

# Use of Expanded Polystyrene Beads for Mosquito Larval Control

To find a new technology for control of immature stages of mosquitoes, the expanded polystyrene (EPS) beads were evaluated in the laboratory for mosquito control (Sharma 1994). The EPS beads are the expanded form of polystyrene granules which are produced indigenously and are available commercially as hard translucent glass-like beads with diameter ranging from 0.6 to 2.5 mm. The unexpanded beads contain an expanding agent. When exposed to super heated steam, they expand about 35 to 40 times of their original volume and are thus named as expanded polystyrene (EPS) beads. EPS beads are used to produce thermocol sheets for insulation, packaging materials, ice boxes, etc. The raw material for EPS beads is easily available. The size of expanded beads generally suitable for application in mosquito breeding habitats is of 2 to

The EPS beads are light in weight, inert, non-toxic, non-wettable and resistant (do not interact) to sea water, salt solutions, soap and wetting agents. Direct exposure to intense sunlight can turn them yellowish and brittle due to ultra-violet radiation. These are not acted upon by any micro-organisms, are non-biodegradable and remain for years on the surface of water on a single application. Being light in weight, the EPS beads when applied @ 500 g to 1 kg/m<sup>2</sup> in different habitats, float on water surface in several layers. Since mosquitoes lay eggs only on the water surface, the physical barrier formed by the floating blanket of EPS beads prevents them in doing so. Further, the immature stages of mosquito trapped under the layer of the beads die of suffocation and mosquitoes do not emerge from the treated habitats.



Application of EPS beads in unused wells

4 mm in diameter. As the volume of expanded beads is enormous (1 kg of expanded beads equals to approximately 57–60 litres of water-volume), their transportation becomes a problem. The raw material is 35 to 50 times less voluminous than the expanded beads. To overcome the difficulty of transportation of large volumes of expanded beads, NIMR has designed and fabricated a machine mounted on a truck for on-site expanding of raw granules into EPS beads.

## Field Evaluations of Expanded Polystyrene (EPS) Beads

The EPS beads were extensively evaluated at Nadiad (Gujarat), Shahjahanpur (Uttar Pradesh), Hardwar (Uttarakhand) and Chennai (Tamil Nadu) field units of the National Institute of Malaria Research for control of mosquito breeding in habitats such as wells, overhead tanks, underground tanks, sluice-valve chambers, choked manholes and tanks of biogas plants (Sharma *et al* 1985; Chandrasahas and

Sharma 1987). These studies showed that the EPS beads provide control of mosquito breeding on long-term basis.

The trials conducted at different places showed that the mosquito breeding habitats suitable for application of EPS beads are confined and stagnant permanent/semi-permanent water bodies, water collections that can not be drained off, water surfaces not subjected to wind currents (as slight breeze can drift them away exposing the water surface for mosquito oviposition), habitats not interfered by humans or animals, deep quarry pits not exposed to wind, permanent underground water collections, temporary rainwater pools, cisterns and unused wells.

The technology of EPS beads has not been used on an operational scale in the country so far. There is a good scope of using this approach in a variety of situations in urban, industrial and rural areas as part of an integrated vector management strategy



EPS beads making machine mounted on a truck

for control of mosquito vectors, breeding in a wide variety of man-made, large-size containers/habitats which are not usually amenable for cleaning regularly such as large industrial tanks, domestic cisterns, wells, septic tanks, etc. □