

INSECTICIDAL PAINTS FOR CONTROL OF COCKROACHES

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The efficacy of certain insecticidal paints/varnishes recently developed by the Paints Group of the Laboratory for the control of cockroaches and allied crawling insects commonly met in the Services, has been described.

There has been an increasing interest in use of insecticidal paints and lacquers in hospitals, kitchens and ships¹⁻⁶ etc. Paints and lacquers are very useful for local treatment; they can be applied easily to restricted areas, and are generally effective for a longer period than insecticides applied in other ways. However, no indigenous insecticidal paints and varnishes are available from the trade. Therefore, an attempt was made to develop the insecticidal paints and varnishes in this laboratory for use by the Services.

MATERIALS AND METHODS

Insecticidal paint/varnish—The insecticides were first dissolved in acetone and then mixed with ready made paint/varnish and stirred well so as to give required concentration. Two coats of this using a 1" brush were applied on mild steel panels.

Test panels—Mild steel panels (30.5 cm × 30.5 cm) were used. The painted panels were allowed to dry till they left clean and smooth surface. Control panels were painted with paint/varnish containing no insecticide. All the paints used were white. Throughout the investigation, the panels were stored in the conditioned room having temperature $26 \pm 1^\circ\text{C}$ and 72 ± 3 percent RH. They were kept upright except during a test when they were kept flat on the table. As and when panels became dirty after exposures, due to voiding of excreta and urine etc. by the insect, they were cleaned under tap with a pad of cotton wool.

Test insects—Adult cockroaches, *Periplaneta americana* Linn. collected from gutters in the field and of uniform size were used in the experiment. The adults after collection from the field in glass bottles were confined in an iron mesh cage and washed well under tap before use. During confinement they were either maintained on dog biscuits or wheat flour containing small amounts of yeast and a pad of cotton wool soaked in water. Only healthy and active insects were used.

Insecticides—The insecticides used in these investigations were Tech. DDT, Lindane and Tech. Malathion. These were obtained from the trade.

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TABLE I

RESIDUAL ACTIVITY OF INSECTICIDAL PAINTS/VARNISHES AGAINST ADULT COCKROACHES, *Periplaneta americana* LINN.

Formulation	Period of exposure in hours	Per cent mortality in successive exposures. (The figures within brackets indicate the number of days after treatment of panels)																
Paint + 10% DDT (tech)	24	10	13	10	13	10	13	10	13	10	3							
		(4)	(12)	(27)	(54)	(88)	(134)	(180)	(226)	(274)	(286)							
Paint + 15% DDT (tech)	24	27	40	30	10	10	10	10	10	10	10							
		(4)	(27)	(54)	(68)	(68)	(68)	(68)	(68)	(68)	(68)							
Paint + 10% malathion	24	87	87	100	97	100	93	93	77	47	43	60	50	50	97	87		
		(21)	(31)	(38)	(44)	(50)	(59)	(95)	(107)	(121)	(134)	(149)	(241)	(157)	(274)	(286)	(291)	
Varnish + 10% Malathion	24	53	43	47	43	47	43	50	23	27	30	13	10	10	10	14		
		(376)	(340)	(354)	(368)	(382)	(396)	(414)	(428)	(442)	(456)	(470)	(484)	(484)	(484)	(484)	(484)	
Paint + (5% DDT + 5% Lin. dane)	24	87	90	90	97	87	90	93	97	93	100	100	90	90	63	56	40	50
		(42)	(56)	(70)	(90)	(105)	(119)	(133)	(147)	(164)	(179)	(193)	(207)	(214)	(228)	(256)	(270)	(284)
Varnish + 10% Malathion	24	53	27	30	20	20	20	20	20	3	7	7	7	7	7	7	7	7
		(15)	(31)	(36)	(52)	(64)	(78)	(92)	(106)	(120)	(134)	(134)	(134)	(134)	(134)	(134)	(134)	(134)
Varnish + 10% Malathion	24	53	20	20	20	17	17	17	17	17	17	17	17	17	17	17	17	17
		(314)	(372)	(408)	(438)	(468)	(498)	(498)	(498)	(498)	(498)	(498)	(498)	(498)	(498)	(498)	(498)	(498)

Note—There was no mortality in control.

E X P E R I M E N T A L

The insects were exposed on treated panels by confining them under a glass funnel (15 cm dia). Ten insects were used in each assay. No anaesthetic was used for narcotising the insects. The insects to be exposed were loosely gripped singly in the palm. A rectangular card board piece with a U-shaped cut (the open end of U being towards the margin of the card board) was placed over the panel and under the glass funnel in such a way that its open end remained slightly deeper in the rim of the funnel and the rest projected slightly away from the margin of the panel forming a small groove. Individual insects were pushed through this aperture. It did not cause any injury or abnormality in the insects. There were three replicates in each assay. The exposure period was 24 hours. At the end of the exposure period the insects were removed and confined over a glass plate under a funnel and provided with small amount of food and water.

After exposure, if the insects were severely affected and were knockdown over the panel, they were picked up with a force p, and transferred over a rectangular clean glass plate (30.5 cm×30.5 cm) and confined under the funnel till final observations. If they were still sufficiently active and were likely to escape out of funnel being lifted, they were transferred by bringing the glass plate in the same level as the exposed panel and slowly and gently shifting the funnel over to the glass plate as if it were a question of shifting the position of area of confinement of cockroaches under the funnel. The mortality counts were made at the end of 24 hours. This bioassay was also carried out in the same conditioned room of the laboratory where the panels were kept throughout the test period, having temperature $26\pm 1^{\circ}\text{C}$ and $72\pm 3\%$ RH.

R E S U L T S A N D D I S C U S S I O N

The results obtained in various experiments are summarised in Table I.

It will be seen that the percentage mortality effected on DDT paint/varnish surfaces is very low as compared to that on other insecticidal paints. The malathion continued to produce more than 50 per cent mortality of cockroaches for a period of 376 days. However, the residual toxicity of malathion when incorporated in varnish was found to be considerably reduced. The paint containing 5 per cent DDT + 5 per cent lindane effected more than 50 per cent kill for a period of 314 days. Lindane alone being much volatile is short lived and therefore is not preferred. The mode of action of DDT + lindane composition is initially perhaps due to high activity of lindane vapour and which later on is compensated by the blooming of DDT and which in turn continue to effect high mortality for long.

The mammalian toxicity of malathion no doubt is the least as compared to other insecticides but in view of its being an organophosphorus insecticide and a strong inhibitor of human cholinesterase it is not considered safe to use. Whereas DDT and lindane are the lowest toxic materials.

It is therefore concluded that a paint containing both DDT and lindane is the safest and the best for use of variety of purposes.

A C K N O W L E D G E M E N T S

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