SUMMARY

Water is one of the prime necessities of life. We can not live without water. Water has become an essential commodity for the development of the industries and agriculture. The word pollution taken from Latin word – Pollutionem; meaning defilement from polluere, to soil or defile (make dirty).

The growing population has lead to the need for greater quantities of water then are readily available in a pure quality of course the waste water is recycled even then some pollutants remains in the recycled water which may be very harmful to the living beings.

Studies were carried out on the effects of different concentrations of the polluted Hindane river water on:

1. Seed germination percentage, seedling growth and dry matter transfer in certain legumes cucurbits and cereals.

2. Plant growth and yield of some legumes and cereals only.

3. The uptake and distribution of total nitrogen, total phosphate and total heavy metal during seedling growth and further adult plant growth in materials and suitable concentrations selected from above studies.

4. Analysis of pure and selected concentrations of polluted Hindane river water for total nitrogen, phosphate and heavy metal contents.
5. Analysis for total Nitrogen phosphate and heavy metal of the soil and also of edible and crops parts done with the nearest form from the point of where polluted effluents; and Dhamola river discharge down stream (experimental) and of one nearest farm before effluent discharge (control) to assess the extent of hazards under actual field conditions.

6. Effects of polluted stream on plant distribution pattern and studies near the point of polluted stream, discharge.


For the study of seedling growth, experiments were conducted in different concentrations of polluted Hindane river water in selected legumes cucurbita and cereals. The polluted water was diluted with distilled water, to get 10%, 25%, 50% concentrations, the distilled water served as control.

Studies on the plant growth and yield were conducted in certain legumes and cereals only. For these studies 25% and 50% sterilized polluted river water were selected for irrigation. The soil was procured from experimental plots of Government Horticulture Research & Training center Saharanpur. Later the soil was filled in polythene bags each bag was filled with 2kg of soil.

The seeds of two legumes viz. Vigna mungo L. and Vicia faba Linn. and two cereals Triticum aestivum Linn. and Oryza sativa Linn.
were sown in these polythene bags and were allowed to grow under natural conditions. These bags were irrigated with 25% and 50% polluted river water when ever necessary. Simultaneously a control set of each crop was also maintained by irrigating with distilled water. For the growth study plant samples were taken on 30th and 60th day of seedling emergence.

The studies on the distribution of plants growing on the perennial stream bank were made on one site before confluence and two sites after confluence.

The major outline of the investigation includes:

1- Effect of different concentrations of polluted Hindane river water on germination, pattern of seedling growth and dry matter transfer in selected cereals, cucurbits and legumes.

2- Effect of different concentrations of polluted Hindane river water on plant growth and yield. These investigations were carried out on cereals and legumes only.

3- Effect of different concentrations of polluted Hindane river water on total nitrogen and phosphate and total heavy metal uptake and distribution, during seedling growth and further plant growth.

4- Biochemical analysis for total N, P and heavy metal in pure polluted Hindane river water as well as in its various concentrations used in the present investigation.

5- Effect of total N, P and heavy metal of polluted Hindane river water in soil and plant parts in the actual field conditions of the
nearest farm from the point of polluted water discharge down stream (experimental) and of the nearest farm before polluted water discharge (control).

The results obtained from the above investigations reveals:

1- There is a general promotion (at lower polluted water concentration i.e. 10%) and inhibition (at all higher polluted water concentrations i.e. 25% and 50%) in percent seed germination and seedling growth to selected cereals, cucurbits and legumes. At all inhibitory concentrations the increase in dry weight of seedling parts is suppressed with simultaneous the decrease in dry matter loss/transfer from cotyledons of different plants studied. Further, at lower promotory concentration (10%) in cereals, cucurbits and legumes, the dry weight increase in seedling parts was induced with simultaneous increase in dry matter loss/transfer from cotyledons.

2- Growth and yield studies done in legumes and cereals, the crops were irrigated with different concentrations of polluted Hindane river water growth and yield in cereals and legumes were promoted at lower concentration (25%) and inhibited at higher concentration (50%). Similarly in polluted Hindane river water irrigated sets of Triticum aestivum, Oryza sativa, Vicia faba and Vigna mungo same pattern of promotion and inhibition were observed in lower (25%) and higher (50%) polluted water concentration,
respectively. Besides this, organ specific and crop-based differences in response to various concentrations of polluted Hindane river water were well marked.

3- Observations show that total nitrogen, phosphate and heavy metal uptake and distribution in seedling parts in nearly similar to dry weight changes in cereals, cucurbits and legumes. Further, the total nitrogen, phosphate and heavy metal level on per gram basis are promoted in presence of lower concentration and inhibited in presence of higher concentration of polluted Hindane river water. However the data on total nitrogen, total phosphate and total heavy metal on unit weight basis show increased level in treated sets as compared to control. Thus, the increased and decreased total N, P and heavy metal levels of the whole plant, as shown by data on per organ basis, is a consequence of increased and decreased growth rather than its cause. In general total heavy metal uptake is more in plants irrigated with polluted Hindane river water and uptake is more pronounced at higher concentrations. Likewise the soils irrigated with polluted Hindane river water plant were found to contain large amount of total N, P and heavy metal than the soil with plants, thus showing the uptake of these nutrients from the polluted Hindane river water through the soil by the crop plants. Thus, it may be possible that out of several factors responsible for the
reduced growth, one of the factors may be the higher concentration of polluted Hindane river water. It might have increased uptake of heavy metals, which probably interfered the growth mechanism.

Analysis of total N, P and heavy metal contents in the pure polluted water and in different concentrations reveals that lower levels of N, P and heavy metal are promotory for growth and higher levels being inhibitory.

Thus, through our investigations we can conclude that polluted river water proves to be beneficial to the crop plants if given in lower concentration and thus acts as a liquid fertilizer and may reduce the requirement for commercial fertilizers. However, it proves to be hazardous for crops in higher concentration. The toxic materials present in the polluted water proves to be at phytotoxic levels that limits their agricultural use. The principal health hazard associated with the chemical constituents of waste water arises from the contamination of crops of ground water.