***The effect of irrigation with sulfur water on the chemical and physical properties of soil, land cover, and adaptation of some living organisms***

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**Abstract**; The purpose of this study was to investigate the effect of irrigation with sulfur water on the chemical and physical properties of soil, land cover, and adaptation of some living organisms.

The research was applied to the sulfur- spring site in the town of Saiya in Samail. The water protocol was applied to sulfur water, and an analysis of minerals and materials was done on water samples. Soil protocol was also applied to samples from four sites of topsoil (5-20 cm) over which sulfur water flows. In addition, the land cover protocol was also applied to crops irrigated with sulfur water. Besides, observation and interviews with some of the townspeople were conducted to identify the crops that have adapted to the sulfur water.

The results of the research indicate a medium-risk salinity of sulfuric spring water. The results also show that it contains a percentage of potassium and nitrate, and this would increase soil fertility. It also contains a high amount of sodium (high soda) (285- 79 g / L), with which it is necessary to consider the good drainage of water into the soil. The soil through which the sulfur spring water flows was characterized as a simple alkaline (pH = 8.3) and its easy-to-crush granular structure with clayey clay tissue, during which many roots and a high percentage of carbonate appeared indicating the effect of the use of sulfur water on chemical and physical changes in the soil. The soil fertility is indicated by a high percentage (92%) of tree density in the area. Many crops also have shown their adaptation to the sulfuric spring water over the years, most notably the palm trees. It has also noted the presence of small ponds (repelling) swimming in these water. Thus, the researchers recommend the possibility of using sulfur spring water for irrigation if its properties are studied and evaluated.

**Research Questions**

1. What are the hydrological characteristics of sulfur water in Saiya Spring, in Samail?

2. What are the chemical properties of the soil over which sulfur water flows?

3. What are the physical properties of soil over which sulfur water flows?
4. What is the nature of the ground cover irrigated with sulfur water?
5. What classes of organisms have shown their adaptation to sulfur water?

**Research Procedures**

1.Setting a timetable for the research plan.

1. Distributing the roles among the research team.
2. Identifying and reviewing the related literature of the research topic and document them.
3. Selecting the study site to start collecting data. (Saiya Spring, Saiya town, Samail State)
4. Determining the appropriate protocols for collecting research data which include: water protocol, soil protocol, and land cover protocol.
5. Determining the appropriate devices and tools to be used in the application of the protocols and select the necessary data. Implementing the prescribed protocols to samples taken from the specified sites.
6. Interviewing some residents of the town of Saiya
7. Collecting data and organizing it into tables.
8. Inserting the data at the program site. ([www.GLOBE.gov](http://www.GLOBE.gov))
9. Analyzing the collected data.
10. Discussing the results and the recommendations.
11. Identifying protocols that are appropriate for the data collection.

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| --- | --- | --- | --- | --- | --- | --- |
| Dissolved oxygen | Acidity (pH) | Salinity )ppm( | Electrical Conductivity (µs( | Temperature ˚C | Transparency | **The Sample** |
| 4 | 10.51 | 854 | 1179 | 30 | 120 | Sulfur spring water  |
| 8 | 8.89 | 514 | 753 | 23 | 120 | Water collected with sulfur water used for irrigation |
| 8 | 8.2 | 441 | 646 | 21 | 120 | Water from a fresh source near the spring |

**Summary**; Regarding the soil, the results show that it has an easily fragmented granular structure and it is rich in roots and carbonates, forming clayey clay tissue. The presence of roots in the soil and the high percentage of tree cover at the study site (92%) indicate the fertility of the soil. Although the prevailing belief shows that sulfur water is not valid for irrigation, the conclusions of the current study reveal that it is possible to use sulfur water in irrigation especially if there is an opportunity to mix it with a source of fresh water