Pak. J. Agri. Sci., Vol. 28, No. 3, 1991

ENVIRONMENTAL POLLUTION IN RURAL SECTOR

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An attempt has been made to create awareness in respect of agricultural pollution. The level of global communication resulting from the use of biocides has assumed an alarming dimension. Almost everybody in the world has a measurable amount of toxic chemicals. Similarly, use of fertilizer is recognized as a potential source of environmental pollution, specifically with respect to water quality. It is feared that continued fertilizer leaching, may render groundwater unfit for drinking. A need for abatement of the agricultural pollution is emphasized. General remedies as well as a programme of formal education are suggested.

INTRODUCTION

Since the inception of universe, man has been constantly tampering with the natural ecosystem and causing undesirable changes. Almost every activity of man is directly or indirectly generating some kind of environmental imbalance/pollution and agriculture is no exception in this regard. Intensive agricultural practices are deteriorating the soil on which depends the very existence of life on this planet. The major agricultural oriented pollution problems confronting Pakistan today are: poisoning of soil-air-water matrix by the action of fertilizers and pesticides, and misuse of agricultural resources like livestock, forestry, fisheries, wildlife, etc.

Among all the agricultural concerns, agro-chemicals have given rise to grave environmental contamination (Kanwar, 1985). It is being forecast that the continuous and unthoughtful use of chemicals will render agricultural land, water and air, unfit for supporting life. It is unfortunate that most of the public environmental protection programmes are urban-oriented, whereas the pollution and its direct effects in the rural sector which comprises 70% of our population are neglected. This article is an attempt to make public aware about the gravity of environmental problems in the countryside and suggests their short and long term remedies.

Agro-chemicals: The agro-chemicals can be grouped into two broad categories i.e. biocides and fertilizers. Biocides are man made products such as insecticides, herbicides, fungicides, rodenticides, etc. They are poisonous substances deliberately disseminated to exploit their toxic properties. They become polluants when they reach wrong targets. After a continuous use, these toxic chemicals are found in rivers, wells, lakes, oceans, in the air and soil, in the bodies of fish, birds, worms, eggs, in many human beings, mother's milk, and possibly tissues of the unborn child. Some pesticides destroy enzymes, which protect body from harm, block energy generating oxidation processes and initiate malignancy in the cells (Fude, 1987).

Dichloro-diphenyl-trichlorocthylene (DDT) is, perhaps, the most notorious chemical. It was used to kill both medical and agricultural pests saving millions of human lives as well as many from starvation. However, an indiscriminate over-use has

caused worldwide environmental contamination and death of non-target organisms. Almost everybody in the world has a measurable amount of DDT and its breakdown products. Toxic effects of DDT have migrated from areas of application to remote places. Even Alaskan Eskimos have traces of DDT in their body fat (Fude, 1987). DDT is strongly adsorbed to soil particles that make their way into rivers, seas through soil erosion. Lakes, bays and reservoirs all tend to become traps for DDT because of large volume of sediments continually deposited in them. DDT attacks nervous and reproductive systems of human body. DDT can harm phytoplankton by inhibiting its photosynthesis and upset the O_2 balance of atmosphere (Anonymous, 1989). However, use of DDT is falling and risk of its hazard is reducing. The level of global contamination resulting from the use of biocides needs no further emphasis. Some of the remedial measures to eliminate/reduce the hazards are as under:

1. A better control over the disposal and dispersal of the chemicals.
2. Use of carefully designed and calibrated spraying and dusting machines with possibly electrostatic spraying to magnetize spray drops and reduce drift losses.
3. Field application supervised by trained/qualified personnel.
4. Use of protective devices e.g. mask, gloves, long boots, etc.
5. Avoid long exposures of field workers to active material.
6. Scientific research to dig up new substances that may replace poisonous synthetic biocides.

Fertilizers pollution: Use of fertilizers in agriculture is recognized as a potential source of environmental pollution, especially with respect to water quality. Nitrate-Nitrogen (NO_3-N) pollution is one area that is currently receiving considerable attention. A certain portion of NO_3-N pollution comes from the use of agricultural fertilizers which can enter directly from the fields into the streams of underground sources. The extent of agricultural contribution of NO_3-N to both surface and subsurface water is not fully known. However, circumstantial evidence indicates that water quality deterioration could be associated with the increased nitrogen fertilizers use. Groundwater pollution is of increasing concern in Pakistan as about 60 to 70% of the drinking water comes from wells. Pollution of drinking water supplies is being reported frequently (Kanwar, 1985).

At the University of Agriculture, Faisalabad, a study was conducted by taking 150 samples of drinking water from different areas of Faisalabad city. The results indicated higher nitrate contents in the areas fed from industrial effluent, whereas areas with better drainage contained lower nitrate contents. Similar were the results from WASA tubewells in the urban area (Yaqoob, 1990). No study, however, was available for the agricultural fields prior to the studies of Fude (1987) and Khan (1989) which were conducted to look into the leaching behaviour of nitrates under varying amounts of tillage, nature of implements, doses of fertilizers, depth of irrigation, and time of sampling after the fertilizer application. The experiments included nitrogenous fertilizers. Almost all the factors generally produced significant effects on the leaching of fertilizer (NO_3-N) into the soil profile.

The results further indicated a noticeable leaching of nitrates upto 90 cm soil depth after first irrigation. Experimental evidence indicated that leaching of nitrates was observed upto 150 cm soil depth which was the last point of observation in these studies. Different soil strata starting from surface upto 150 cm soil depth were sam-

pled to analyze soil in respect of NO_3-N contents. Mathematical models were developed to predict the nitrates at a desired soil depth. The models indicated that nitrate concentration exponentially decreased with the depth of soil. An extrapolation of this trend suggested nitrates would certainly move to far lower depths than considered here.

If the above mentioned trend of leaching continues in our agricultural fields, the day is not too far when we will badly pollute the groundwater reservoir and render it unfit for human and animal consumption. In order to avoid/reduce the pollution resulting from fertilizer leaching, remedial measures like split applications of fertilizer, light but frequent irrigations, tillage and other land management practices would have to be properly examined.

Air pollution: Air pollution has reached hazardous levels in urban areas (Sial *et al.*, 1991). Industrial and automobile wastes and livestock excretions are continuously aggravating the issue. Agricultural activities are also creating air pollution in several ways such as spraying of insecticides, pesticides, fumes and odours from animal barns and poultry houses, etc. These days, use of wheat threshers has become a matter of great concern in the countryside. The machines create high levels of air pollution by throwing fine wheat straw alongwith dust in the air. Modifications in the design of threshers are generally suggested.

Heavy dust storms make life terrible in the provinces of Punjab and Sindh during summer months. Formation of the storms is primarily the result of unwanted tillage practices and especially leaving the tilled fields fallow after cultivation. Detachment of soil sediments from such fields becomes root cause of the dust storms. Such dust storms can be avoided, using proper soil mulches, raising wind breaks and above all abandoning the practice of soil fallowing that has little advantage in the light of recent research.

Land pollution: Many farmers in Pakistan leave crop residues in their fields which become a growing concern for land pollution. The residues such as rice stalks, hulls, bagasse, etc., have large quantities of cellulose. At the University of Agriculture, Faisalabad, the above waste materials were successfully used to produce glucose. Similarly, wheat bran was used to produce lipase by fermentation process. Likewise, studies were conducted to prepare single cell protein from agricultural wastes and gram bran (Yaqoob, 1990). Both public and private sectors need to promote large scale use of such results.

No-till concept: Arguments are often advanced in favour of no-till farming which offers drastic energy savings in addition to other fringe benefits. The success of no-till farming, solely depends upon extensive use of herbicides to kill weeds before as well as after planting. Some developed nations are practising no-till agriculture and badly polluting atmosphere (Sial *et al.*, 1991). Since such countries are upsetting the global environment, United Nations Environmental Pollution Agency (UNEPA) should ask the international community to voluntarily stop no-till farming. Instead, mechanical methods of eradicating weeds should be encouraged.

Waterlogging and salinity: The waterlogging and salinity problems are inherent whenever irrigated agriculture is practised but these problems are no where so serious or involved as in Pakistan, where the very basis of economy is irrigated agriculture. According to one estimate, due to the twin menace, Pakistan is loosing culturable land at an alarming rate of 50,000 to 100,000 acres each year (Anonymous, 1989).

There are historical evidences that the civilizations that depended on irrigated

agriculture could not last longer than 200-300 years, as the lands were either salted or waterlogged. In less than hundred years after initiation of canal irrigation in the subcontinent, the picture is gloomy. Thus, history may repeat itself, if contamination resulting from waterlogging and salinity is left unattended.

General recommendations: If the present trend in modernization of agriculture continues, pollution issues will become increasingly complicated. What general model be adopted to minimize the pollution is rather more important than identification of problems. The following submissions may provide a guideline to plan environmental strategies:

1. Important enough is to dispel the impression that environmental protection is more of necessity than luxury and it is a basic dimension of sustainable development.
2. Availability of trained manpower would prove a key for the successful execution and assessment of environmental projects. Thus, initiation of formal educational programmes will be useful as outlined below:
   - Sections on environmental issues be included in school textbooks in order to teach minors who are always more receptive.

     Optional course on "Environmental Protection" may be introduced at secondary, higher secondary and degree levels.

     Graduate degree programmes in environmental engineering and environmental management be initiated at appropriate institutions in order to train manpower and promote research activities on environmental issues.

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