



The Linkage between Agricultural Practices and Environmental Degradation

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Abstract

Everything surrounding us is environment. Human have been benefit from nature since existence. Environmental pollution is a main problem now days and is likely to influence the daily life of human populations. The advancement in science and technological activities yielded disruptive results in nature. This paper provides the insight view about the linkages and effects of various agricultural practices on our environment. The effects of human on environment were unconsidered initially because of environment renewability feature; even it was thought that the environment would eradicate the impurity. But with the passage of time the harmful effect became more than renewability capacity of environment therefore the environment started to deteriorate rapidly. Main reasons of environment pollution are irregular and rapid industry, urbanization, organic and inorganic wastes that left in environment, unintended usage of agricultural lands and wrong agricultural applications. Erroneous using of pesticides and chemical fertilizers, irrigation, tillage, plant hormone applications and lack of knowledge are the key reasons. Also stubble burning, planting without rotation and inappropriate animal wastes are assumed as mistakes. Due to unsustainable human practices and activities the entire production platform of the planet has now become seriously endangered.

Keywords: Agricultural Practices, Environmental Degradation.

1- Introduction

Environment quality appears to be degraded in almost all regions with intensive agriculture and rapid urbanization. Unfortunately, little information is available to evaluate the extent to which agricultural contaminants such as fertilizers, pesticides have impaired the health of soil and freshwater ecosystems. However, incidents of algal blooms and eutrophication are widespread in freshwater systems all over the world which is an indicator that these systems are profoundly affected by water pollution. Groundwater quality suffers from many of the same pollution problems as surface waters and faces the additional challenge of being very difficult to restore once the underlying aquifer is contaminated. To improve soil quality and prevent soil degradation proper crop rotation, cover cropping, addition of organic matter at regular interval is needed. Judicious and timely application of irrigation water, fertilizers and pesticides is very important in this regard. While applying fertilizers and pesticides, the risk mitigation measures that can be followed include preventing spill, use of only appropriate amount, avoiding spray over impervious soil layer, and avoiding chemical application to the bare or eroding soil or near water systems such as wells, streams, lakes etc. Regular soil and water quality testing and addressing the problem through scientific remedial measures is quite

necessary to keep the environment clean and green.

As environmental conditions affect the agricultural practices, agricultural practices also have effects on environment. Namely; agriculture affects to global flow of greenhouse gases. The main reason for the destruction of forest land is to obtain agricultural land. As a result of agricultural land obtaining, greenhouse gases are created at the same time. These greenhouse gases show the second major negative impact after the negative effects of greenhouse gases which created by the using of the fossil fuels. There is thus a need of increased awareness regarding the conservation of our environment.

2- Agricultural Practices vs Environment

Environment can also be described as an external medium where human, animals and plants live together. Environment pollution occurred by irregular urbanization, irregular and rapid industry, organic and inorganic wastes that left in environment, unintended usage of agricultural lands and wrong agricultural applications. Erroneous use of pesticides and chemical fertilizers, irrigation, tillage, plant hormone applications are some of the wrong practices. Also stubble burning, planting without rotation and inappropriate animal wastes are assumed as mistakes (Gurbuz, 1992). Evaluating the effects of best management practices in agricultural watersheds is often complicated by significant temporal variability in weather and hydrologic conditions (Zollweg&Makarewicz, 2009). Best management practices are increasingly being used by decision makers to reduce agricultural non-point source pollution while improving productivity for the farmers (Esen&Uslu, 2008). There is a need to consider

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local level policies and practice, informed by a combination of participatory approaches and sound science at an appropriate scale (Stoate et al., 2009).

Mentioned below are few of the agricultural practices which harm the environment directly or indirectly:

3-1- Use of Insecticides and Pesticides

Insecticides/Pesticides and their degraders can be found almost any time of the year in streams draining extensive agricultural or urban areas. They are also often found in shallow ground water (Gilliom et al., 2006). Pesticides/Insecticides are used to eliminate harmful insects, microorganisms and other pests from the crop fields. They when mix with soil, water, air and food, cause problems to agricultural food and affect both human health and natural balance and thus causing environment problem. Pesticide runoff is an important contributor to surface-water contamination (Wohlfahrt et al., 2010). Important thing about pesticides/insecticides are that they not only kill the harmful but also kills many harmless but useful organisms. Modeling stream water pollution by herbicides in agricultural areas is a critical issue since numerous and incompletely known processes are involved (Odoux et al., 2009). It has reported that alternative implementation designs combining the use of herbaceous riparian buffers with other practices capable of altering nutrient and pesticide loads, riparian hydrology, and in stream habitat are needed (Smiley et al., 2011).

The persistence/insecticides and toxicity of these medications are affected by environmental conditions such as temperature, pH, and soil type; consequently, these chemicals may degrade quickly or persist longer than expected (Boxall et al., 2003). Compounds may be transported quickly to surface waters via runoff or they may be transported slowly and persist months after use. Environmental concentrations of emerging compounds generally occur in amounts that are an order of magnitude lower than acute toxicity levels.

3-2- Use of Chemical fertilizer

The fertilizers usually improve the crop vigor and production and when used in excess cause environmental pollution. Using high amounts of nitrogen fertilizer often results in soil washing, ground water contamination, degrading drinking water, streams and sea. The biggest issue facing the use of chemical fertilizers is groundwater contamination. Nitrogen fertilizers break down into nitrates and travel easily through the soil. Because it is water-soluble and can remain in groundwater for decades, the addition of more nitrogen over the years has an accumulative effect. The excess amount of Nitrogen fertilizer causes Algal Bloom in the water, which hinders the growth of other organisms in the same water. This also affects the water organisms and when that water is used somewhere they break the natural balance of environment. Additionally the lettuce and spinach that are grown in the high amount nitrogen applied soils accumulate NO₂ and NO₃ and some carcinogenic substances like Nitrosamine. Drinking waters should not contain more than 20 ppm Nitrate. For this purpose many European countries makes limitation to nitrogen fertilizer usage in ground water conservation regions.

Nitrogen groundwater contamination also contributes to marine "dead zones". The increase in the water-soluble nitrates creates an influx of plant-life, which eats up oxygen and starves out fish and crustaceans. This has an impact not only on the aquatic ecosystem, but on local societies who depend on food sourced from those areas.

3-3- Crop Rotation

Crop rotation is the practice of growing a series of dissimilar/different types of crops in the same area in sequential seasons. Agricultural applications which are without rotation due to lack of knowledge or economic reasons entail to one-way consumption of soil plant nutrition elements, decrease to soil fertility, degradation, increasing of disease and harms in the soil and it also cause soil erosion.

3-4- Plant Hormone Usage

Plant hormones are the organic substances that are produced by the plants and responsible for the plant growth and development and also increase the yield. Using of plant hormone is harmless in case of appropriate dosage and time, but the same hormone could make toxic effect if it used careless. The most used hormone is 2,4-D. The allowable limit to use this hormone varies from country to country e.g. Sweden does not give permission for any residue of 2,4-D, on the other hand Germany allowed 2.0 ppm in citrus species and 0.1 ppm for other products.

3-5- Irrigation

Good irrigation practices are the back bone of high agricultural yield and quality in arid and semi-arid regions. Wrong irrigations practices cause environmental problems such as rising of ground water, salinity, fertilizers and chemical additives residues go deep in the soil with irrigation water; trace elements accumulate in water sources and cause soil erosion. These types of waters are the main cause of disease and are harmful to other living organisms. Also excessive irrigation leads to soil salinity and desertification (Haktanir, 1989). On the other hand bad agricultural policies and its implications has an effect on land use, thus changes the economic conditions of a region (Schuler & Sattler 2010).

3-6- Soil tillage

Tillage is the agricultural preparation of the soil by mechanical agitation of various types, such as digging, stirring, and overturning. Wrong soil tillage without giving due regards to field location, soil structure and climate conditions cause soil erosion in rainy seasons. This situation not only cause inefficient soils but also pollutes streams and fills up dams with soil (siltation). The other effects are that the soil loses a lot of its nutrients like nitrogen and its ability to store water, higher rate of fertilizer and chemical runoff, decreases the water infiltration rate of soil (results in more runoff and erosion since the soil absorbs water slower than before), reduces organic matter in the soil (microbes, carbon compounds, earthworms, ants, etc.), destroys soil aggregates, compaction of the soil, also known as a tillage pan, crop diseases can be harbored in surface residues.

3-7- Animal Wastes

Animal waste put forth a large scale of concerns about the impacts of animal wastes on environment. Businesses like poultries cause negative effects on environment because of manure, urine, animal and animal products processing wastes. These organic wastes contaminate to soil and streams, beside dust, gas and smell effects on environment (Sayili&Akmaz 1994).

3-8- Stubble Burning

Burning small grain stubble and straw as a means of managing excess residue is commonly practiced in the crop production areas of many countries. Farmers and ranchers often burn stubble to remove straw and duff from the field. Burning cereal crop residues after harvest can somewhat reduce diseases where straw serves as a host to pathogens. Burning also results in changes in soil temperature, soil moisture, and nutrient availability (Gupta et al., 1994). Burning grass pastures results in short-term increases in nitrogen mineralization which results in a short burst of nutrient available for the plant (Rice & Garcia, 1994). Burning is also completed to control weeds and insects (Rice & Garcia, 1994).

Research has shown that occasional burning of straw, stubble, and grass may provide the producer with an economical and effective management tool and in some cases increase small grain and grass production in the short-term. However, the same research has shown that repeated, long-term burning of straw or grass (pastures) can have a more permanent negative effect on soil quality and overall soil health. Repeated burning can cause long term reduction in yields. These long-term losses in yield cannot be offset by the addition of fertilizer. Additionally, soils that are high in fertility may take several years to show the detrimental effects of burning. Furthermore, what may look like a savings in fertilizer, pesticides for weed control, or insecticides for insect control, will eventually turn into increased long-term costs to maintain productivity due to continual loss of organic matter, organic nitrogen, organic carbon, and the size and quantity of microbial pools.

4- Results and Discussion

The ever-increasing environmental degradation can be attributed to various causes. But human or anthropogenic activities are the biggest culprits. Yet it is science and technology developed by man which alone can restore the environment. And good agriculture practices and use of biotechnology can play a very big role in this direction. Modern agricultural practices use many kinds of chemicals such as fertilizers, pesticides, cleaners, crop preservatives to produce and keeping large amount of high quality food products. But each of these chemicals has dangerous and unforeseen side-effects like toxicity to non-target organisms which causes to ecological imbalance (Sinha et al., 2009). As mentioned above, wrong agricultural practices cause to environment pollution in various dimensions. In other words, modern agriculture techniques could cause environmental pollution if not used sensibly by humans. Sustainable agriculture which is a new agricultural technique seems environmentally friendly and it is supported by developed countries.

Environmentally friendly agriculture has three common applications. These are good agricultural

practices, organic agriculture and precision agriculture. Intelligent agriculture techniques like crop rotation, sowing of legumes (that are able to nitrogen fixation) and fallowing techniques reduce the negative effect of agriculture on climate. There is a need to develop agricultural practices which are featured by sustainability and ecologically friendly methods.

5- Conclusions

The natural environment, with all its ecosystem services, comprises the entire basis for life on the planet. Its value is therefore impossible to quantify or even model. The state of environment has at any given stage has its effects on food production through its role in water, nutrients, soils, climate and weather. Frequent use of pesticides and chemical fertilizers, bad irrigation techniques, stubble burning, planting without rotation, inappropriate animal wastes, tillage, plant hormone applications and lack of knowledge are the key reasons for deteriorating environment. Therefore there is a need to adopt sustainable agricultural practices to save our planet.

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