

ARTICLE ID: 14

Soil pollution in agricultural: Effect Production

Hansa Baradwal*and Suman Kantva**

*Institute of Agriculture Science Bundelkhand University, Jhansi, UP,
Department of Soil Science and Agriculture Chemistry

** ** SKN, Agriculture University, Jobner, Department of Agronomy

Introduction: -

Soil Pollution has gradually become a major challenge that we need to overcome for establishing a healthy environment. Weathering of the earth's crusts by different processes leads to the formation of soil that accumulates over the centuries. The soil is the home for a large part of bacterial biodiversity and other microscopic and macroscopic living organisms. However, let us consider our very own country India. Indian economy is largely dependent on agriculture. Thus, we Indians give very high priority to the development of agriculture, fisheries, and livestock. Therefore, for surplus production, it is very important to protect crops from any type of damage that occurs due to insects, weeds, rodents and other crop diseases.

Soil pollution refers to anything that causes contamination of soil and degrades the soil quality. It occurs when the pollutants causing the pollution reduce the quality of the soil and convert the soil inhabitable for microorganisms and macro-organisms living in the soil. Soil contamination or soil pollution can occur either because of human activities or because of natural processes. However, mostly it is due to human activities. The soil contamination can occur due to the presence of chemicals such as pesticides, herbicides, ammonia, petroleum hydrocarbons, lead, nitrate, mercury, naphthalene, etc in an excess amount.

Types of Soil Pollutants: -

- ✓ Heavy metals (such as lead and mercury, at excessively high amounts) in the soil can make it very poisonous to humans.
- ✓ PAHs (polycyclic aromatic hydrocarbons) are a class of organic chemicals where only carbon and hydrogen atoms are present.



- ✓ Coke (coal) production, automobile emissions, cigarette smoke, and shale oil extraction are all sources of PAHs in the soil.
- ✓ Industrial Waste Soil contamination can come from the dumping of industrial waste into soils.
- ✓ Pesticides are chemicals (or chemical mixes) that are used to kill or prevent pests from reproducing.

Causes of Soil Pollution: -

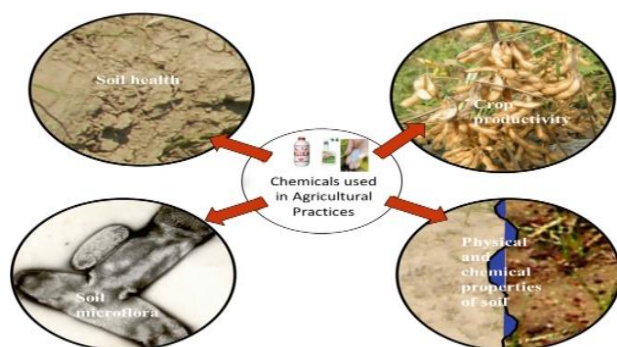
Soil pollution can be natural or due to human activity. However, it mostly boils down to the activities of the human that causes the majority of soil pollution such as heavy industries, or pesticides in agriculture.

- 1. Pesticides: -** Before World War II, the chemical nicotine chemical present in the tobacco plants was used as the pest controlling substance in agricultural practices. However, DDT was found to be extremely useful for malaria control and as pest control of many insects during World War II. Therefore, it was used for controlling many diseases. Hence, post-war, people started using it as pest control in agriculture for killing rodents, weeds, insects, etc and avoiding the damages due to these pests. However, everyone gradually the adverse effects of this chemical which led to the ban of this chemical in many parts of the world including India. Moreover, pests became resistance to DDT due to the chemicals regular use. Hence this led to the introduction of other harmful chemicals such as Aldrin and Dieldrin. Pesticides are synthetic toxic chemicals that definitely kill different types of pests and insects causing damage to agriculture but it has many ecological repercussions. They are generally insoluble in water and non-biodegradable. Therefore, these chemicals will not gradually decompose and keep on accumulating in the soil. Therefore, the concentration of these chemicals will increase when the transfer of these chemicals take place from lower to higher trophic level via the food chain. Hence, it will cause many metabolic and physiological disorders in humans.
- 2. Soil Pollution: -** Chlorinated Organic toxins- The harmful effect of DDT and other chemicals led to the introduction of less persistent organic and more-biodegradable substance such as carbamates and organophosphates. However, these chemicals act as

harmful toxins for nerves, hence they are more dangerous to humans. It led to pesticides related to the death of field workers in some agricultural fields.

3. **Herbicides:** - Slowly, the industries began production of herbicides like sodium arsenite (Na_3AsO_3), sodium chlorate (NaClO_3), etc. Herbicides can decompose in a span of few months. However, even they affect the environment and are not environmentally friendly. Even though they are not as harmful as organo-chlorides but most of the herbicides are toxic. They are known to cause birth defects. Furthermore, research suggests that spraying herbicides causes more insect attack and diseases of plants in comparison to manual weeding. One thing to note here is all the above factors occupy just a small portion of the causes. Majority of the causes is related to manufacturing activities in chemical and industrial processes that are released in nature or environment.
4. **Inorganic Fertilizers:** - Excessive use of inorganic nitrogen fertilizers leads to acidification of soil and contaminate the agricultural soil. Also known as agrochemical pollution.
5. **Industrial Pollution:** - The incorrect way of chemical waste disposal from different types of industries can cause contamination of soil. Human activities like this have led to acidification of soil and contamination due to the disposal of industrial waste, heavy metals, toxic chemicals, dumping oil and fuel, etc.
6. **Inferior Irrigation Practices:** - Poor irrigation methods increase the soil salinity. Moreover, excess watering, improper maintenance of canals and irrigation channels, lack of crop rotation and intensive farming gradually decreases the quality of soil over time and cause degradation of land.
7. **Solid Waste:** - Disposal of plastics, cans, and other solid waste falls into the category of soil pollution. Disposal of electrical goods such as batteries causes an adverse effect on the soil due to the presence of harmful chemicals. For instance, lithium present in batteries can cause leaching of soil.
8. **Urban Activities:** - Lack of proper waste disposal, regular constructions can cause excessive damage to the soil due to lack of proper drainage and surface run-off. This waste disposed of by humans contains chemical waste from residential areas.

Moreover, leaking of sewerage system can also affect soil quality and cause soil pollution by changing the chemical composition of the soil.



Sources:- <https://link.springer.com/>

Sources: - <https://ibanplastic.com/>

Effects of Soil Pollution: -

Soil pollution is not only the problem in India but it is a global problem. It causes harmful effect on the soil and the environment at large. Contamination of soil will decrease the agricultural output of a land. Major soil pollution after effects are:

1. **Inferior Crop Quality:** - It can decrease the quality of the crop. Regular use of chemical fertilizers, inorganic fertilizers, pesticides will decrease the fertility of the soil at a rapid rate and alter the structure of the soil. This will lead to decrease in soil quality and poor quality of crops. Over the time the soil will become less productive due to the accumulation of toxic chemicals in large quantity.
2. **Harmful Effect on Human Health:** - It will increase the exposure to toxic and harmful chemicals thus increasing health threats to people living nearby and on the degraded land. Living, working or playing in the contaminated soil can lead to respiratory diseases, skin diseases, and other diseases. Moreover, it can cause other health problems.
3. **Water Sources Contamination:** - The surface run-off after raining will carry the polluted soil and enter into different water resource. Thus, it can cause underground water contamination thereby causing water pollution. This water after contamination is not fit for human as well as animal use due to the presence of toxic chemicals.
4. **Negative Impact on Ecosystem and Biodiversity:** - Soil pollution can cause an imbalance of the ecosystem of the soil. The soil is an important habitat and is the



house of different type of microorganisms, animals, reptiles, mammals, birds, and insects. Thus, soil pollution can negatively impact the lives of the living organisms and can result in the gradual death of many organisms. It can cause health threats to animals grazing in the contaminated soil or microorganisms residing in the soil.

Solution to reduce the soil pollution: -

- ✓ Use of correct farming techniques
- ✓ Recycling of Waste before disposal, Recycle and Reuse Products
- ✓ Use of organic fertilizers instead of chemical fertilizers and pesticides
- ✓ Community education and awareness, Get the Locals Involved
- ✓ Proper maintenance of sewage system, Proper disposal method of household and industrial waste
- ✓ Reforestation and Afforestation Should be Promoted
- ✓ Planting new trees and plants is afforestation. We live because plants live. If the plants die, all living things will also die. Thus, whenever trees are cut down new trees should be planted. Planting trees in hilly areas are most effective for conservation.

Reference: -

<https://www.toppr.com/>

<https://link.springer.com/>