

## Effects of Agricultural Practices on Environment

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**Abstract.** The advancement in science and technological activities yielded disruptive results in nature. However, for a certain period human beings had lived unaware about their damage on nature. Afterwards the detriment of human on environment unconsidered initially because of environment renewability feature, even it was thought that the environment would eradicate the impurity. In time, increasing of harm on environment with every aspect was more and more than renewability capacity of environment therefore the environment started to deterioration and pollution 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 are some of the wrong applications. Also stubble burning, planting without rotation and inappropriate animal wastes are assumed as mistakes.

**Keywords:** agricultural practices, ecology, environment pollution, pesticide.

### 1. Introduction

Human have been benefit from nature since existence. It cannot be said that the relations between human and nature was in negative direction initially. Human really organized to local areas while they were dealing with agricultural activities, and for a long time they applied the agricultural technical without corruption to the balance of the nature. As the results of science and technology like various activities, methods, and their results acquired nature disruption attributes. For a certain period human being had lived unaware about their damage on nature. Afterwards the detriment of human on environment unconsidered initially because of environment renewability feature, even it was thought that the environment would eradicate the impurity. In time, increasing of harm on environment with every aspect was more and more than renewability capacity of environment therefore the environment started to deterioration rapidly. On the other, pollution and corruption that occurs owing to common activities of human effected quantity and quality of agricultural production, and these interactions made an important discussion subject that called as agriculture-environment relationships [1]. There are many of plants that used to medical purposes. *Matricaria recutita* L. is a well-known medicinal plant species that used in several medicinal preparations and its essential oil. It was reported that agricultural practices impact sesquiterpenic compounds of the of *M. recutita* L. [2]. Animals also benefit from nature and again they effect to human directly or indirectly. It has been reported that amongst all the parameters used to assess the quality of hay, fungal diversity and the production of breathable dust were the most sensitive parameters to agricultural practices and climatic factors [3].

As environmental conditions effect to agricultural practices, agricultural practices also have effects on environment. Namely; agriculture affects to global flowing 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. Forests collect carbon 20 or 40 times more than agricultural lands and most of the carbon is released into atmosphere when forests has been destroyed to open agricultural land [4].

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Methane gas can also occur sometimes in agriculture. Paddy cultivation worldwide is responsible for 40% of global methane emission. High microbial decay of organic materials emits methane into the atmosphere where rice grows in low-oxygen environment. Ruminant livestock bring 15% of global methane emission. These animals digest the cellulose and release methane gas into the air.  $N_2O$  which is another greenhouse gas is closely related to agriculture. A part of nitrogen released into the soil turn in  $N_2O$  and released into the atmosphere as a result of nitrogen fertilizer application. Nitrogen fertilizers led to %0.1 - %1.5 of the natural  $N_2O$  oscillation. Different application in agriculture is affecting the spread of greenhouse gases. Fossil fuels are used more in areas of intensive agriculture [5].

## **2. Effects of Agricultural Practices on Environment**

### **2.1. Negative effects of agricultural applications**

Environment described as external medium where human, animals and plants triple live together. Environment consists from two pieces that human hand made and natural environmental. Environment pollution occurred by irregular urbanization and unconscious industry and applications. Also the balance between human and the natural environment where human live breaks [6]. 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 are some of the wrong applications. Also stubble burning, planting without rotation and inappropriate animal wastes are assumed as mistakes [7]. Evaluating the effects of best management practices (BMPs) in agricultural watersheds is often complicated by significant temporal variability in weather and hydrologic conditions [8]. BMPs are increasingly being used by decision makers to reduce agricultural non-point source pollution while improving productivity for the farmers [9]. There is a need to consider local level policies and practice, informed by a combination of participatory approaches and sound science at an appropriate scale [10].

#### **2.1.1. Pesticide usage**

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 [11]. 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 [12]. 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 [13].

Additionally fields, streams, lakes, ground water and sea converted to a kind of poison storage in time [14]. 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.

#### **2.1.2. Chemical fertilizer usage**

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.

### **2.1.3. Irrigation**

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 [15]. 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 [16].

### **2.1.4. 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 [17].

### **2.1.5. Rotation**

Bioenergy 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 [18]. 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.

### **2.1.6. 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.

### **2.1.7. 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.

### **2.1.8. Animal wastes**

Animal production has caused many changes in kinds of industry sectors. These changes put forth a large scale of concerns about the impacts of animal wastes on environment. In great business' animal husbandry especially poultries cause to negative effects on environment because of manure, urine, animal and animal products processing wastes. These organic wastes contaminate to soil and stream beside dust, gas and smell effects on environment [19]. Animal wastes play an important role in environmental pollution [20].

## **2.2. Positive effects of agricultural applications**

As agriculture has negative effects on environment it also has positive effects. For instance some regions that have commonly agricultural applications have various favorable environmental effects kind of natural life, oxygen production and climate depending on regions and ecology. As example although fertilizing has negative effects on air, it has indirect positive effects. In the fertilized fields, O<sub>2</sub> is consisted by photosynthesis so it increases amount of O<sub>2</sub> in atmosphere. So cereal production areas constitute 12 ton oxygen in per 1 ha area. Oxygen production in agricultural area is more than forests and empty areas. In these areas, the poison of the air decreases depending on CO<sub>2</sub> reception.

### 3. Results and Suggestions

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. But every single of these chemicals has dangerous and unforeseen side-effects as like toxicity to non target organisms which causes to ecological imbalance [21]. As described on the top, wrong agricultural practices cause to environment pollution in important dimensions. In other words, agricultural technical especially modern technical could make environment pollution in the event unless human would sensitive. For this reason humanity developed a new perspective to decrease the negative effects of agriculture. 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. Also rotation, sowing of legumes that able to nitrogen fixation and fallowing reduce the negative effect of agriculture on climate change. We suppose to make many researches about the agricultural practices which are featured by sustainability and ecologically friendly methods.

As we know, water and air are the abandonment sources of agriculture and all vital activities. Environment that comprised by unpolluted air, water, soil, far from noise and other dirtiness, clean, beautiful, green and healthy is the biggest demand of present day human and guarantee of future.

### 4. References

- [1] D. Eser, and H. H. Geçit. Ekoloji. *A.Ü. Ziraat Fakültesi*. 2010, 1584, Ders Kitabı: 536.
- [2] S. Petronilho, M. Maraschin, I. Delgadillo, M. A. Coimbra, and S. M. Rocha. Sesquiterpenic composition of the inflorescences of Brazilian chamomile (*Matricaria recutita* L.): Impact of the agricultural practices. *Industrial Crops and Products*. 2011, 34: 1482–1490.
- [3] A V. Se'guin, S. L. Lavenant, D. Garon, V. Bouchart, Y. Gallard, B. Blanchet, S. Diquelou, E. Personeni, P. Gauduchon, and A. Ourry. Effect of agricultural and environmental factors on the hay characteristics involved in equine respiratory disease. *Agriculture, Ecosystems and Environment*. 2010, 135: 206–215.
- [4] F. Kamer, and S. Gürlek. Gelişmekte Olan Ülkelerde Tarım-Çevre-Ekonomi Etkileşimi. *Doğuş Üniv. Dergisi*. 2003, 4(2): 197-206.
- [5] M. Önder, and A. Kahraman. Global Climate Changes and Their Effects on Field Crops. *10<sup>th</sup> International Multidisciplinary Geoconference SGEM, Conference Proceedings*. 2010, Volume II, Page: 589-592, 20-26 June 2010, Bulgaria.
- [6] E. Özfbey. Türkiye'de Çevre Sorunları. *Ziraat Dünyası Dergisi*, Türkiye Ziraatçılar Derneği Yayınları. 1992, Sayı: 411.
- [7] M. Gürbüz. Çevre Tarım İlişkileri. *Ziraat Dünyası Dergisi*, Türkiye Ziraatçılar Derneği Yayınları. 1992, Sayı: 411.
- [8] J. Zollweg, and J. C. Makarewicz. Detecting effects of Best management practices on rain events generating nonpoint source pollution in agricultural watersheds using a physically-based stratagem. *Journal of Great Lakes Research* Volume 35, Supplement 1. 2009, pp 37-42.
- [9] E. Esen, and O. Uslu. 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.
- [10] C. Stoate, A. Ba'Idi, P. Beja, N.D. Boatman, I. Herzon, A. van Doorn, G.R. de Snoo, L. Rakosy, and C. Ramwell. Ecological impacts of early 21st century agricultural change in Europe – A review. *Journal of Environmental Management*. 2009, 91: 22–46.

- [11] J. Wohlfahrt, F. Colin, Z. Assaghir, and C. Bockstaller. 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.
- [12] C. G. Odoux, P. Aurousseau, M. O. Cordier, P. Durand, F. Garcia, V. Masson, J. S. Monviola, F. Tortrat, and R. Trepos. 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.
- [13] P. C. Smiley Jr, K. W. King, and N. R. Fausey. Influence of herbaceous riparian buffers on physical habitat, water chemistry, and stream communities within channelized agricultural headwater streams. *Ecological Engineering*. 2011, 37: 1314–1323.
- [14] Y. Şimşek. Zirai Mücadele Şaşkınlığı. *Sızıntı Dergisi*. 1991, Cilt: 13, Sayı: 154.
- [15] K. Haktanır. Toprak Kirliliği ve Amaç Dışı Tarım Toprağı Kullanımı. *Tarım ve Mühendislik Dergisi, TMMOB Ziraat Mühendisleri Odası Yayınları*. 1989, Sayı: 33.
- [16] J. Schuler, and C. Sattler. The estimation of agricultural policy effects on soil erosion—An application for the bio-economic model MODAM. *Land Use Policy*. 2010, 27: 61–69.
- [17] Z. Luo, E. Wang, and O. J. Sun. Soil carbon change and its responses to agricultural practices in Australian agro-ecosystems: A review and synthesis. *Geoderma*. 2010, 155: 211–223.
- [18] E. Pellegrino, C. Di Bene, C. Tozzini, and E. Bonari. 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.
- [19] M. Sayılı, and Z. Akmaz. Tarımsal Uygulamalar ve Çevreye Olan Etkileri. *Ekoloji*. 1994, Sayı: 12, Sayfa: 28-32.
- [20] J. Dominguez, C.A. Edwards, and J. Ashby. The biology and population dynamics of *Eudrilus eugeniae* (Kinberg) (Oligochaeta) in cattle waste solid. *Pedobiologia*. 2001, 45: 341-35.
- [21] V. Sinha, V. Rai and P. K. Tandon. Pesticides: Use, impact and regulations for management. *Agricultural Wastes*. 2009, 93-107.