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Synergistic Effect of LASER Light and Waste Water on Seed Germination in *Arachis hypogaea*

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ABSTRACT

Utilization of water resources is crucial to agricultural production for meeting the ever increasing demand of irrigation water for producing more and more food. Since resources are limited and large gap exists between available water supply and amount required, appropriate use of waste water of domestic origin can help in meeting a part of increased demand of water for crop production.

In the present studies seeds germination in groundnut was evaluated under sewage and LASER irradiation to know the effect of these components on seed germination capacity. LASER light enhances the seed germination percentage as compared to control.

INTRODUCTION

Water is the essential part of human life and ecology on earth. It is one of the most valuable resources available to man for his domestic, agriculture and industrial uses, Out of which agriculture claims lion's share accounting for about two-third of water demand. Its availability is also essential for social welfare and economic development at regional as well as national level for agriculture, hydropower production, municipal and industrial water supply, in stream ecosystem, water based recreation and in land navigation depends on surface ground water resources. The quantity and quality of water supplies pose a serious problem today in many regions. With population growing at an annual rate of 1.6 per cent, while irrigation is expanding at the rate of about one per cent only, shortage of water is being experienced in many part of the world especially in arid and semi arid regions. Since intensive agriculture cannot depend on rainfall alone, sewage water as well as low quality water resources may become immense important sources of water in areas, where other sources are inadequate.

The big question mark is whether there will be enough water for producing food for eight billion people expected to inhabit the earth in 2025 and the big task is to balance the available water supply with demands from all user sectors. Industrial and domestic effluents with solid and liquid sewage components are being used for irrigation.

Udgir is a taluka place in Latur district of Maharashtra having a population over 1.5 lakh. The municipal water supply is through a lake but in order to meet the inadequate supply for the fast expanding population water is obtained through tube wells. The lake water is soft for drinking purpose .The town is having a big commercial center and there are small scale industries like oil ills, pulse mills etc. Water is mostly used for washing, cleaning purposes. Therefore the sewage mostly comes under the category of domestic sewage. Besides washing and cleaning, Udgir sewage contains human and live stock excreta which include urine, fecal matter etc. Through nallas, the sewage flows down in the form of small rivulets which

ultimately entering into the river. There are two main sewers carrying sewage, one goes down on the south part of the town and other flows down to the north side which flows down into the river. The present attempt of the study was mainly to understand pollution status of the sewage and evaluate its agro potentiality as sewages are rich in nutrients.

The seeds of Peanut (*Arachis hypogaea)* oil seed crop plant is studied for their seed germination influenced by sewage and LASER light irradiation . Control study was carried out using well water and sunlight.

OBJECTIVES OF THE STUDY

To know the seed germination influenced by sewage and LASER light.

MATERIALS AND METHODS

The present investigation was undertaken to evaluate the agro potentiality and pollution status of domestic sewage at Udgir. The sewage water from Udgir city is discharged along the hill slopes.

MATERIALS

Location and Extent –

Udgir is a taluka head quarters in Latur district of Maharashtra state extending between 18°25’49’ N latitudes and 77°’10’ E longitudes.

Climate –

The climate is usually hot and is classified as semi arid tropical with three distinct seasons viz. summer, winter and rainy. The area receives rain showers from rainy season during the month of June to October.

Experimental details –

The present investigation was carried out by collection of sewage water samples from two different sites (sample 1 and sample 2). The well water sample as control.

Collection of water samples –

Water samples were collected in polythene cans by employing the grab sampling method (APHA, 1985).

Seed germination test:

Peanut seeds were obtained from local market. The red sandy soil used for pot culture experiments.

The presoaked seeds in different percentage of sewage were stimulated with the LASER light and the exposer time was set to10 min , LASER beam fallen from the top onto the seeds equally distributed underneath. The exposition time was measured with a timer.

Germination test was conducted in four replicates as per the method prescribed by ISTA (1996).

EXPERIMENTAL RESULTS AND DISCUSSION

Table 1: Seed Germination influenced by Sewage and LASER light (sample I)

Sr.No.	Sewage sample conc.	LASER light exposure time	Germination (%) After seven days
1	I (20 % Sewage water)	10 min	90
2	II (40 % Sewage water)	10 min	70
3	III(60 % Sewage water)	10 min	60
4	Control	0 min	60

Table 2 Seed Germination influenced by Sewage and LASER light (sample II)

Sr.No.	Sewage sample conc.	LASER light exposure time	Germination (%) After seven days
1	I (20 % Sewage water)	10 min	80
2	II (40 % Sewage water)	10 min	70
3	III(60 % Sewage water)	10 min	40
	Control	0 min	60

LASER light pre-sowing treatment of seeds resulted in the increase of the germination percentage although in some cases no statistically significant effect was observed. The maximal increase of the seed germination percentage was 90% as Compared to control in both sewage samples which justify usage of pre-sowing laser stimulation for improving the sowing quality in terms of germination quality of seeds (tab. 1).

The seed germination percentage, in the lab shows a progressive decrease with the increase in the concentration of sewage water directly from 20 % to 60 %.Thus 20 % sewage water mixed with fresh water and LASER irradiation enhances seed germination, this is due to the synergistic effect of sewage and LASER irradiation.

SUMMARY AND CONCLUSION

- Presence of significant amount of essential nutrients, metals and organic matter provides better nutrition leading to higher percentage of seed germination.
- It was also observed that LASER light irradiation has a synergistic effect on seed germination along with sewage.
- It is recommended that, sewage will be used for irrigation purpose after a thorough analysis of sewage.

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