Groundwater Quality in Paper Mill Effluent Irrigated Area with Special Reference to Organochlorine Residues and Heavy Metals

P. N. Rekha,1 N. K. Ambujam,2 K. K. Krishnani,1 V. Parimala,1 D. D. Vimala1

1 Central Institute of Brackishwater Aquaculture, 75, Santhome High Road, R. A. Puram, Chennai, 600 028, India
2 Center for Water Resources, Anna University, Chennai, India

Received: 8 April 2003/ Accepted: 19 October 2003

The utilization of wastewater for irrigation has increasingly gained importance in various countries of the arid and semi-arid regions, as water is becoming a scarce commodity. Due to the strict enforcement of effluent discharge, industries are opting for reuse of effluent for irrigation. Though the concept seems to be promising the real success can be attributed only if there is no toxic accumulation in the long run. The sustenance of the ground water quality in the effluent irrigated area has been a cause for concern. (Farid et al. 1993; Gallegos et al. 1999). The enhanced transport of pesticides to groundwater and accumulation of heavy metals in effluent irrigated land has also been reported (Graber et al. 1995). The environmental contamination by organochlorine pesticide residues is of great concern due to their toxicity and persistent nature. It is therefore indispensable to investigate whether inadmissible level of pesticide residues and heavy metal concentration are present in the groundwater of effluent irrigated area. If so, better management practices can be undertaken for the long-term sustainability of the effluent irrigation schemes. The present study has therefore been undertaken to assess the current status of water quality, pesticide residue levels and heavy metal concentrations in the groundwater system of effluent irrigated area of Pallipalayam, Tamil Nadu, India.

MATERIALS AND METHODS

The study area is located between 11° 18’ 00” - 11° 23’ 00”N and 77° 44’ 00” - 77° 50’ 00”E on the banks of river Cauvery at Pallipalayam in Namakkal district Tamil Nadu, India (Fig.1). The effluent irrigation program was introduced in 1980. The unique feature of this scheme is that it brought about fusion of the triangular interest viz. paper mill, sugar mill and farmers of the adjoining area. The pulp and paper unit having shifted its raw material choice from forest based hard wood to bagasse, had set up its own sugar mill - adjoining the paper unit. The sugar mill would supply bagasse to the pulp unit after extraction and the paper mill in turn encourages the farmers under its effluent irrigation scheme to grow sugarcane in 75% of the crop area thereby ensuring that its sugar unit gets adequate cane supply. Thanks to this effluent irrigation program adjoining barren land has been converted into irrigated area. Based on the acceptability of effluent irrigation program by the farming community, at present there are four lift irrigation schemes in operation and these schemes are introduced at different

Correspondence to: P. N. Rekha
Figure 1. Location map of the study area