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Comparison Study on Effect of Effluent and Influent of Sewage Treatment Plant on Irrigation Land along with Plant Height in Bhudihal Area, Davanagere

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Abstract:- Influent and effluent water flows are referred to as the entering flow to STP. Influent is the term for the incoming water or wastewater that enters the treatment plant. It includes all the sewage and wastewater from homes, industries, and other sources before it has been treated. The influent is typically characterized by high levels of contaminants and pollutants. Effluent is the term for the treated water that exits the treatment plant after the various treatment processes have been completed. The effluent is typically much cleaner than the influent, although it may still contain some residual contaminants. This study examines how soil characteristics and plant growth are impacted by effluent, and influent, with a particular emphasis on fenugreek farming. The majority of the alterations in the irrigated soil were found to be associated with increases in soil pH, electrical conductivity (EC), and nutrient levels (N, P, and K) of 7.91, 1.01, 241, 41.89, and 96.73.When compared to the plant height measurement shows that influent and effluent irrigation produce superior growth, with influent irrigation producing the maximum plant growth.

Keywords:- *Irrigation, Influent, Effluent and Fenugreek.*

I. INTRODUCTION

Influent and effluent water flows are referred to as the incoming flow to the sewage treatment plant (STP). One of the most important resources is water, which is in short supply in many nations. The effect of fast growing industrialization and population is the depletion of Earth's resources on a daily basis. While lower-quality water is increasingly suggested for irrigation, higher-quality water is used for drinking. Furthermore, for the fertility of dry soil, wastewater is a vital supply of organic matter and plant nutrients. Domestic wastewater is becoming a more significant and cost-effective source of irrigation, which creates dangerous problems. Most countries are interested in repurposing wastewater to supply the necessary micronutrients, NPK (nitrogen, phosphorus, a n d potassium) for growth of plant. When recycle sewage used for agricultural irrigation, it is a resource and an excellent approach to lower the cost of commercial fertilizer in addition to addressing environmental concerns. Recycling wastewater is regarded as an environmentally friendly disposal method since it lessens harm to the environment and aids in preventing the depletion of limited resources.

II. OVERVIEW

Wastewater that has been processed and released from a facility—such as a reservoir or basin—is known as effluent. This water is frequently used for a variety of uses, including irrigation, after treatment. Treated sewage is a dependable water source because it is available year-round and is not impacted by weather variations. In situations where other sources of water are scarce, plants may depend on influence water to supply them with water. Improvement of Soil: It increases the fertility and composition of the soil by adding nutrients, which promotes healthier plant growth. The top layer of the Earth's surface that is conducive to plant growth is called soil. It is a complicated mixture of air, water, minerals, organic matter, and living things. How successfully soil interacts with the environment and sustains plants depends on a number of qualities. Davanagere is the city located in the heart of Karnataka, Davanagere is being developed under the Central government's Smart City scheme. The Municipal Sewage Treatment Plants are made to handle garbage that originates in cities. One STP, with a 20MLD capacity, is situated in Shivanagara, Davanagere.

This STP releases its treated wastewater into a canal that runs beside the villages of Doddabudihal, Chikkabudihal, and others before joining the Thunga Bhadra river.

III. MATERIALS AND METHODOLOGY

The methodology involves selecting a study area, gathering samples, and using various laboratory techniques to analyse the various parameters of soil and water samples from the STP.

The central city of Karnataka is Davanagere. Under the Central government's Smart City initiative, Davanagere city is developing. It is the seventh-largest city in the state. According to the 2022 census, Davanagere city is home to about 530,000 people. Waste that originates in cities is handled by the municipal waste treatment facilities. Shivanagar, Davanagere, is home to one STP with a 20MLD capacity. Before it joins the Thunga Bhadra River, this STP discharges its treated wastewater into a canal that goes alongside the villages of Doddabudihal, Chikkabudihal, and

others. A soil sample was taken from the village of Holalu in the Vijayanagara district of Hoovinahadagali Taluk.To irrigate fenugreek plants, samples of influent and effluent are taken from sewage treatment plants (STP).

➢ *Marerials*

- Glassware: Bottles of reagents, pipette, Burette, conical flask, funnel, and measuring jar, pipette.
- Chemical reagents: H2SO4, AgNO3, MnSO4, K2Cr2O7, FAS, Na2S2O3, MgCl3.
- Chemical reagents: H2SO4, AgNO3, MnSO4, K2Cr2O7, FAS, Na2S2O3, MgCl3.
- Instrument used: whatman filter paper, silica dish, pH meter, TDS meter, opens reflux COD digester, and BOD incubulater.

IV. METHODOLOGY

In this methodology how the procedure is taken please is below according to the research work and my project.

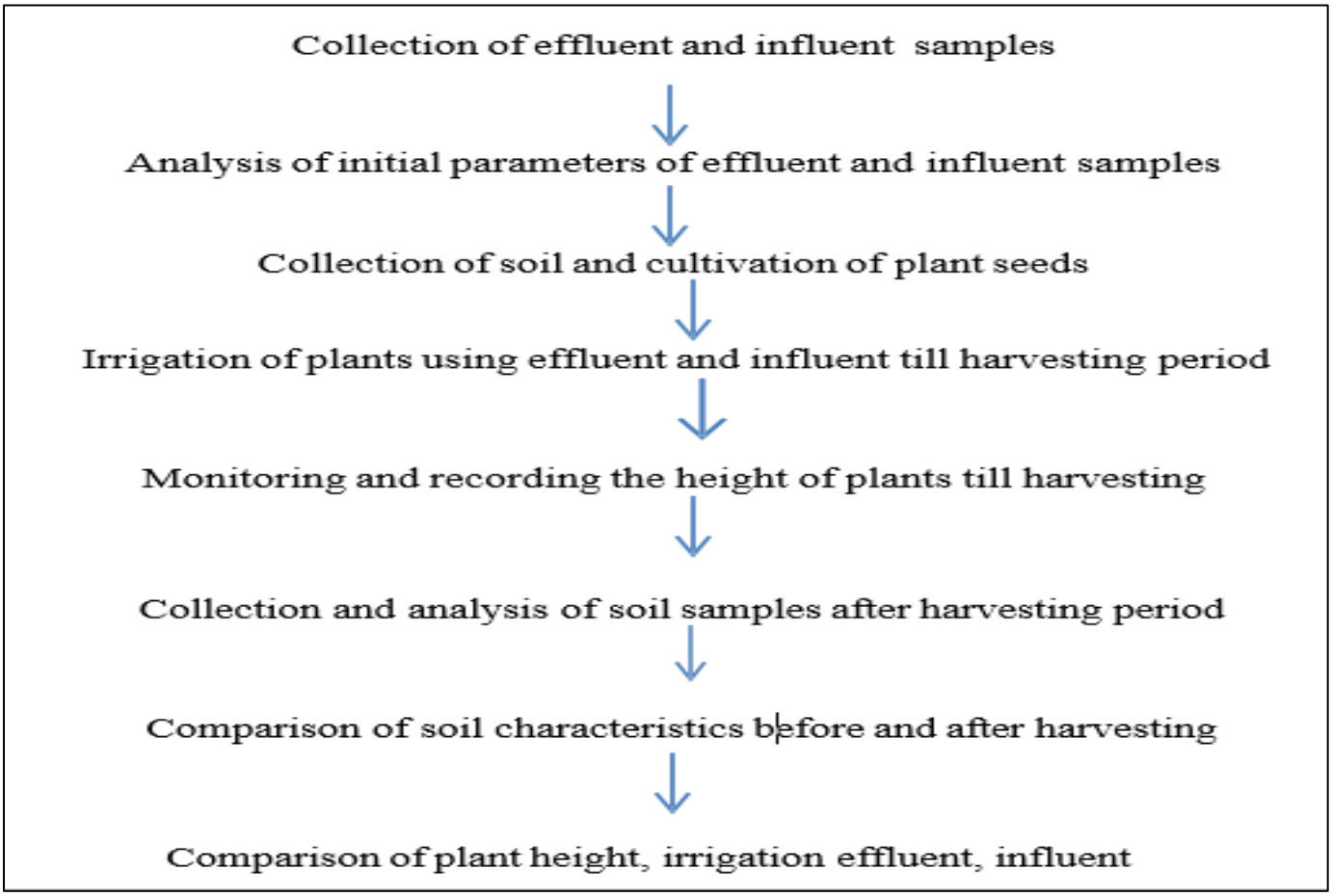

Fig 1: Flow Chart of Methodology

Table 1: Analysis of Water Samples Parameters and Methods.

Sl No	Parameters	Methods
1	pH	pH meter
2	Alkalinity	Using sulphuric acid with a digital titration
3	Hardness	Titrating with a standard solution of EDTA
4	TDS	TDS meter
5	Chloride	Mohr's approach
6	BOD	BOD incubulater
7	Electrical conductivity	EC meter
8	Turbidity	Nephelometer

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Table 2: Analysis of Soil Samples Parameters and Methods

Sl No	Parameters	Methods
1	pH	Calibrated pH meter
2	Electrical Conductivity	Conductivity meter
3	Nitrogen	Kjeldahl technique
4	Phosphorous	Olsen's conduct
5	Potassium	Flame photometer

V. RESULTS AND DISCUSSION

➢ *Effects of Effluent and Irrigation of Plant Height.*

This study focus on fenugreek cultivation analyses the impacts of influent, effluent on soil characteristics and plant growth. Collected samples (effluent and influent) which improve the soil properties like pH, electrical conductivity, nitrogen, phosphorous and potassium. Water samples are used to examine the characteristics of the soil both before and after irrigation in the lab along with plant height. This study examined the plants growth every week for 50 days. In comparison to the effluent sample, the influent water sample had good plant growth.

Table 3: Impact of Irrigation on Plant Height (Fenugreek)

Analysis of plant height	8	16	24	32	40	48	50
Fenugreek plant	Plant height cm at various days						
Effluent	3.1	7.4	11.4	13.1	15.6	17.3	20.1
Influent	3.3	7.5	11.7	13.2	15.6	17.4	20.2

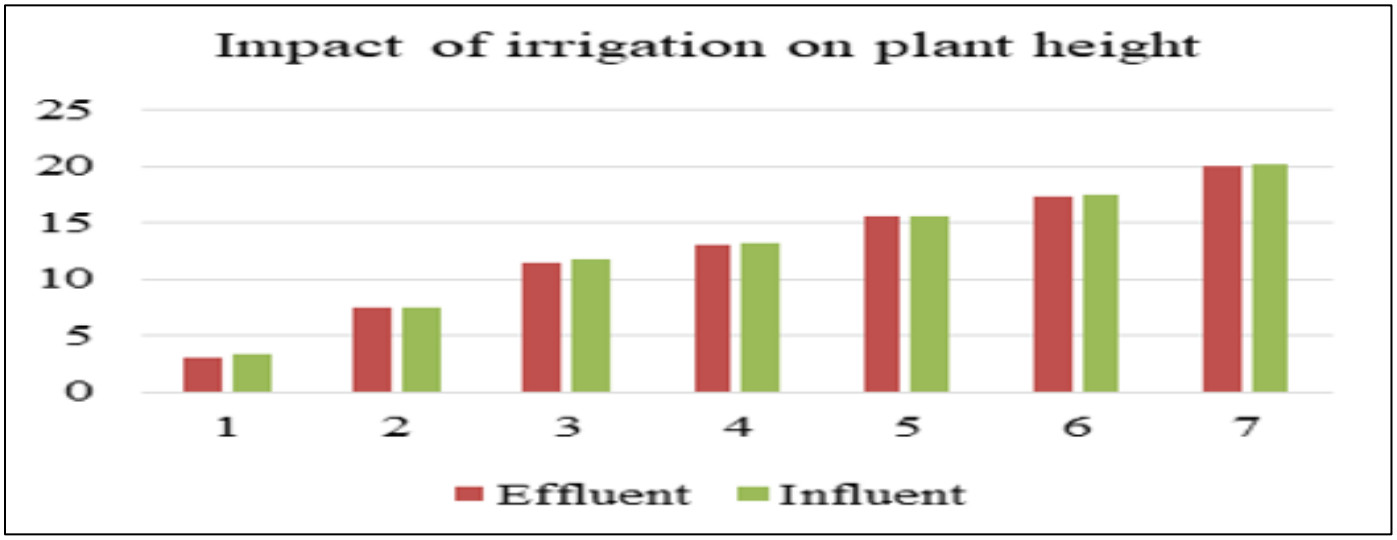

Fig 2: Graphical Representation of Impact of Irrigation on Plant Height

At several intervals, the plant heights were measured (08, 16,24, 32, 40, 48, and 50 days). On the first interval of the eighth day, the fenugreek plant's initial heights 3.1 and 3.3 for effluent, and influent respectively. The plant height by the last interval was 20.1, and 20.2 cm. Using influent and effluent allowed fenugreek plants to grow to their maximum height of cm, but in effluent sample growth was lower than that of the influent.

Table 4: Effects of Irrigation On Soil Properties

Sl no	Parameters	Units	Initial	Results	
				Effluent	Influent
1	pH		6.03	7.42	7.91
2	EC	ms/cm	0.46	0.93	1.01
3	N	kg/ha	210	231.73	241
4	P	kg/ha	34.18	39.34	41.89
5	K	kg/ha	78.76	89.36	96.73

- **pH**: When irrigation causes a rise in soil pH compared to before, it is because of the several factors. Some fertilizers in the samples changes soil pH. The soil is already in alkaline, fertilizers high in potassium, phosphorus, especially those with phosphates or potassium carbonate, makes the pH go up even more. Water used for this study for irrigation might also effect on soil pH. Organic matte.

- **EC:** When we irrigate with water two water samples it can increase the soil's electrical conductivity which measures many salts are dissolved in the soil. This happens because the water can break down salts like sodium chloride (table salt), calcium carbonate, and magnesium sulphate, all add to the salt levels. Additionally, fertilizers used during irrigation often contain dissolved nutrients like potassium, phosphates, and nitrates. These also raise the EC because they add more salts to the water. So, both the salts in the water and the nutrients from fertilizers contribute to a higher EC level in the soil.
- **Nitrogen**: There are a few reasons for increase in the nitrogen levels during irrigation. Direct nitrogen increases come from fertilizers, and irrigation helps in the breakdown of organic matter, which releases additional nitrogen in the form of nitrate and ammonium. Increased water samples also support the microorganisms that increase nitrogen levels by converting ammonium to nitrate.
- **Phosphorus:** A number of variables in the samples including as fertilizer application, runoff, and soil conditions, can cause phosphorus levels to rise during irrigation. Phosphorus-rich fertilizers have the ability to increase the phosphorus content of runoff or soil. Decomposition of organic matter, release additional phosphorus, is aided by irrigation in the study.
- **Potassium:** Fertilizers in the water sample especially in influent have high in potassium and cause the soil's potassium levels to increase irrigation. By increasing in the fertilizers' dissolution, water sample raises the potassium content of the soil. Additionally, irrigation increases the microbial activity, which facilitates the release of potassium into the soil solution from soil minerals and organic matter.

VI. CONCLUSION

This study, which focused on the cultivation of fenugreek, looked at how influent and effluent affected the properties of the soil and the growth of plants. According to initial evaluations of the water quality the effluent had an alkaline pH, low turbidity, and elevated BOD and COD. The most significant changes were seen in the soil that was irrigated with influent after fenugreek was planted using influent water sample. These changes included an increase in soil pH, electrical conductivity, and nutrient levels (N, P, and K) of 7.91, 1.01, 241, 41.89, and 96.73, respectively. After 50 days, the soil that was irrigated with influent showed an increase in plant growth from 3.3 to 20.2. Comparison to effluent irrigation, influent irrigation showed the highest rate of plant growth, according to the study. The large amounts of phosphorus, potassium, and nitrogen in the influent are the reason for the soil's high nutrient content.

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