



## EFFECT OF CHEMICAL FERTILIZER ON SOIL FERTILITY: A GEOGRAPHICAL STUDY OF AKKALKOT TALUKA IN SOLAPUR DISTRICT

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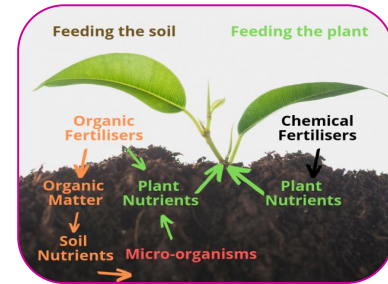
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### Abstract :

Agriculture is the fundamental mode to satisfy the food demands of mankind and soil is the only medium to practice agriculture. Maintenance of soil quality and fertility is the most crucial to satisfy the world food demand. Modern agriculture has become capital, chemical and technology intensive. In India the increased use of fertilizers and pesticides in agriculture started since 1970s as part of the green revolution to meet the nutrients demand of high yielding and fertilizers responsive varieties of crops. Different types of pesticides and chemical fertilizers are use in Akkalkot which is harmful for soil and human health. This study is based on field level data for Akkalkot area of Solapur district. Fertilizers are compounds that include a single or multiple nutritional elements, as well as any materials that are applied directly to the soil for the goal of encouraging plant growth, boosting crop yields, or improving crop quality. As the essential macronutrients are lost by many reasons like overgrazing by animals or leaching in soil, it is very essential to maintain the soil fertility as it directly affects the crop productivity. Fertilizers and Pesticides are mostly used in food grains and vegetable farming. But limitation of fertilizer uses is not satisfactory, so this chemical fertilizer have been negatively effecting on the soil health. In study area different types of chemical fertilizers for the improvement of crop production are like Urea, DAP and others. Over use of fertilizers, more than the recommended amount for continuous monoculture cropping system caused formation of accumulation of mineral salts of fertilizers that lead to soil degradation in long term. Soil degradation directly effect on the soil structure and nutrient uptake and its effect on production. Earthworms and other micro-organisms are essential and play a crucial role inorganic matter. For this study 120 farmers interviewed with well deigned questionnaire. The impact of use of chemical fertilizers is medium scale in Akkalkot.

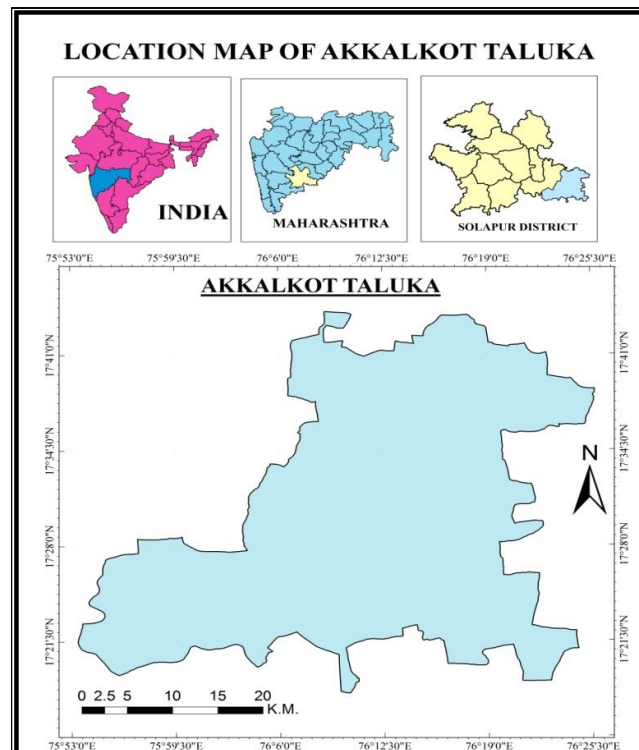
**Key Words:** Effect, Chemical Fertilizer, Soil Fertility, Water Quality Micro-organism etc.

### Introduction:

Agricultural activity is most important in human development. Agriculture is depending on organic matter as well chemical fertilizer. Now a day for fulfillment of growing population tradition agricultural activity is not support to food demand. So most the farmers are use high quantity chemical fertilizer for commercial farming. Soil is certainly very significant to us. It is very essential to keep the soil clean and healthy to maintain our earth as a beautiful planet and as a complete ecological system. But now a day's soil suffers from pollution due to very fast growth of industrialization urbanization and also use of chemical fertilizers herbicides and pesticides. Fertilizers are substances used to add nutrients to the soil to promote soil fertility and increase plant growth. Chemical fertilizers increase crops production and their overuse has hardened the soil decreased of soil fertility. Chemical fertilizers are high in nitrogen salts and when the nitrogen is absorbed by soil too quickly it will dehydrate and dry up the plant. The application of chemical fertilizers and pesticides has become necessary by farmers to achieve maximum productions of agriculture produce and to feed the growing population but excessive use of this fertilizer creates adverse effect to the soil health. Due to chemical fertilizer use, increases salinity and heavy metal accumulation and accumulation of nitrate lead to problems of infertility in soil. Uses of Excess quantity of chemical fertilizer in soil make contaminate the groundwater and possibly the surface water of river and lake with the negative effect. Continuous use of acid farming nitrogen fertilizers causes a decrease in soil PH.

### Study Area:

Akkalkot taluka is situated in southern part of the Maharashtra plateau. Akkalkot taluka is lies between  $17^{\circ}17'54''$  to  $17^{\circ}44'13''$  north latitude &  $75^{\circ}53'142''$  to  $76^{\circ}25'143''$  East longitude. According to area the Akkalkot tehsils as a 6<sup>th</sup> rank with 1401 Sq. Km. & contains 138 villages. Akkalkot tehsil occupies the southeast corner of the district and is bordered by Osmanabad District to the north, Gulbarga and Bijapur districts of Karnataka to the southeast and south respectively and South Solapur Taluka to the west. Akkalkot tehsil is occupied by the Bori, Harana and Seena river basin. The tehsil headquarters is located at Akkalkot, which is also the largest city in the tehsil and a religious center of the area.



**Literature Review:**

The review of literature has got its own importance by any monographic work because it provided important information about the different study angles through the subject handled by other writers. The concept of green revolution and use of chemical fertilizers and pesticides and herbicides are commonly used in many scholar studies. Virinder Sidhu and others focused on pesticides pollution in agriculture soils and sustainable remedies for soil quality improve. He also studied the types of pesticides which used in agriculture.

Pratibha Prashar and Shachi Shah in their views chemical fertilizers impact on soil microflora and also soil functions affected by use of pesticides and fertilizers. According to him soil is the most diverse and favorable habitat for microorganisms.

Ashwini and Jithesh in their articles use of artificial fertilizers impact on soil fertility and due to the chemical fertilizers the structure, chemical content, proportion of microorganisms are also changes in soil.

In Maharashtra according to Thorat J. and More A.L. studied on the impact of fertilizers on condition of environment and human health. They are also focused on environmental pollution, human health and organic fertilizers.

**Objectives:**

**The present study has certain specific objectives. These are as follows.**

1. To study the effect of chemical fertilizer on soil fertility.
2. To suggest for remedies for improve the soil fertility.

**Methodology:**

This study was conducted in January to March 2023 both primary and secondary sources of data were used. Primary source data generated through field work and well structured interview and questionnaire were used. The secondary data were obtained from relevant literature. Purposeful sample of 120 farmers were selected and interviewed for the study.

**Hypothesis:**

**The following hypothesis consider for present study...**

1. Chemical Fertilizer is applied in excess can cause great harmful affect to soil.
2. Chemical fertilizers effects on soil fertility through nutrient imbalance and soil PH.
3. Excessive use of chemical fertilizers can pollute underground water and water bodies.

**Table 1**  
**Data Collection and Discussion**

Sr. No.	Indicators	Classification	Total Farmers	Percentage (%)
1.	Land Holding Capacity	Large (More than 10 Acre)	23	19.2
		Medium (5-10 Acre)	41	34.2
		Small (Less than 5 Acre)	56	46.7
2.	Types of Fertilizer	Chemical	34	28.3
		Organic	33	27.5
		Chemical and Organic	53	44.2
3.	Nature of Soil Structure (Hardness)	Yes	63	52.5
		No	57	47.5
4.	Availability of Earthworms in soil	Yes	51	42.5
		No	69	57.5
5.	Changes in Soil Colour	Yes	77	64.2
		No	43	35.8
6.	Non availability of Soil	Yes	69	57.5

	Porosity	No	51	42.5
7.	Water Holding Capacity	100 %	35	29.2
		75 %	59	49.2
		50 %	26	21.7
8.	Crop/ Food Quality	Good	50	41.7
		Medium	59	49.2
		Satisfy	11	09.2
9.	Changes in Water Quality	Yes	66	55
		No	54	45
10.	Presence of Micro-Nutrient in Soil	Yes	58	48.3
		No	62	51.7
11.	Declination of Micro-Organisms in Soil	Yes	87	72.5
		No	33	27.5
12.	Condition of Soil Fertility	Good	34	28.3
		Medium	73	60.8
		Low	13	10.8
13.	Soil Degradation	Yes	77	64.2
		No	43	35.8

**Source:** Field Study (2023)

In this study we have collected 120 farmer's views regarding impact of chemical fertilizer on the soil fertility. This study includes land holding capacity, types of fertilizer, nature of soil structure (hardness), availability of earthworms in soil, changes in soil colors, non availability of soil porosity, water holding capacity, crop/ food quality, changes in water quality, presence of micro-nutrient in soil, condition of soil fertility, soil degradation, declination of micro-organisms in soil etc.

Table 1 shows that the land holding capacity of farmer. According to survey and as a result of Indian family system in study region the small farmer (less than 5 acre) proportion is large (46.7%). In study region chemical and organic fertilizers is used for growth of plant. The total 72.5 percent of farmers used both fertilizers but out of that 28.3 percent farmers used only chemical fertilizers. By cause of overuse chemical fertilizers 52.5 percent farmer's agricultural land and soil became hard and also 57.5 percent of farmers land recorded non availability of earthworms. For the reason of chemical content, fertilizer during monsoon and dry season chemical reaction happened with soil, so in study region 64.2 percent respondent react with change in natural colour of soil. Due to overuse of chemical fertilizers 57.5 percent of land recorded Non availability of Soil Porosity in study region and its effect on water holding capacity of soil. In study region 21.7 percent agricultural land is only 50 percent natural water holding during monsoon period. By reason of chemical fertilizer the quality of crops and food decline from excellent to satisfy. The survey recorded 58.4 percent farmers react for medium and satisfied. In study region use and over dose of chemical fertilizer, chemical content and harmful compound was accumulated in soil. And it added and dissolved in natural water body like well and tube well of farmers during rainy season. So in Akkalkot taluka recorded 55 percent of water body's changes quality of natural water. For the growing of good quality and healthy crops, the NPK content fertilizer is required so most of farmers prepared only NPK base fertilizer and monoculture cropping system. But that time other micronutrients are not used for healthy growing crop and its impact on declining the proportion of micronutrients in soil and study also recorded 51.7 percent agricultural land absence of micronutrients. In modern agriculture practice, farmers look less preference for livestock rearing and mixed farming in both at the same time. So in study region quantity of livestock is less and its affect on non availability of organic matter. Hence most of the farmers prepare for chemical fertilizer. In study region chemical fertilizer is used in large scale so it's effect on soil fertility and recorded medium and low fertility. Overall in study region due to overuse of chemical fertilizer the soil became degraded and its effect on low scale total crop production.

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**Conclusion:**

The availability of earthworms in the soil is decreasing; soil quality and fertility is closely linked with the microbial biodiversity of Agricultural lands thus changes in the composition and properties of soil micro organisms. The soil structure become hard of 52.5% farmers land. The quality of natural groundwater in the water bodies of land is changing. The quality of crops and food is declining and increasing soil degradation in the study region.

**Remedies:**

With the help of following remedies we overcome on problems related to excessive use of Chemical Fertilizers...

1. Use of chemical fertilizers should be limited.
2. More emphasis should be given on the use of organic fertilizers instead of chemical fertilizers. Organic manures also contain organic matter through which the physical condition of the soil improves like aeration, soil structure, and water holding capacity.
3. Use of biological pesticides and herbicides.
4. Mixed cropping system and trap crops should be planted.
5. Crop rotation should be adopted.
6. Group farming should be developed and farming should be done with the advice agricultural experts.
7. Parasitic insect should be used and agro forestry should be use.
8. Water should be used according to the need of crop.

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