

A REVIEW ON EFFECT OF VARIOUS CONTAMINANTS ON SOIL PRODUCTIVITY AND QUALITY.

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Abstract:

Consumer Society, in order the growing need for food, agricultural land required to achieve maximum efficiency and highest productivity with good quality products. It is known that the nutrition of plant is one of the most important factors to maintain agriculture productivity and quality. But now a day it is becoming very poor in nutrient or poor in quality or inefficient. Such effect is because of excessive use of chemical fertilizers, chemical pesticides in the soil which has adverse effect on public land and environment health.

Heavy metal is among the most important contaminant in the soil. This paper aims to compile information about soil contamination with heavy metals and other pollutants like dust, oil, with its sources and effects on soil. Heavy metals like As, Pb, Hg capable to reduce fertility of soil Soil also shows less fertility and productivity due to oil spillage and reduced source of live hood in the affected areas.

All such pollutants have adverse effects on soil quality and productivity and also on human health. The fertilizer input rate and continuous discharging of industrial waste water on soil surface causing nutrient imbalance and lowers the quality of soil.

Key words: Chemical pesticides, fertilizers, contamination, heavy metals, productivity.

INTRODUCTION

Fertilization increases the quality and productivity of soil. There are two types of fertilizers organic and non-organic. These mainly contains phosphate, nitrate, ammonium and potassium salts. Some fertilizer contains radioactive elements and heavy metals. Heavy metals like Hg, Cd, As, Pb, Cu, Ni and natural radioactive elements like ²³⁸U, ²¹⁰P, ²³²Th [1-2]. But its consumption increased rapidly in recent years throughout the world which causes environment problems. It is responsible for accumulation of heavy metals in the soil and plant system. Plant absorbs the fertilizers through the soil and then enters the food chain. Thus it causes problems of human health and soil pollution. The heavy metals and the radioactive elements are the

inorganic pollutants which can accumulate in the soil [3]. Human activities have potential to produce such pollutants in soil which affects soil ecosystem [4].

Oil production in some countries like Nigeria, Nigerian economy depends on refining of petroleum products. They are getting the benefit of it but directly or indirectly provide adverse effect on soil. Cultivable lands are rendered to uncultivable land due to loss of its fertility and increases health problem in that area [5-6]. Acidification of soil is the one of dangerous problem, sometime the source for the same is acid rain. Strong acidification retards the fertility and productivity of soil [7]. Soil contamination plants deposition by dust have adverse effect on plant communities.

EFFECTS OF CHEMICAL FERTILIZERS ON SOIL PRODUCTIVITY

The soil is one of the most important ecological factors. We depend on soil for food. But now a day soil is getting infertile less fertility because of excessive use of chemical fertilizers. After a long use of fertilizer there occurs deterioration of soil fertility, soil deterioration of balance of current elements. Toxic substances from fertilizers accumulate in vegetable and causing negative effect in humans and animal are fed. Soil structure also play important role in fertility. Especially NaNO₃, NH₄NO₃, KCl, K₂SO₄, NH₄Cl from the fertilizers disturbs the soil structure and cause the deterioration and which gives difficulty to obtain high quality and efficient products.

High level of sodium and potassium containing fertilizers make a negative impact on soil pH, soil structure deterioration and the increased features of acid irrigation or other agricultural operation and finally the benefit derived from it is not possible. Continuous and excess use of acid forming nitrogen fertilizers causes acidity of soil and leads to less productivity. Potassium containing fertilizers also disrupt the nutrient balance in the soil and provide less fertility. It also shows negative effect on worms in the soil like earthworm and a soil mite has been devastating and lethal effect [8].

Nitrogen is one of the most important elements in soil which required for plant development. It the major part of chlorophyll and the green color of plant. It gives proper

growth and proper development of plant and crops. Hence fertilization is mostly done to provide necessary nitrogen in the soil and plant. But the excess fertilization means the excess nitrogen in soil which shows adverse effect on plant like there causes diminished root system. Sometime cause burning of leaf tissue and plant death. And thereby reduces the crop yield means less productivity [9].

There occurred 28% to 48% of nitrogen fertilizer remained in the soil as residue when applied to maize [9]. About 28% of nitrogen from urea left in the soil when applied to sorghum and 31% oxinide nitrogen remained in soil when used for same [10]. 19 % to 235 anhydrous ammonia used for maize crop which was remained in the soil as residue [11]. Such residual nitrogen in the soil lowered the productivity further.

Excess use of phosphate containing fertilizers increases the acidity of soil and consequently it reduces the yield of crop. Because there occurs the loss of nutrient from the soil by ion exchange [12].

EFFECTS OF HEAVY METALS ON QUALITY OF SOIL

Introduction of heavy metals in the soil by industrial effluent and excessive use of chemical toxic pesticides. Heavy metals like Arsenic As, Mercury Hg, Lead Pb, Cadmium Cd, Chromium Cr, and Zinc Zn added in the soil as toxicity. Make the soil highly polluted. Metals has harmful effect because it does not undergo biodegradation and hence its residue remained in the soil is in the soil and reached to human being by food chain. So its presence in the soil reduces its quality [13]

Arsenic (As) both in organic and inorganic form is highly toxic .Its residue in the soil reached to human being via food and shows carcinogenic effect in human being.

Soil can be contaminated with lead(Pb) from sources like industrial effluent, leaded fuel, and old lead plumbing pipe .Lead accumulate in the soil and its quantity from the soil cannot be reduced because it is highly immobile. Lead from the soil reached to human being via food chain and causes health problem like brain damage and brain retardation.

Soil contamination with Mercury (Hg) by sources like industrial effluent, painting and also by fertilizers and fungicidal spray. Mercury from soil effects on photosynthesis and oxidative metabolism in plant and there by retards the proper growth of plant or crop and finally reduces the fertility or productivity.

EFFECT OF ACID RAIN ON SOIL PRODUCTIVITY

Acid rain is the result of air pollution. Air pollutants like sulphur dioxide SO₂ and oxides of Nitrogen present in air by the sources like automobile exhaust, industrial exhaust which produces toxic acid rain. Acid rain causes the acidification of soil and reduces the nutrient like Potassium (K), calcium (Ca), and magnesium (Mg) from the soil by ion exchange mechanism. Loss of nutrient means loss of fertility and productivity of soil [14].

Acid rain also causes foliar damage of vegetation or crop and as a result of this the yield reduced.

EFFECT OF DUST ON VEGETATION

Dust is one of the pollutants which retards the crop yield. Dust is the type of particulate pollutant which consists of different particle size dust. Dust is able to carried by wind. The sources for the dust are mineral extraction, Construction activity including cement and many more.

Dust deposited on plants and blocks the pores on plant and thereby blocks stomata. It retards the growth of crop or plant. Physical and chemical effect of dust on both plant and soil are responsible for less crop yield [15].

If dust is applied on plant then at night time there occurs the loss of water from plant parts which directly retard the growth of crop or plant [16].

EFFECT OF OIL SPILLAGE OR CRUDE OIL ON SOIL PHYSICAL PROPERTIES

Presence of oil factors in the soil decreases the Saturated Hydraulic Conductivity (K_s) and Water holding capacity of soil. This is because oil blocks the pore on the soil.

Bulk density and porosity is affected here it reduced to some extent and caused faulty growth and less yield of crop [17].

Macro porosity also decreased because of oil pollutant in the soil. It results into lack of flow of air and water in the soil. And finally reduced the fertility and productivity of soil [17].

CONCLUSION

Today the demand of food is increased because of population growth. To fulfill the demand of population all are trying to increase the productivity of soil. For such we are using chemical fertilizers, chemical pesticides at high rate. But its excess quantity reduces the quality and productivity of soil. Means it provides negative effect on soil. Use of pesticides and pass of industrial effluent in the soil added heavy metals in it. Heavy metals from soil reach to plant or crop and finally reached to human being by food chain. It causes negative effect on human health causing deases like brain damage, retardation, cancer.

Soil polluted with oil decreases Water holding capacity, saturated hydraulic conductivity, porosity and macro porosity decreases because of oil pollutant and thereby reduces the fertility and finally productivity of soil because of lack of air and water flow within the soil.

Acidification of soil due to acid rain is also dangerous for good crop yield. Soil productivity is negatively affected by acid rain or its acidification. Also acid rain directly caused negative effect on plant in the form of burning of small leaves.

Dust from different sources and with different particle size has direct and indirect effect on soil as well as on plants.

Deposition of dust on plant parts block the stomata and

retard the growth of plant. Deposition of dust on soil blocks pores on the surface of soil and provides less water and air flow in soil and retards its productivity. Dust may contain toxic element which are dangerous for crop as well as soil.

Hence it is necessary to pay attention towards the sources and effects of different pollutants or contaminant in the soil. We have to control such activities to sustain the fertility and productivity of soil.

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