Pyrethroid-impregnated curtains for Japanese encephalitis control

Vas Dev[1] has reported on the application of insecticide-impregnated bed-nets for malaria control in this journal. In tropical countries such as India and Africa, sleeping under the bed-nets is considered uncomfortable due to high temperature and humidity. Therefore, a method for interrupting man–mosquito contact by the use of pyrethroid-impregnated curtains to cover doorways, windows, eaves and other mosquito entry points of huts has been reported[2]. We have successfully demonstrated the efficacy of this approach against filaria and Japanese encephalitis (JE) vectors.

Two field trials were conducted during 1991–92 near Madurai. Hessian curtains impregnated with deltamethrin (2.5% flow, K-Othrine) @ 50 mg/m^2 covering the eaves, windows and doorways of eight one-roomed huts significantly reduced indoor resting and man-biting densities of *Culex quinquefasciatus*, vector of filaria, for 3.5 months. The cost was approximately Rs 43/hut[3]. Laboratory studies showed that polypropylene material absorbed less deltamethrin but retained it for a longer duration on the surface than hessian material. Therefore, in village-scale trials during 1994–97 in Cuddalore district, polypropylene curtains (made from used urea bags) impregnated with a reduced dosage of deltamethrin (25 mg/m^2) were used. Curtains were fixed to eaves and hung on doorways in 192 huts. Indoor light trap collections revealed that up to 5 months there was 89–100% reduction of *Cx. vishnui* subgroup, the vectors of JE. Thereafter, the percentage reduction declined and it was 62% when tested at six months. The impact of deltamethrin-impregnated curtain was perceptible in all-night biting catches also. The indoor collections indicated 100% reduction of *Cx. vishnui* subgroup while 88 to 100% reduction was seen in *Thinnai* (porch) collections[4]. Both in Madurai and Cuddalore, the village community welcomed the strategy and we found them using the curtains correctly during the unscheduled visits to the trial sites. In Cuddalore district, JE is highly seasonal, occurring during the southeast monsoon season (between September and December). Therefore, impregnated curtains give protection for the whole JE transmission season and it would be sufficient to re-impregnate once a year.

There are further advantages of using curtains over bed-nets. Impregnated curtains are less expensive than the treated bed-nets. Each hut requires about 12 m^2 of polypropylene material (8 used bags) which costs about Rs 32, whereas one nylon bed-net costs about Rs 100–150. Minimum two bed-nets are required per hut and the total quantity of deltamethrin required for impregnating two bed-nets is 20 ml, more than the quantity required for the curtains (12 ml) per hut and this adds to cost also. Bed-net protects individuals, whereas curtains provide protection to all the occupants of the hut. In the huts where curtains are used, mosquitoes are less exposed to the insecticide due to limited area covered, hence, the development of resistance to the insecticide may be delayed. A person handling impregnated bed-net daily is exposed to more insecticide (10 ml/net) than a person handling doorway curtain (1–1.5 ml/curtain). Also, user of an impregnated bed-net is likely to come in contact with the net often during sleep, thus further exposing to insecticide.

The advantages, social acceptability with long-term savings and possible better impact than indoor-spraying, make pyrethroid-impregnated curtains suitable for inclusion in the disease mosquito control programmes by the implementing agencies. The Tamil Nadu Public Health Department has agreed, in principle, to implement this strategy for control of JE in Cuddalore district with the technical assistance of Centre for Research in Medical Entomology.

1. Vas Dev, *Curr. Sci.*, 1998, **74**, 52.
2. Majori, G., Sabatinelli, G. and Coluzzi, M., *Med. Vet. Entomol.*, 1987, **1**, 185–192.
3. Poopathi, S. and Raghunatha Rao, D., *Med. Vet. Entomol.*, 1995, **9**, 169–175.
4. Annual Report of Centre for Research in Medicinal Entomology, 1995–96, pp. 17–18.

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Robot pollinators

This is in relation to the article titled 'Pollinator management – An ecofriendly green revolution eludes India' (*Curr. Sci.*, 1998, **74**, 21). I remember during the early months of 1996, my friends and I took part in an annual science day exhibition, hosted and jointly sponsored by the Tamil Nadu Agricultural University in co-operation with the local school administration. In our section (plant breeding and genetics) an exhibit under the title 'Crop breeding in 21st century' accompanied by a two-minutes recorded speech was arranged by us. The exhibit attracted a very good response and there were numerous questions asked. The theme was, 'Robots, artificial intelligence and computers in agricultural research'. We explained that under the circumstances of unavailability of effective male sterility systems and difficulties in emasculating and pollinating the self-pollinated crops to exploit heterosis, 'micro robot pollinators' of less than a bee's size could be developed and used by our future generations for hybridization research as well as hybrid seed production. Centrally remote controlled 'micro robot pollinators' will emasculate the flowers of female parents and collect pollen from the male parents and pollinate them as desired by the breeders. Everything programmed in advance.

Now, if anybody wishes to grade this kind of development in pollinator management at 100, then the 'synthetic bee pheromone' developed and utilized by Americans is to be rated at 1. On the other hand, it is unfortunate that I

have to rate the pollinator management systems available in India at −273 (i.e. absolute zero, absolute zero in absolute terms). Having understood the potentiality of 'bee hive systems' and with a fine plan to improve yields of crops through this (National Commission on Agriculture, 1976) we have somewhere failed to put the plan into action, thereby leading to a colossal loss of billions of rupees of national income over several years. There need not be a more striking illustration than this, that our system is poor in investing in important fields of science, especially in agricultural research and development and worse in implementing technologies. The first constructive step could be initiated by the scientists, learned farmers and commoners by way of 'mass memorandums' to persuade the Government to look into the implementation of the recommendations of the National Commission on Agriculture, 1976 so as to sustain, if not to boost, our future economy. Meanwhile, the corporate sector could be motivated to launch plans such as 'hire a bee hive' and so on, in the lines of 'Teakquity' and tamarind tree schemes.

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NEWS

DRDO signs MOU with Bharathiar University

Under the terms of an MOU signed on 18 April 1998, DRDO and Bharathiar University (BU), Coimbatore have agreed 'to exchange scientists and faculty members for effective interaction for mutual benefits and to formulate research areas which will benefit DRDO's programmes.'

Through this MOU, DRDO and BU will collaborate on research and development projects in the following areas: Thin film technology; Bio-sensors; Infrared detectors technology; Low radiation measurement; Plasma engineering and special coatings; Microbiology and biotechnology; Bio-medical technology; Eco-toxicology; Effluent treatment; Psychological and physiological environments of the armed forces; and in any other area in which BU has, or will have, expertise.

DRDO will provide money for the programmes to BU through its various schemes of assigning projects to academia; BU will manage these funds according to its accounting procedures and regulations. The University will provide opportunities for DRDO personnel to pursue master's and doctoral degrees and attend short-term courses on its campus.

A rather large seventeen-member joint DRDO–BU Policy Committee will oversee the implementation of this 10-year MOU which is expected to lay the foundation for long-term research and strengthen the interactions between DRDO and BU, and establish this University as a centre of excellence.

RESEARCH NEWS

Optical sensors in environmental monitoring

P. K. Choudhury

Optical fibres were first developed by and for the telecommunication science community, but, today, these are widely used in multifarious disciplines. These fibres are now specially recognized as possible devices upon which to base a new generation of sensors. Fibre optic sensors have shown a major impact on the process industries. This is because optical fibres are immune to electromagnetic interference, and, also, require very little electrical power. Optical fibres have now, indeed, found their largest and highest value in the overall sensor market. Now the scientists are exploiting the use of optical fibre sensors in the emerging market of environment assessment and control, an area where a diversity of chemical measurements are required.

It is the principle of total internal reflection which is exploited for the light-wave transmission through optical fibres, and all fibre optic sensors involve the interaction of light with the measurand; the interaction being in the infrared, near infrared, visible or the ultraviolet region of the electromagnetic spectrum. Of course, there are many kinds of principles involved in the interaction of light in chemical and gas sensing contexts, e.g. luminescence, fluorescence, scatter and back-scatter, absorption, reflection, spectrometry, colourimetry, etc. The propagating light beam through an optical fibre gets affected because of these effects; the affected parameters may be phase, intensity, wavelength, polarization, and spectral distribution. So the light now suffers from change in its properties, and it is this change that is measured by electronic equipments. This is how the fibre optic sensors work. Thus, the configuration of optical fibre sensors can be achieved in numerous different formats; however, every format will essentially be equipped