Poll Res. 41 (2) : 582-585 (2022) Copyright © EM International ISSN 0257–8050

DOI No.: http://doi.org/10.53550/PR.2022.v41i02.027

A STUDY ON THE CONTINUOUS USAGE OF ORGANIC, INORGANIC PERSISTENT PESTICIDES IN THE AGRICULTURAL FIELDS IN AND AROUND SIRUMALAI AREA WITH A SPECIAL REFERENCE TO THE IMPACT ON GROUND WATER AND SOIL

V. SENTHILKUMAR¹, HARESH M. PANDYA², V.A.VIJAYAGEETHA³, A. PANDIYARAJAN⁴ AND V.N. JANAKARAJAN^{5*}

 ^{1,2,3} Department of Physics, Chikkanna Government Arts College, Tiruppur 641 602, Tamilnadu, India
⁴Department of Chemistry, G.T.N Arts College (Autonomous) Dindigul Tamil Nadu India
⁵Department of biochemistry, Government Erode Medical College, Perundurai, Erode 638 052, Tamilnadu, India

(Received 23 August, 2021; Accepted 7 October, 2021)

ABSTRACT

In the present study the impact of pesticide pollution due to the discharge of pesticide waste water from the agricultural field in the Sirumalai agro lands was studied. In order to evaluate the physical and chemical parameters of water, the pond water samples, and the ground water samples all the sides were collected and analyzed for various water quality parameters and soil parameters. The pond water is the main source of water for the bore wells located in and around the agricultural land. During the rainy season the pond water percolates into wells and bore wells. Now water is completely polluted due to percolation of pesticide waste waters which are potentially harmful, accumulation of various pesticides chemical residues in water reaches the ground water source. Bio – accumulation and bio-concentration of the pesticide waste water causes high degree of pollution. The bore wells in and around the northern side of the pond polluted with very high TDS and it is beyond redemption due to the higher limits of TDS, hardness, phosphate, ammonia and nitrate. All the water samples taken in and around the agriland are not chemically portable. The presence study reveals that the physico-chemical analysis of pond water in the pond as well as ground waters are above the permissible limit. The dissolved oxygen is analyzed and found to be deteriorated. It is due to utilization of dissolved oxygen in the water by organic matter and by the pesticides. The investigator observed that the solar evaporation tank made of black body tank, function more effectively during summer with very high evaporation rate. The investigator found that during the normal operation period, the colour of the effluent varies and becomes clear after treatment with alum, which favours the penetration of solar energy easily and hence the efficiency of the evaporation tank increases than the normal cement slab. The advantage of utilizing the black body natural kadappa tanks for evaporation is very strong and it can absorb very high degree of solar radiation which is converted into thermal energy. The investigator observed that the solar evaporation tank made of black body tank function more effectively during summer with very high evaporation rate. The solar evaporation tank is blessed in principle of black body surface which can absorb solar radiation more effectively than ordinary cement slab.

KEY WORDS : Pesticides, Black body radiation, Zero liquid discharge.

INTRODUCTION

Ideally a pesticide must be lethal to the targeted

pests, but not to non-target species, including man. unfortunately, this is not the case, so the controversy of use and abuse of pesticides has surfaced. The

A STUDY ON THE CONTINUOUS USAGE OF ORGANIC, INORGANIC PERSISTENT PESTICIDE 583

rampant use of these chemicals, under the adage, "if little is good, a lot more will be better" has played havoc with human and other life forms (Mathur, 1999).

Benefits of Pesticides

The primary benefits are the consequences of the pesticides' effects the direct gains expected from their use. For example the effect of killing caterpillars feeding on the crop brings the primary benefit of higher yields and better quality of cabbage. But the three main effects result in 26 primary benefits ranging from protection of recreational turf to saved human lives. The secondary benefits are the less immediate or less obvious benefits that result from the primary benefits. They may be subtle, less intuitively obvious, or of longer term. It follows that for secondary benefits it is therefore more difficult to establish cause and effect, but nevertheless they can be powerful justifications for pesticide use (Warren, 1998.)

Hazards of Pesticides

The credits of pesticides include enhanced economic potential in terms of increased production of food and fiber, and amelioration of vector-borne diseases, then their debits have resulted in serious health implications to man and his environment. There is now overwhelming evidence that some of these chemicals do pose a potential risk to humans and other life forms and unwanted side effects to the environment (Mathur, 1999).

Impact on environment

Pesticides can contaminate soil, water, turf, and other vegetation. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds, fish, beneficial insects, and non-target plants. Insecticides are generally the most acutely toxic class of pesticides, but herbicides can also pose risks to non-target organisms.

SCOPE AND OBJECTIVES

SCOPE The present study is attempted to evaluate the extent of pollution of ground water due to the persistent use of pesticides to kill the pest in the various crops. The ground water quality was very much affected by pesticide residues, present in the agriculture lands of Sirumalai. A state of high degree of pollution results from the pesticides and fertilizers at Sirumalai agricultural lands.

OBJECTIVES

- To analyse the Physico chemical parameters of bore well water.
- To analyse access the water quality with special reference to presence of pesticide residue in ground water.
- To analyses different parameters for the soil in Sirumalai.
- To recommend suitable remedy for the prevention of pesticide pollution in ground water.
- To remove the pesticide residue found in the wash water and bore well water, solar evaporation method using black kadappa stone tank.
- To study the impact of pesticide residue contaminated water in Sirumalai.

MATERIALS AND METHODS

Dindigul district is an administrative region in the south of Tamil Nadu, India. The district was carved out of Madurai District in 1985. It has an area of 6266.64 km² and comprises three Revenue Divisions, eight Taluks, and 14 Panchayat Unions. The district is bound by the Erode, Tirupur, Karur, and Trichy districts in the north, the Sivaganga and Tiruchi districts in the east, the Madurai district in the south, and the Theni and Coimbatore districts and the state of Kerala in the west. The investigator has collected ground water sample in two (east and west side of sirumalai) directions to study the impact of the pesticide effluent in the ground water. Most of the water samples, during survey it was observed that the water becomes unfit for drinking with salty taste. The investigator has also collected soil sample from the study area.

CONSTITUENTS SOIL

The water samples are collected at different sites and subjected to severe analysis for physical-chemical characteristics. To study distant wise distribution and accumulation of nutrients in the soil, the soil samples were collected at different sites in and around the Sirumalai area. The living part of the soil is just critical to plant growth as the physical soil structures. Soil microorganisms are the essential link between mineral reserves and plant growth. The cycles that permit nutrients to flow from soil to plant are all interdependent and they work only with the help of living organisms that constitute the soil community.

RESULTS AND DISCUSSION

Drinking water standards are regulation that Bureau of Indian Standards (BIS) set to control the level of contamination in the drinking water. Bureau of Indian Standard consider the inputs from many organization, i.e. Central, State, Semi Government, Municipal Corporation, Public Health Organization, etc. throughout the standard setting process (Employment Information: Indian Labour Statistics, 1994).

The results of the various physico-chemical analyses of bore well water samples are presented and discussed.

SOLAR EVAPORATION

The water quality for drinking and irrigation depends upon total dissolved constituents. The dissolved ions are time importance in determining the water quality and irrigation purposes. The reason may be that various chemical ions can move much faster into the ground and can seep through the sandy soil in to the ground water ad surface water (Webster *et al.*, 1999).

In order to control the pesticides problems in ground water, the Black Surface solar Evaporation tank has been fabricated using Kadappa stone. Here, black surface of kadappa stone tank enhances the absorption of solar radiation for evaporation and prevents the dissolved salt from contaminating the water resources and the soil, directly without any pre-treatment for the evaporation of the ground water (Webster *et al.*, 1999).

Graph 1. Graphical representation of the results obtained during solar evaporation process using Black Kadappa.

S. No	Parameters (ppm)	Standard value (ppm)	Experiment value (ppm)
1.	Nitrogen	75.00	50.00
2.	Phosphorus	25.00	6.00
3.	Potassium	60.00	500.00
4.	Iron	5.00	8.62
5.	Sulfate	6.50	2.20
6.	Boron	0.05	0.00

CONCLUSION

The investigator has made an attempt to find the impact of pesticide pollution due to the discharge of pesticide waste water from the agricultural field in the Sirumalai agro lands. In order to evaluate the physical and chemical parameters of water, the pond water samples, and the ground water samples all the sides were collected and analyzed for various water quality parameters and soil parameters.

SOIL TEST

The big pond which is located on the northern side of the agrilands. The pond water is the main source of water for the bore wells located in and around the agricultural land.

During the rainy season the pond water percolates into wells and bore wells. People in the residential area are desponding on ground water source also but at present it is completely polluted with a toxic pesticide residues and the water becomes highly polluted. Now water is completely polluted due to percolation of pesticide waste waters which are potentially harmful, accumulation of various pesticides chemical residues in water reaches the ground water source. Bio – accumulation and bio-concentration of the pesticide waste water causes high degree of pollution.

In general the pond near agrifield in the agrifield water sources becomes pesticide waste water. The bore wells in and around the northern side of the pond polluted with very high TDS and it is beyond redemption due to the higher limits of TDS, hardness, phosphate, ammonia and nitrate. All the water samples taken in and around the agriland are not suitable for drinking.

The present study reveals that the physico, chemical analysis of pond water in the pond as well as ground waters are above the permissible limit. The most of the water sources like wells and bore wells has to be checked. From the ground water samples collected in and around the agro field the quality parameters like pH, conductivity, turbidity, ammonia is measured.

The dissolved oxygen is analyzed in dissolved oxygen.& it is found to be decreased. It is due to utilization of dissolved oxygen in the water by organic matter& by the pesticides. Hence the ground water sample cannot be used. The investigator observed that the solar evaporation tank made of black body tank function more effectively during summer with very high

S.No	Sample Collection	Places of Collection of sample	
1	Bore Well	Sirumalai (East)	
2	Bore Well	Sirumalai (West)	
S.No	Parameter	Method of Analysis	
1	Colour	Visual comparison	
2	Turbidity	Neplo turbidity meter	
3	TDS	Conductivity method	
4	Electrical conductivity	Conductivity meter	
5	pH	pH Meter	
6	Total hardness	EDTA Titrimetric method	
7	Calcium	EDTA Titrimetric method	
8	Magnesium	Calculation from Total Hardness	
9	Iron	Spectrophotometer	
10	Ammonia	Nessler's Method	
11	Nitrite	Spectrophotometer	
12	Nitrate	Spectrophotometer	
13	Chloride	Silver nitrate	
14	Fluoride	Colorimetric meter	
15	Sulphate	Turbidity method	
16	Phosphate	Spectrophotometer	

Table 1. The results obtained during solar evaporation process using Black Kadappa.

evaporation rate.

The investigators found thee during the normal operation, the colour of the effluent varies and becomes clear after treating with alumn, which favours the penetration of solar energy easily and hence the efficiency of the evaporation tank increases than the normal cement slab.

The advantage of utilizing the black body natural kadappa tanks for evaporation is very strong and it can absorb very high degree of solar radiation which is converted into thermal energy. Thermal energy is directly converted into heat energy. Heat energy is utilized for the evaporation of pesticide residue in water.

The investigator observed that the solar evaporation tank made of black body tank function more effectively during summer with very high evaporation rate. It is observed that the sugar effluent treatment by solar evaporation tank will be eco friendly, economical, simple and easy for adoption as stated in Table 1.

The solar evaporation tank is blessed in principle of black body surface which can absorb solar radiation more effectively than ordinary cement slab. The black coats natural Kadappa slabs obtained from the earth is used for construction of mini model solar evaporation tank in step wise position.

SUGGESTION AND RECOMMENDATIONS

In India the water quality management is carried out in a very classical methods. Hence lakhs of peoples are affected by various water borne diseases and suffering a lot,, due to impact of pollution. It implies clearly that in India protection of water sources, disinfection of water bodies, new innovative and modern techniques in water treatment research should be encouraged for immediate and safer life to all the people.

All the waste chemicals, and waste water should be collected by the authorities or by efficient and dedicated private organisation in a separate place and treated properly, before being discharged into water resources like river, lake, ponds ,wells and bore wells.

REFERENCES

- Mathur, S.C. 1999. Future of Indian pesticides industry in next millennium. *Pesticide Information*. 24(4): 9-23.
- Employment Information: Indian Labour Statistics, 1994. Chandigarh: Labour Bureau, Ministry of Labour.
- Warren, G.F. 1998. Spectacular Increases in Crop Yields in the United States in the Twentieth Century. *Weed Tech.* 12 : 752.
- Webster, J.P.G., Bowles, R.G. and Williams, N.T. 1999. Estimating the Economic Benefi ts of Alternative Pesticide Usage Scenarios: Wheat Production in the United Kingdom. *Crop Production.* 18: 83.