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Impact of Pesticides and Fertiizers on Soil Health

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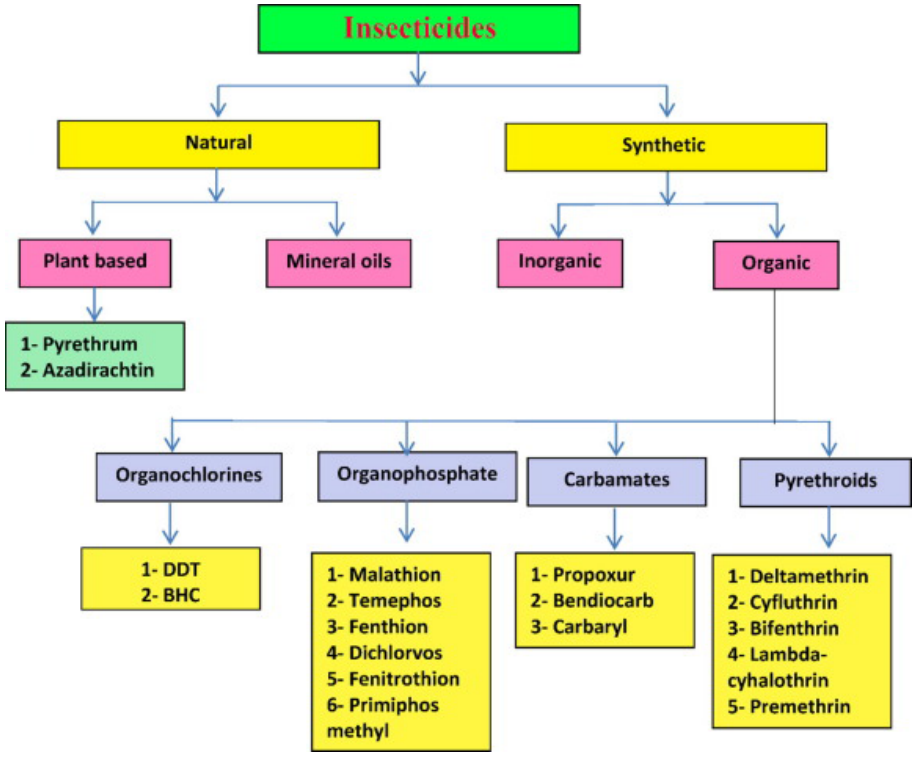
Introduction

In many parts of the world, agricultural pesticide use and the adverse effects that it causes are pervasive. Because runoff and pesticide drift are the main causes of offsite pesticide movement, efforts to lessen this impact have mostly concentrated on lowering pesticide contamination of the soil. The overuse of these compounds and their environmental persistence have led to major issues, such as soil, water, and, to a lesser extent, air pollution, which has a negative impact on the ecosystem and the production of food. In regards to soil pollution, the remaining pesticide concentration is frequently higher than what the standards permit. The difficulty is to minimize the quantity of these contaminants in these areas to produce agricultural soils that are suitable for growing environmentally friendly crops.Rhizodeposition, the nutrient content of bulk and rhizospheric soil, soil organic carbon, pH, moisture, enzyme activity, and many other aspects of soil are all significantly impacted when fertilizers and pesticides are applied to the soil. In order to advance the concept of sustainable agriculture, it is crucial to comprehend the relationship between soil biodiversity and soil functions as well as the consequences of different anthropogenic actions affecting the variety of soil microbes.

Classification by Origin

Biopesticides ✓

(Chemical Pesticides (Organic and Inorganic ✓



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Classification by Chemical Composition

- Organochlorines ✓
- Organophosphates ✓
- Carbamates ✓
- Pyrethroids ✓
- Newer Molecules insecticides ✓

Classification by Targets

- Insecticide ✓
- Fungicide ✓
- Rodenticide ✓
- Avicide ✓
- Nematicides ✓
- Molluscicides ✓

Classification of Pesticides

Acute toxicity to mammals was once thought to be low for substances like dichlorodiphenyl-trichloroethane (DDT), 1,19-(2,2,2-trichloroethylidene)bis(4-chlorobenzene), and other organochlorine (OC) compounds [18]. But their use resulted in phenomena like eggshell deteriorating and the bioaccumulation of OCs in fatty tissues in long-lived creatures, which led to the creation of less persistent substances like carbamate insecticides and OP Compared to OCs.

Impact of Pesticides and Fertilizers on Soil Microflora

Depending on a number of factors, such as the type of pesticide used, the characteristics of the soil, and the populations of established microorganisms in the soil, soil microorganisms respond differently to different types of chemical pesticides applied to agricultural soils. The overall number of bacteria, fungus, protozoa, and algae may differ based primarily on the pesticide's toxicity and potential as a source of nutrients or energy. However, pesticide treatments undoubtedly change the overall structural and functional diversity of the soil microbial populations.In soil, high inputs of the organophosphate pesticide methamidophos significantly decreased fungal biomass and total microbial biomass carbon. However, under the same conditions, gram-negative bacterial biomass and catabolic activity increased while gram-positive bacterial biomass was not greatly impacted.It has been found that pesticides such as dimethoate, chlorpyrifos, and fosthiazate alter soil microbial parameters such as biomass, basal respiration, and microorganism-specific respiration; however, the effects were not reliant on the species of plants or the richness of plant functional groups.Accordingly, it can be established that a variety of soil bacteria may acquire the ability to not only tolerate the presence of these extremely toxic substances but also use them as a source of energy and nutrients if they are consistently exposed to high concentrations of toxic and persistent chemical pesticides in agricultural soils. Bioremediation of such contaminated locations results from the full or partial mineralization/transformation of such pesticides in soil to a level that is either non-toxic or significantly less toxic than the parent molecule.

Impact of Pesticides and Fertilizers onSoil Fertility

FERTILIZERS

Inorganic fertilizers are used worldwide in systems that regularly and significantly export nutrients in harvested goods, including eight to thirty acres of arable crops. Numerous research carried out in labs, pots, and fields showed that mineral fertilizers have varying impacts on soil health. Soil friability is a negative impact on soil caused by the use of chemical fertilizers that build up acidic soils, such as sulfuric and hydrochloric acids. The rock particles are held together by the soil crumbs, which are dissolved by the various acids in the soil. Clay is combined with humus or decomposed natural materials, like dead leaves, to create soil crumbs. The

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drainage of the soil depends on these mineral-rich soil crumbs, which additionally substantially improve soil air circulation.

The health of the soil is impacted by a number of widely used chemical fertilizers, including potassium chloride ammonium sulfate ammonium nitrate urea, and triple super phosphate. One synthetic N fertilizer is ammonium sulfate (NH4)2SO4, which has 21N-0P-0K + 24% S. It produces sulfuric acid (H2SO4) when it combines with water in the soil. The pH of sulfuric acid is less than 1. It kills organisms and is extremely poisonous.

PESTICIDES

Pesticide use typically has a significant impact on the soil's microbial characteristics, and changes in soil fertility have been noted in tandem. At an application dosage of 1500 mg/kg of soil and an exposure period of 28 days, the amount of bacteria in soil treated with the fungicides mancozeb and dimethomorph was significantly decreased. The herbicide linuron and pesticide diazinon also showed a similar, albeit somewhat less noticeable effect. At this dosage and exposure duration, the same three insecticides nearly equally reduced populations of N2-fixing bacteria.In comparison to soil unaffected by chemical pollution, it was further found that the effects of pesticides and chemical fertilizers such as triadimefon and ammonium bicarbonate result from substantial decreases in organic C and total N of 58.5, 54.8, and 55.0%, correspondingly.consequently may be suggested that a change in the microbial population dynamics brought on by pesticide application disrupts the availability and balance of micronutrients in soil

Conclusion

Degradation of the environment is one of the most important effects of this chemical and technologically intensive agriculture. Such agricultural practices have had a significant impact on soil, which is the most basic component of farmed fields. Significant soil pollution has also resulted from the widespread and unwarranted use of chemical pesticides and fertilizers. on addition to being subjected to high concentrations of various toxic, non-toxic, and persistent chemical fertilizers and pesticides, the biodiversity of soil ecosystems on farmed lands is also inevitably impacted by any modifications in soil.

References

1. Aktar MW, Sengupta D, Chowdhury A (2009) Impact of pesticides use in agriculture: their benefits and hazards. InterdiscToxicol 2(1):1–12.

2. Handa SK, Agnihotri NP and Kulshreshtha G (1999) Effect of pesticide on soil fertility. In Pesticide residues; Significance, Msanagement and analysis. pp 184–198

3. Zelles L, Scheunert I. and Korte F (1985) Side effects of some pesticides on non-target soil microorganisms. J Environ Sci Health 20:457–488.