

Working Paper 6

**IRRIGATION, HEALTH AND ENVIRONMENT:
A REVIEW OF LITERATURE FROM TURKEY**

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Control Measures against Malaria and Schistosomiasis

In Turkey, control measures for malaria have long been applied as this disease has a fairly long history in the country. The main strategy has been chemical mosquito control and draining of marshes. Chlorinated hydrocarbons were used successfully as insecticides both for agricultural and health purposes between 1940 and 1960 (Kasap and Alptekin 1997). However, *Anopheles sacharovi* developed resistance against DDT in 1959 and against dieldrin in 1970 (Gokberg 1959, Zulueta 1959, Curtis 1962, Ramsdale 1975, Giglioli 1979, Ramsdale, Herath and Davidson 1980, Kasap 1989). Therefore, the sales of aldrin, dieldrin, chlordane and BHC were prohibited in 1979, and in 1980 DDT was added to the list.

The use of organochloride compounds was replaced by the application of organophosphates such as malathion, which was banned in 1984 due to the resistance developed at tolerance levels (Kasap and Alptekin 1997). During the period 1984-1990, another organophosphate insecticide (pirimiphos-methyl) was used with success and in 1991 resistance was not detected in *Anopheles sacharovi*. Currently, only endosulfan is used as a chlorinated hydrocarbon. In addition, bendiocarb from the carbamate group was also used until 1996 so that different insecticides were applied on a rotational basis (Kasap et al. 1992).

Currently, mosquito control is carried out by the municipalities in the urban areas and in rural areas by the Turkish Agency for Malaria Control. The latter normally prefers larvae control, whereas municipalities usually spray insecticides from the air. In recent years, the focus has been on the use of biological control measures, using bacteria (*Bacillus thuringiensis israelensis*), predator fish (*Gambusia affinis*), and growth hormone inhibitors such as methoprene (Altosid) and pyriproxyfen (Sumilarv). It seems that these products can be used in the future too, as their continued use does not seem to lead to the development of resistance in mosquitoes, attack only the target mosquito population, minimize environment pollution, have long periods of effectiveness, and can be applied with standard equipment (Geldiay and Deveci 1990).

As schistosomiasis occurs only sporadically in Turkey, there are practically no prescribed control measures. Researchers have recently proposed that surveys to detect infected cases should be conducted immediately. They expect the disease to spread in the GAP region after development of water structures and irrigation systems and urge the government to adopt a policy towards effective control of the disease (Özcel 1995, Özcel and Özbilgin 1995).

THE USE OF PESTICIDES IN TURKEY

Production, Registration and Prohibition of Pesticides

Pesticide production in Turkey has increased over the years. From 1960 to 1994, the number of companies licensed to produce technical pesticide compounds and formulations increased from 17 to 53 and the number of importing firms increased from 10 to 61 (EFT 1995). The number of active ingredients used in pesticide formulations increased from 105 to 281, while the amount of pesticide used per year increased from 23,425 tons to 32,363 tons as shown in table 15. As of 1994, 1378 different pesticides, mainly insecticides, herbicides and fungicides, were registered in Turkey (table 16).