulation can often be applied. They are suitable for the town surroundings where there are natural or artificial mosquito habitats, the network of sewage does not exist, there are a lot of non-canalized latrines which are a source of flies, etc.

Provision of water-supply and drainage are among the most important measures to prevent the formation of breeding places of the mosquitos and particularly of Culex quinquefasciatus, as well as of flies. The environmental management measures for mosquito control are expounded in detail by WHO(3,4).

## 2.2 Sanitary Measures

These measures should precede each disinsection or deratization treatment. In many cases their timely and proper implementation can lead to a reduction in the density of pests, as a result of which other measures become unnecessary. The sanitary measures recommended for pest control are well-known, and yet they are not always carried out. We would like to point out and concentrate on only some of them.

(a) Cleaning of canals, water-filled basements, industrial establishments, sewage and waste-water collections, pits, etc. where mosquitos and some species of flies may breed.

(b) Proper collection (in closed trucks) and regular final disposal of the food-waste in restaurants, children's and health institutions, households, etc. These should be collected in tightly closed, undamaged trucks, impenetratable for rodents, flies and cockroaches. Where there is no tap water, the water should also be collected in cisterns where pests cannot penetrate.

(c) Foodstuffs should be kept well packed or covered, unreachable for rodents, flies and cockroaches.

(d) Keeping houses and social places in good order and hygiene by regular cleaning of the floors (against fleas and mites), regular change of linen and washing of sheets and blankets (against lice, fleas, bed bugs, mites, etc.), as well as guarding against scattered wastes and rubbish (where rodents make nests and cockroaches breed)(5,6,7,8,9,10,11,12).

(e) Cementing and plastering of all cracks, holes and chinks near drainage, water-supply or heat-pipes, electricity installations, on floors, walls, doors or ceilings. In this way the spreading out of cockroaches and rodents is cut off.

(f) Destruction and filling of the rodent burrows, and carrying out deratization and control of ectoparasites.

(g) Strict observation of the rules of personal hygiene (against fleas, scabies, lice, Demodex, etc.).

A number of other hygiene measures can be mentioned which can contribute to the reduction of the pests in urban areas. The main purpose of all such action is to prevent the formation of breeding places for the pests and to deprive them of food and shelter. That is why it is important to protect buildings against the presence of rodents, etc.

The use of different types of netting against the penetration of insects (house-fly, mosquito, sand-fly, etc.) into premises (bedrooms, kitchens, etc.) reduces man-insect contact.

## 2.3 Repellents

Repellents are very effective for the protection against biting insects and ticks. Most widely applied are dimethylphthalate, permethrin, etc. Repellents are lately used successfully to prevent the infestation of new places by cockroaches or their penetration into wrappings and packings(7). Efforts are being made to find food repellents against rodents that damage the cooling and electricity installations, materials for packing, etc. However, the short effect of repellents is a disadvantage which has not been overcome to date.

## 3. PHYSICAL METHODS FOR PEST CONTROL IN URBAN AREAS

The concentration of too many people in a small area in the big towns has a negative impact on the pest control activities. In overpopulated suburbs in particular, the presence

of many children and animals necessitates extreme care when applying pesticides in order to prevent any poisoning. That is why we should not belittle the application of physical methods of control.

### 3.1 Traps

The use of traps for the capturing and killing of rodents is the most widely and preferably applied method. Various types of traps are available which have proved quite effective in different countries. They are recommended where the use of rodenticides is forbidden (kindergartens, restaurants, food establishments, etc.), and where poisoned animals dying could cause unpleasant odours. Their efficiency depends to a great extent on the attraction of the baits used in them(6).

Insect traps are used less for mosquitos, fleas, flies, etc.

### 3.2 Sticky Traps

Recently some progress has been made in the discovery of certain sticky substances which are harmless to people and at the same time help in reducing the number of rodents, cockroaches, flies, etc. They are much more effective in attracting pests and that is why some attractants or pheromones could be added to them.

### 3.3 Low Voltage Electricity

It is used for fly and rodent control in big enterprises for processing and stocking of foodstuffs, where toxic agents cannot be applied.

## 4. BIOLOGICAL METHOD OF PEST CONTROL

This topic is dealt with in a separate working paper.

## 5. CHEMICAL METHOD OF PEST CONTROL

In spite of the increase of pests' resistance to pesticides, chemical control will continue to remain a basic method in urban areas.

The chemical compounds for pest control show much better efficiency when their application is preceded by hygiene and environmental manipulation. In practice, however, this is done in the opposite order; in many cases immediately after residual spraying against cockroaches in buildings, the people carefully wash up the treated surfaces, which destroys the very effect of the treatment.

Another important prerequisite for the success of the control carried out with chemicals is the proper choice of time for treatment, according to the biological and ecological peculiarities of the species. The control will be more effective if started at the time when the population begins to grow, rather than if this moment is missed and the control is started when the population is at its maximum. In such cases we would achieve less reduction of the number of individuals, though the efforts and expenses put into the control would be much more. Against mosquitos larviciding is better recommended than adulticiding, while with fly control it is just the opposite. It is important however that we bear in mind what stage of development the population is in, for every species, during the time of control. For example, if most of the insects in a biotope are IV instar larvae or pupae, larviciding will not give the desired results and adulticiding will have to be planned as well.

The proper choice of methods for disinsection and deratization affects cost-effectiveness. For instance, in some urban districts a heavy problem recently has been the fleas which can be found in stray cats and dogs. The animals enter basements or ground floors of buildings and become strongly infested with fleas. Our experience shows that a combination of cleaning, netting and preventing entry of animals into these places and a complete treatment with residual insecticides can solve the problem. If one of these measures is not fulfilled, then numerous treatments will be necessary to control new infestations.

Cockroach control requires preliminary knowledge about the population densities in all the buildings and on all floors. The treatments should be started from the less populated to the more populated places in order to reduce migration. In public institutions the canteens should be treated last because they are the source places. Sources of new infestations such as wrappings or the sewage network should be detected and eliminated. After spraying with insecticides, some poisonous baits should be placed.

With rodents it should be known which species are subject to deratization and which are the most suitable methods and means according to the nature of the sites. In urban areas special attention should be paid to the sewage network.

Last but not least is the problem of the formulations of the chemicals. The same agent, in different forms, shows different efficiency or lasting effect. If proper application instructions are provided, we may seek the community's assistance with pest control in urban areas. For example the community may help in preparation of various chemical compounds as sprays, baits etc. Appropriate application equipment needs to be used(13).

### 5.1 Larvicide Treatments

Larvicide treatments are carried out against mosquitos and flies. They are necessary only in cases when preventive measures are not accomplished properly and insect breeding habitats persist.

A necessary prerequisite is the constant search for places populated by larvae, their densities and the species composition so that the methods for control can be determined. A wide range of larvicides are available(14).

In urban areas insecticides with the lowest toxicity (fenitrothion, jodfenphos, temephos, malathion, etc.) which are not dangerous for the non-target fauna should be used. A new trend is the combination of chemical and biological insecticides, as well as the use of monomolecular films which cover the surface of the water(15).

Experience shows that with systematic weekly observations of the habitats and appropriate larvicide treatments against I and II instar larvae, mosquito densities can be kept at minimal levels with least effort and expense.

Larvicide treatment against flies in urban areas is considerably restricted in scope than those in rural areas because of the lack of large biotopes. Special attention should be paid to suburbs especially where there is no proper sewage network and the garbage is not being regularly and properly collected. Garbage containers are a source of flies and should be treated regularly with larvicides. Best results are achieved if treatment is made when the garbage is being removed because larvae are to be found at the bottom of containers. Garbage should be covered with soil and then sprayed with insecticides against newly-hatched flies.

The new agents modelled on the basis of development inhibitors as dimilin and neporex are quite promising larvicides for the control of house-flies and the other synanthropic species.

### 5.2 Space Spray

For reducing the number of flying insects space treatment has been widely applied recently. The aerosol is used the most - hot and cold, ULV, etc. - because it has a good initial effect and reduces the number of insects. The most often used is Dichlorvos(15). Space sprays should be used according to local situations as well as weather conditions (wind speed, vertical draughts).

In sewage networks smoking with insecticides is applied against cockroaches and fumigation is carried out for control of rodents and their ectoparasites(6,7,10,15,16).

In epidemic conditions, when the aim is a quick reduction of the number of vectors, including mites, space spray is the best method. Very suitable insecticides are pyrethroids, jodfenphos, malathion, etc.

Ground treatments are better recommended than airplane or helicopter treatments because of lower adverse effect on non-target organisms, and also as they are more cost-effective.

### 5.3 Residual Sprayings

This method of control is still one of the basic ones for the control of a number of pests, e.g. flies, cockroaches, fleas, bedbugs, etc.

The main point is searching out the places where pests hide or inhabit, and then select ways and means of treatment. Most of the carbamates and organophosphorous insecticides have residual action lasting up to several weeks. The choice of an insecticide is determined not only on its toxicity but also on the odour. People may refuse certain insecticides such as malathion, pyrimiphos-methyl and others because of the unpleasant odour. They are also not appropriate for public places where a lot of people gather - hotels, restaurants, schools, hospitals, etc.

The residual effectiveness should be checked after each treatment, so that it can be reapplied to prevent emergence of new generations.

The addition of sugar or milk to insecticide solutions ensures a longer action of the agent in fly control, treating only those spots where they most often rest. Viscose paint-on baits composed of insecticides could be applied with a brush.

### 5.4 Baits

A basic method for rodent control still remains the use of rodenticides or anticoagulants in the form of baits(6,17).

Poisonous baits are very successful also in cockroach control.

The effectiveness of this method of control depends to a great extent on the attractiveness of the baits themselves, so that pests take the necessary dosage of poison. That is why it should be decided for each separate case which of the available foodstuffs are most attractive for rodents, cockroaches and flies.

More methods for the reduction of the number of pests in urban areas can be mentioned. Research work in this respect is being carried out by a great number of specialists in almost all advanced and developing countries.

In conclusion, we may note that the future strategy of pest control should be determined on the basis of complex studies for a more effective application of the integrated control, bearing in mind cost-effectiveness, use of less toxic and harmless biological and chemical methods, raising of the level of requirements for preventive measures, environmental protection, etc.

Properly selected methods and means of pest control, when combined with good organization, research and health-education, will contribute to the maintenance of a low number of pests at lower costs in urban areas.

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