

An Investigation on The Operational Usage of Local Formulated Insecticides in Controlling the populations of Cockroach Species, *Periplaneta americana* and *Blattellagermanica* in The different Localities of Quetta City of Balochistan, Pakistan

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Abstract – Cockroaches are well known insects of order Blattidae. The climate of Quetta was favorable for the metamorphosis of cockroaches. Two most common species of Quetta city were *Blattellagermanica* and *Periplaneta americana*. Cockroaches act as economic pest and their control was challenge for entomologists. In the present investigation, the effectiveness of locally formulated insecticides was investigated against the two cockroach species i.e., *Periplaneta americana* and *Blattellagermanica* collected from different localities of Quetta city during the year 2012. The contact jar method was implied. Sixinsecticides were selected in this study including Baygon, Nature guard, and Mortein Power guard, Furadane, Chloropyrifos and Organochlorine, respectively. From the results of the present study, it was concluded that among the other selected insecticides, Baygon was found to be more effective with 100 % efficacy, because it knock down all the *Periplaneta americana* and *Blattellagermanica* at direct contact, while Mortein was found to be next to baygon, whereas the Nature guard and Organochlorine provide almost the similar results and provide 80% efficacy within the contact of 15 minutes, however, Chloropyrifos and Furadan gave 80 % mortality rate after 1 hour contact. Therefore, in our present study, Baygon was proved to be more operational than any other selected insecticides, thence, its usage should be more acclaimed to control the populations of two cockroach species i.e., *Blattellagermanica* and *Periplaneta americana* abundantly found in Quetta city of Balochistan.

Keywords – Quetta, Cockroaches, *Blattellagermanica*, *Periplaneta americana*, Metamorphosis.

1. Introduction

Quetta is the capital of province Balochistan (Pakistan). It's a valley surrounded by mountains and is present in the center of Balochistan. Insects first emerged on earth before 400 million years during late Silurian period [1]. Cockroaches can live easily in kitchens, latrines, buildings, drainage, and store rooms in gardens. Cockroaches usually live in groups [2]. They feed on human feces as well as human food sources so they are prominent vectors of disease spreading [3]. They are the carrier of bacteria, viruses and protozoan [4]. Foraging make cockroaches' transporter of the pathogen [5]. They contaminate food with their secretions [6]. German cockroaches are mostly present in the gardens while American can be observed in the kitchens, latrines, and store rooms[7]. Cockroaches are classified on their basis of their hallmark features that is they are somewhat dorsoventrally flattened, head is concealed below the pronotum, cerci is prominent and mouthparts are chewing type with antennae that is well defined [8].The American

Cockroach *Periplaneta Americana* [9] is larger cockroach while the German cockroach, *Blattellagermanica* [10] (Blattellidae), is smaller. Cockroach comes under the most important economical insects' pests which include fire ants, termites and cockroaches also [11]. They discharge secretions from their mouth and glands which produce a smell that can be felt in the area visited by them and eject unpleasant odor which spoil our food and environment. German cockroach due to its small size, food habits and specific actions is considered as worldwide pest [12]. Cockroaches are harmful as well as they are also important as a tools for balancing environment. Cockroaches are responsible for breaking macrobiotic matter in to simplest form. They are also of vital significances because they transfer the microbes of soil by loading the microbes on the different body parts. American and German cockroaches can be repelled by using mint oil [13]. Citronellal, citral, gennaniol and eugenol also act as repellent for the American cockroach [14]. The German cockroach, *Blatellagermanica* is

resistant to insecticides like organophosphates, organochlorines, and carbamates and sometimes in some places show resistance to a few synthetic pyrethroid insecticides [15]. Chemical control has a temporary effect that is not long lasting and reliable [16].

2. Materials and Methods

2.1. Materials

This research work was conducted at research laboratory of Entomology, Sardar Bahadur Khan Women's University Quetta during the one year period extend from January 2012 to December 2012. In this study *Blattella germanica*, and *Periplaneta Americana* were collected from different localities of Quetta city during the year of 2012 after collection they were reared in the laboratory of SBK Women's University Quetta and then after rearing they were subjected to insecticides that were of different types to observe the efficacy of insecticides.

2.2. Chemicals

Nature guard (Ready to use)

Chemical Composition:

Esbiothrin (d-trans Allethrin) 75:25, Permethrin, Orange oil (d-limonene)

Baygon (Ready to use)

Chemical Composition:

Tetramethrin 0.3 % , Cypermethrin 0.15 % , D-Allethrin 0.10%

Mortine all insect killer powerguard (Ready to use)

Chemical Composition:

Imiprothrin 0.02 % , Permethrin 0.03%, d-trans Allethrin (Esbiothrin) 0.10 % , Furdane, Chloropyrifos, Organochlorine. Diluted for 12 hours on magnetic stirrer before use. (Chloropyrifos is a poisonous crystalline organophosphate insecticide (group of chemicals which are commonly used as insecticides) which was used to control pests such as cockroaches, beetles, grubs, fire ants.). The chemical structure of organochlorines was diverse but every of above compound contain chlorine, which places them in a bigger group of compounds called chlorinated hydrocarbons (chlorine containing hydrocarbons).

2.3. Cockroaches' collection

Cockroaches were collected from houses, hospitals, kitchens and different localities of the Quetta city. Collection was made by hand picking and trapping. Two most common species of the Quetta city, German cockroaches and American cockroaches were collected for the present studies.

2.4. Rearing

Roaches are one of the popular insect used for experimental purposes. They can be easily grown in all seasons. They reproduce quickly in such a way that large number of nymph hatch in small time [17]. There was no specific rearing method for cockroaches. Many techniques were used for rearing of insects by the entomologist. The room

used for rearing of cockroaches must have the controlled temperature of 28 C with humidity 5-62% [18]. German cockroaches were reared in (22 x 27cm) jars. Wet cotton stripes were used in the jars in order to provide moist drinking surface. They were fed with fleshy fruits, bread, cakes, and soybean [19]. After every 10 days jars were cleaned and insects were shifted to the other jar. Females carrying eggs were separated and transferred to the different jar [20].

2.5. Glass jars method

Tests were conducted on adult cockroaches (German and American cockroaches). WHO standard method was used for evaluation [21]. Inside surface of glass jars was coated by the thin layer of butter in order to stop escape of cockroaches during test performance. Concentration of insecticides was prepared according to their labels. Those which need to be prepared were diluted in 100 ml of water on the magnetic stirrer. Insecticides were diluted for 12 hours on magnetic stirrer in order to achieve better results. After Dilution of insecticide, we pipette out 1ml of insecticide with the help of pipette and distributed it evenly on the glass surface. After adding insecticide glass was rolled on flat surface in order to achieve uniform distribution of insecticide in glass jar. We kept rolling until all the liquid insecticide evaporated. It took few minutes. Those insecticides having label ready to use were directly applied. One control group of insects and three replicate groups of insects were made for each species of cockroach [16]. To evaluate the resistance of insecticide 10 adult cockroaches were introduced in each jar among which one was for control purpose and three were for observations. Cockroaches were shifted in the jars by hand catching method. In this way all the six insecticides were tested. Readings were taken after the interval of fifteen minutes.

3. Results and Discussion

Different species of cockroaches were collected from all over the Quetta city. A total number of 120 cockroaches were collected and rare among which 60 were German cockroaches and 60 were American cockroaches (adults). The species of cockroaches were identified by the help of identification keys. After rearing different locally formulated insecticides were applied on the cockroaches by using glass jar method that was described by WHO (World Health Organization). The insecticides that were used were Nature guard, Baygon, Mortein, All insect killer power guard, Furdan, Chloropyrifos and Organochlorine. (Whose compositions are mentioned in materials and methods). Two groups were made during conduction of practical, one was experimental group and other was control group. Among 4 used jars one was for control purpose and three were for experimental purpose. Six treatments were given by using above mentioned 6 insecticides for each specie [14]. Readings were taken after the observation of 15 minutes.

Table 1: Effect Of insecticides on American cockroaches

S.No	Insecticide name	Direct contact	After 15 minutes	After 30minue	After 45minutes	After 1 hour
1	Nature guard	No direct	20% alive 80% dead	20% alive	20% alive	100% dead
2	Baygon	Direct death	100% dead	100% dead	100% dead	100% dead
3	Mortein All Insect killer (Power guard)	No direct	100% dead	100% dead	100% dead	100% dead
4	Furadan	No direct	80% alive 20% dead	80% alive 20% dead	80% alive 20% dead	80%.alive 20% dead
5	Chloropyrifos	No direct	40% dead 60% alive	60% dead 40% alive	80%.dead 20% alive	80% dead 20% alive
6	Organochlorine	No direct	20% dead 80% alive	60% dead 40% alive	80%dead 20%.alive	80% dead 20% alive

Table 2: Effect of insecticides on German cockroaches.

S.No	Insecticide name	Direct contact	After 1 hour
1	Nature guard	10__5, 50%	No dead
		10__7,70%	No dead
		10__5,50%	No dead
2	Baygon	10__all dead 100%	No alive
		10__all dead 100%	No alive
		10__all dead 100%	No alive
3	Mortein All Insect killer	10__all dead 100%	No alive
	Power guard	10__all dead 100%	No alive
4	Furadan	10__all dead 100%	No alive
		10__all dead 100%	No alive
		10__all dead 100%	No alive
5	Chloropyrifos	10__all dead 100%	No alive
		10__all dead 100%	No alive
		10__all dead 100%	No alive
6	Organochlorine	10__all dead 100%	No alive
		10__all dead 100%	No alive
		10__all dead 100 %	No alive

In the present research six insecticides were used, i.e., Baygon, Chloropyrifos, Furadan, Organochlorine, Nature guard and Mortein all insect power guards. From the present study it was concluded that Baygon was the most effective insecticide among all six insecticides which were used with 100 % mortality rate at direct contact, while Mortein power guard provide 85 % mortality. On the other

hand mortality rate of Nature guard, Organochlorine, Chloropyrifos, and Furadane was about 80 %. According to [22] 77.95%- 59.74% reduction was achieved in one week treatment by the use of synthetic pyrethroid (0.13 % allethrin + 0.02 % deltamethrin). While an insecticide used in present study contains d-trans allethrin in them (mortein all insect killer power guard, Nature guar) provides 85%, 80 % mortality respectively [23] in Southern Iran

conducted research on German cockroaches. According to his results highest mortality rates were given deltamethrin, lambda-cyhalothrin, and cypermethrin. On the other hand present research concluded that insecticides containing cypermethrin (Baygon) provides best results of 100 % mortality. Chlorpyrifos resistance was suggested by [24] for the option of rotational practice of this compound with pyrethroid. While present research in Quetta evaluated Chlorpyrifos with 80 % mortality.

4. Conclusion

On the basis of judgement and observations that were rendered by performing the experimental work on the effectiveness of locally formulated insecticides that were implied on the *Blattellagermanica* and *Periplaneta americana*. It is to be noted that Baygon is the most effective insecticide in knocking down of cockroaches in efficient manner; it has active ingredients that are responsible for its efficacy against cockroaches. Thus it is concluded that it could be used to control the cockroaches on large scale or in agriculture sector as well as public sector to get rid of these economic pests in better and sophisticated manner.

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