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Environmental impacts of agriculture

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Abstract

Agriculture is the practice of rearing domestic animals and crops with the goal of food production. Although agriculture is essential in sustaining human life, the practices associated with it have certain impacts on the environment such as climate change, deforestation, pollution, and environmental degradation. Agriculture can either sustain or degrade the environment. Actually, agriculture and climate change have a reciprocal relationship. Because of poor agricultural practices, climate change increases. And this climate change affects agricultural production through precipitation levels and temperature variations. The most significant climate change associated with agriculture is brought about by methane, nitrous oxide and carbon dioxide. These are greenhouse gases, which are released into the Earth's atmosphere from farming. Also, the energy required for irrigation, farm machinery and the production of fertilizer results in large emissions of green house gases, which contribute to climate change. Negative impact occurs due to intensive agriculture, which affects the environment through high-energy consumption and the polluting effects of pesticides and fertilizers. To achieve sustainable agriculture, healthy soils should be maintained, water pollution should be reduced, number and variety of wild species on farms should be increased (e.g. soil organisms, pollinators and pest-control agents), crop and livestock diversity should be maintained and emissions of carbon dioxide should be decreased to reduce global warming.

Keywords: Global warming, pollinators, degradation.

1. Introduction

Agriculture is an important for sustaining life because it is the process of producing food, feed, fibre and many other desired products by the cultivation of certain plants and the raising of domesticated animals (livestock). It is an art of managing the growth of plants and animals for human use. Agriculture has been derived from two latin words: *Agri* is from Latin *ager* meaning "a field" and *culture* is from Latin *cultura* meaning "cultivation" in the strict sense of "tillage of the soil." Agricultural activities have significant impacts on water quality, including increase in stream sedimentation from erosion, and increase in nutrients, pesticides, and salt concentrations in runoff. In some of the regions, the misuse of pesticides has led to the development of pesticide-resistant strains of pests, destroyed natural predators, killed local wildlife, and contaminated human water supplies. Improper application of fertilizers has changed the types of vegetation and fish types inhabiting nearby waterways and rivers. Modern agriculture is an evolving approach to agricultural innovations and farming practices that help farmers increase efficiency and reduce the number of natural resources like water, land, and energy necessary to meet the world's food, fuel, and fibre needs. The agribusiness, intensive farming, organic farming, and sustainable agriculture are other names of modern agriculture.

2. Impact of Modern Agriculture on the Environment

As we know that modern agriculture improved our affordability of food, increases the food supply, ensured the food safety, increases the sustainability and also produces more bio-fuels. But with the same time, it also leads to environmental problems because it is based on high input–high output technique using hybrid seeds of high-yielding variety and abundant irrigation water, fertilizers and pesticides. The impacts of modern agriculture on Environment are discussed below:

2.1. Soil Erosion

The top fertile soil of the farmland is removed due to the excessive water supply. This leads to the loss of nutrient rich soil that hampered the productivity. It also causes the global warming because the silt of water bodies induces the release of soil carbon from the particulate organic material.

2.2. Contamination of ground water

The ground water is one of the important sources of water for irrigation. From agricultural fields nitrogenous fertilizers leach into the soil and finally contaminate groundwater. When the nitrate level of groundwater exceeds 25 mg/l, they can cause a serious health hazard known as “Blue Baby Syndrome”, which affects mostly infants even leading to their death.

2.3. Water-logging and salinity

Irrigation has big importance to high agricultural yield and quality in arid and semi-arid regions. Wrong irrigations cause to environment problems. Rising of ground water, salinity, fertilizers and chemical additives residues go to deep with irrigation water, trace elements collect in water sources and cause to soil erosion and these kinds of waters make disease and harmful on the whole living organisms so this type of waters are a very important environment problem. Also excessive irrigation as a purpose of agricultural production leads to soil salinity and desertification. It can be said, as agricultural policies affect land use, they have effects on the amount of soil erosion in agricultural regions through changes of the economic conditions of agricultural production. The salinity of the soil is one of the reasons of low productivity just because of the improper management of farm drainage. In this situation, the roots of plants do not get enough air to respiration then it leads to low crop yield as well as low mechanical strength.

2.4. Excessive use of fertilizers

The fertilizer which are used to improve plant growth, more and qualified product and some features of soil like physical, chemical and biological structure cause to environmental pollution in case of excessive or wrong usage. Using high amounts of nitrogen fertilizer results to soil washing, contaminates to ground water, drinking water, stream and sea nonetheless it increases nitrogen amount. This also affects the water organisms and when that kind of waters used to somewhere they break the natural balance of environment. Additionally the lettuce and spinach that are grown in the high amount nitrogen applied soils accumulate NO_2 and NO_3 and some carcinogenic substances like nitrosamine. Drinking waters shouldn't contain more than 20 ppm nitrate. For this purpose many European countries makes limitation to nitrogen fertilizer usage in ground water conservation regions. Unconscious using of phosphorus fertilizers also breaks natural balance due to increasing phosphate value in water. Excess micronutrient elements in soil are much more important than nitrogen, phosphorus and it is harmful to the domestic plants.

2.5. Eutrophication

It refers to the addition of artificial or non-artificial substances such as nitrates and phosphate, through fertilizers or sewage, to a fresh water system. It leads to increase in the primary productivity of the water body or 'bloom' of phytoplankton. Excessive use of fertilizers that consists of nitrogen and

phosphorus leads to over nourishment of the lakes/water bodies and gives rise to the phenomenon of eutrophication (eu = more, trophication = nutrition).

2.6. Excessive use of Pesticide

Pesticides that are used to elimination of harmful insects, microorganisms and other pests which they mixing with soil, water, air and food, they cause to problems on the agricultural foods and affect both human health and natural balance so finally they become an environment problem. Pesticide runoff is an important contributor to surface-water contamination. A pesticide that specialized on a harmful doesn't kill only target, it also kills many harmless organisms. Modeling stream water pollution by herbicides in agricultural areas is a critical issue since numerous and incompletely known processes are involved. 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. Additionally fields, streams, lakes, ground water and sea converted to a kind of poison storage in time. There are hundreds of pesticides that are used in the world. According to WHO's classification, 33 pesticides are very dangerous, 48 of them are quite dangerous, 118 of them are moderately dangerous and 239 of them are less dangerous of totally 700 mostly used pesticides. A 75% rate of pesticide usage belongs to developed countries

2.7. Soil tillage

Wrong soil tillage with regards of without any concern field location, soil structure and climate conditions cause to soil moving with rain in other words cause erosion. This situation not only cause to inefficient soils, it also pollutes streams and fills up dams with soil etc. serious environment problems. Cultivation of natural ecosystems has led to marked decline in soil C storage, such that conservation agricultural practices are widely recommended as options to increase soil C storage, thereby mitigating climate change. Rotation Bio-energy crops play an ecologically and economically fundamental role as an alternative to agri-food productions and as renewable energy sources. Little attention has been focused on soil quality following conversion of agricultural lands to biomass crops. Agricultural applications which are without rotation due to lack of knowledge or economical 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 to erosion.

2.8. Plant hormone usage

Plant hormone term means that some organic substances that created by plants and can be effective even very low intensity, and they moved in plant for growing and development also they 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 amount of this hormone shows difference country to another. As an example Sweden doesn't give permission any residue of 2,4-D, Germany allowed 2.0 ppm in citrus species and 0.1 ppm for other products.

2.9. Stubble burning

As intensive agricultural technical common, the yield per area also increased. With regards of increased product, total stem and hay value also has increased, but stem and hay using area

decreased rapidly. This situation made faster to stubble burning at developed countries. For elimination of stem, hay and especially secondary product applied agricultural areas; stubble is burned to prepare seed sowing. But it is clear that stubble burning cause to very important environment problems. It cause to wind and water erosion, product lose when it made uncontrolled applications, breaks the natural vegetation and makes the soil unfertile by destroying vitality on the top side of soil. For these harms on the environment, stubble burning prohibited with laws in many countries.

3. Conclusion

There is no doubt that modern techniques have boosted the agricultural production which enabled to feed the exploding population of the world. But if we evaluate the impact of this modern agriculture on the environment that is not very satisfying and thus it seems that this production is temporary. The extensive use of pesticides and fertilizers have degraded the fertility of the soil and depleted our sources of water as well as air. Moreover the poor irrigation and tilling practices have lead to soil erosion, and degradation of the fertile layer of the soil thus leading to desertification of soil. There is no doubt that we have to make production of food even better in order to meet the requirements of the growing population but we will have to discover new techniques and methods which can prevent the depletion of the useful natural resources without compromising the production of the food.

4. References

1. Esen E, Uslu O. Assessment of the effects of agricultural practices on non-point source pollution for a coastal watershed: A case study Nif Watershed, Turkey. *Ocean & Coastal Management*. 2008; 51:601-611.
2. Stoate C, Ba'ldi A, Beja P, Boatman ND, Herzon I, van Doorn A *et al*. Ecological impacts of early 21st century agricultural change in Europe- A review. *Journal of Environmental Management*. 2009; 91:22-46.
3. Wohlfahrt J, Colin F, Assaghir Z, Bockstaller C. Assessing the impact of the spatial arrangement of agricultural practices on pesticide runoff in small catchments: Combining hydrological modeling and supervised learning. *Ecological Indicators*. 2010; 10:826-839.
4. Odoux CG, Arousseau P, Cordier MO, Durand P, Garcia F, Masson V *et al*. A decision-oriented model to evaluate the effect of land use and agricultural management on herbicide contamination in stream water. *Environmental Modelling & Software*. 2009; 24:1433-1446.
5. Smiley Jr PC, King KW, Fausey NR. Influence of herbaceous riparian buffers on physical habitat, water-chemistry, and stream communities within channelized agricultural headwater streams. *Ecological Engineering*. 2011; 37:1314-1323.
6. Şimşek Y. Zirai Mücadele Şaşkınlığı. *Sızıntı Dergisi*. 1991, Cilt: 13, Sayı: 154.
7. Haktanır K. Toprak Kirliliği ve Amaç Dışı Tarım Toprağı Kullanımı. *Tarım ve Mühendislik Dergisi, TMMOB Ziraat Mühendisleri Odası Yayınları*. 1989, Sayı: 33.
8. Schuler J, Sattler C. The estimation of agricultural policy effects on soil erosion- An application for the bio-economic model MODAM. *Land Use Policy*. 2010; 27:61-69.
9. Luo Z, Wang E, Sun OJ. Soil carbon change and its responses to agricultural practices in Australian agro-ecosystems: A review and synthesis. *Geoderma*. 2010; 155:211-223.
10. Pellegrino E, Di Bene C, Tozzini C, Bonari E. Impact on soil quality of a 10-year-old short-rotation coppice poplar stand compared with intensive agricultural and uncultivated systems in a Mediterranean area. *Agriculture, Ecosystems and Environment*. 2011; 140:245-254.