

APPLICATION POSSIBILITIES OF UP TO DATE, ENVIRONMENTALLY SAFE TIME RELEASE FORMULATIONS FOR MOSQUITO LARVA CONTROL

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Up to date mosquito control – acceptable also in terms of environment protection – must be aimed mainly at the larvae and not the imagoes causing damage. As mosquito larva killers, the application of insect growth regulators (IGRs), which are less toxic to the environment, as well as active ingredients with *Bacillus thuringiensis var. israeliensis* may be appropriate.

However, the application of biorational active ingredients requires higher than average professional skills as these formulations exert their effect only in a certain short period of cycle of the pests. In laboratory tests it was found that the most sensitive developmental phase of mosquitoes was the elder last instar larva. In order to reduce the frequency of treatments and to prolong treatment efficacy, special formulations have been developed and used. These formulations, however, have not been applied widely enough.

Since the IGR methoprene may show under certain circumstances some undesired side effects to aquatic fauna in permanent waters, endangering e.g. some crustaceans and chironomid midges, most experts favour the use of methoprene against floodwater mosquitoes. In such situations the heat- and UV-sensitive active ingredients require protection by the use of special slow release and highly stabilized formulations.

The Bábolna Bioenvironmental Centre has developed an improved methoprene formulation which releases the active ingredient at an appropriate rate for prolonged action, and provides protection against destructive influences (hydrolysis, UV light, etc.).

In co-operation with the Stockhausen Company we have incorporated methoprene or *Bacillus thuringiensis var. israeliensis* spores and active protein crystals into Culigel SP pellets that consist of linked polymers and co-polymers of acrylamide and/or acrylate forming a hydrophilic super-absorbent matrix. This non-toxic, mostly biodegradable substance is an ideal controllable slow-release system. In its dry form it provides excellent protection from undesirable environmental factors, but after swelling in water it forms, together with some inert dispersant, an ideal and controllable slow-release system.

In laboratory tests, superabsorbent-incorporated formulations of methoprene, BIOPREN BM GR (5%), and BIOPREN BM EC (20%) were compared for residual activity against yellow-fever mosquito (*Aedes aegypti*). The comparison was made at concentration levels of 0.01, 0.1, 1.0, and 10 ppm active ingredient. Complete inhibition was found at 0.01 ppm only with freshly made solution of both products. At 0.1 ppm complete inhibition was extended to one week in the case of both products. Efficacy of the products remained at 100% during the first four weeks at 1 ppm concentration, but Biopren BM GR reminded effective for 9 weeks while BIOPREN BM EC was effective for six weeks. When applied in a 10 ppm active ingredient concentration, BIOPREN BM 5 GR formulation was completely effective in preventing mosquitoes from hatching for a prolonged period, i.e. 8–12 weeks.

Polyacrillic and polysaccharide polymer granules containing 5% *Bacillus thuringiensis var. israeliensis* – 10.000 ITU/mg – were tested under normal laboratory conditions against L₄ state *Aedes aegypti* larvae. Application at 5 ppm gave a 100% inhibition of larval development for a period of 4 weeks, which decreased to 80% by the 10th week. The 10 ppm concentrate gave 100% effect for 6 weeks dropping to 95% by the 8th week and by week 10 it still had a 90% effect.

According to preliminary field tests currently under way, it is predicted that these formulations, having a prolonged residual activity, will considerably facilitate the wide application of these biorational pesticides in practice.