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Research note

Surfactants for a mosquito ovitrap

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In order to isolate pathogens from mosquitos for epidemiological investigations, it is most desirable to sample the gravid and once-oviposited populations. These samples include much higher proportions of pathogen-infected and infective individuals than those obtained by usual biting collections. Mosquito ovitraps incorporated with a non-repellent surfactant would enable us to trap such mosquito populations in efficiency.

For ecological investigations of mosquitos, ovitraps without any surfactant have also been used by many workers. However, it is quite troublesome to count mosquito eggs especially singly laid numerous aedine eggs in the field. Instead, counting the drowned mosquitos in ovitraps is much easier.

This experiment was intended to select an efficient, non-repellent but preferably attractive surfactant so that it could be incorporated into mosquito ovitraps with a promising attractant.

Surfactants examined for their potential use in ovitraps were chosen from a group of compounds previously screened for their antimicrobial properties. Simple lipids (Kabara *et al.*, 1972) and complex lipid esters (Conley and Kabara, 1973) as well as a member of a new surfactant family, aminimide (Kabara and Haitsma, 1975), were tested as possible candidates. The test compound at various concentrations was first dissolved in tap water, placed into a 5-cm-diam petri dish the wall of which was lined with a strip of filter paper and set in a mosquito cage with an untreated petri dish overnight and in complete darkness. The mosquitos drowned into the water irrespective of sex and the eggs singly laid on filter paper by *Aedes aegypti* and the egg-rafts laid on water surface by *Culex pipiens molestus* were counted next morning. Each test was repeated 3 to 5 times and the ratios of numbers of eggs or egg-rafts laid in the treated petri dishes against those in the untreated dishes were averaged among the replicates.

As shown in Table 1, sucrose laurate (consisted of 58.3% mono-, 34.0% di- and 7.7% trilaurates) was most effective at 100 ppm in drowning the mosquitos, 40-times more than the untreated was. None of the attracted aedine mosquitos could have oviposited in alighting on the wet filter paper but perished into the treated water as indicated in the attractancy ratio of 0. Although no evaluation was made, the direct observation on flying behavior of mosquitos suggested some attractancy of sucrose laurate. At 10 ppm the surfactant drowned 11.7-times more *A. aegypti* and 15.4-times more *C. p. molestus* than the untreated did.

A common surfactant, Triton X-100 was also effective at 100 ppm against *A. aegypti*, followed by M-20 (1, 1-dimethyl-2-hydroxymyristylamine methylacrylimide). All other compounds were effective more or less at 100 ppm. Three different monolaurate esters expressed ovipositional attractancy against *C. p. molestus* inspite of their higher or none surfactancy. Hexaglyceryl monolaurate drowned 29.3-times more *C. p. molestus* than the untreated did, yet showed the statistically significant attractancy of 3.6 times in oviposition. Triglyceryl laurate and monooleate were also attractive at 10 and 100 ppm respectively, both showing twice attractany.

In conclusion sucrose laurate was the most effective surfactant among the agents tested and would be worth incorporating in an oviptrap at 10-ppm concentration with no repellency against the ovipositing mosquitos.

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Table 1 Drowning effect and attractancy of the antimicrobial surfactants against the ovipositing mosquitos

Compounds	Conc. (ppm)	*A. agypti*		*C. p. molestus*	
		Drowning	Attractancy	Drowning	Attractancy
Glyceryl monolaurate	100	9.3[a]	0.1[a]	—	0.3
	10	5.7	0.2	2.7	0.2
	1	2.7	1	2.2	1.1
Triglyceryl monolaurate	100	6.7	1	7.5	0.5
	10	2.3	1.6	1	2[b]
	1	—	—	1	1.6
Hexaglyceryl monolaurate	50	9.6	0.6	3.6	1.9
	10	1.4	0.7	29.3	3.6[b]
	1	1.5	0.8	0.9	1.1
Decaglyceryl monolaurate	100	9.3	0.1	3.5	0.3
	10	5.9	0.5	0.9	0.9
	1	2.4	0.7	—	1
Triglyceryl oleate	100	2.8	0.2	5	2[b]
	10	1.2	0.6	2.5	1.2
	1	—	1	0.7	0.9
Sucrose laurate	100	40	0	—	0.4
	10	11.7	0.2	15.4	0.7
	1	3	1.6	1.6	0.5
Decyl alcohol	100	—	1.2	—	0.2
	10	—	1.2	0.8	0.6
	1	—	1.4	—	1.4
M-20	100	23	0	4.3	0.1
	10	8.1	0.9	3.9	0.9
	1	1.8	1	2.8	1.3
Triton X-100	100	36	0.1	2.8	1.3
	10	0.8	1.4	1.4	0.8
	1	—	0.9	—	—

[a] Ratios against the untreated control
[b] Significantly attractive at 5% level
The attractive percentages were normalized by transforming them with arcsin and *t*-tested.

References

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摘　要

蚊産卵トラップのための界面活性剤

病源感染蚊を能率的に捕集するためには，産卵誘引トラップの水面に界面活性剤を適用するとよい．その目的に，殺菌剤として有効であった脂質，エステル，アミンイミドを検討した結果，Sucrose laurate が 10 ppm の濃度で，無処理水に対して，ネッタイシマカを 11.4 倍，チカイエカを 15.4 倍溺死させた．特に 10 ppm では 40 倍のネッタイシマカを溺死させ，しかも産卵数はゼロであった．Hexaglyceryl monolaurate は 100 ppm で 29.3 倍のチカイエカを溺死させ，しかも 3.6 倍の産卵誘引性を発揮した．