

## Morphological and ecophysiological responses of *Oryza sativa* var. T-3 to sewage water

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### SUMMARY

Basmati rice (*Oryza sativa* var. T-3) seed and saplings were treated with different concentration of sewage waste water (0 or control, 10%, 30%, 50%, 75%, 100%). Seed germination percentage, speed of germination index, hypocotyls length, root length, shoot length, average number of tillers/plant, average number of leaves/plant, chlorophyll content and biomass (gm/plant) increased with the increased concentration upto 30% and then declined continuously recording minimum in 100%. The results were statistically significant. Study reveals that the sewage waste water at 30% is very good for irrigation in crop fields but at high concentration it is toxic and retards growth.

**Key words :** Sewage water, *Oryza sativa* var. T-3, Control population, Chlorophyll, Speed of germination index, Analysis of variance.

The utilization of sewage water for irrigation of crop plant is one of the highly beneficial means of supplementary fertilizer. The sewage waste is produced continuously and hence, it could cater the needs of irrigation crops to some extent. It not only prevents the waste from bearing an environmental hazard but also serve as potential source of fertilizer for agricultural use (Day and Tucker, 1977).

Sewage application on crop plant improves the nutrient status, organic matter content and water holding capacity of soil (Sommers, 1977; Khaleel *et al.*, 1981; Hornick *et al.*, 1984; Pal and Bhattacharya, 2003 and Parkian *et al.*, 2003). But as sewage water also contains heavy metals, its continuous application has adverse effect on both soil and plant (Andreson and Nilsson, 1976; Banerji and Kumar, 1979; Arora *et al.*, 1985; Bhattacharya *et al.*, 2003). Veer and Lata (1987) and Skouson and Clinger (1993) have claimed that sewage water treated and irrigated under a strict programme may benefit farmers by making the soil fertile. In higher plants, high concentration of sewage waste induces morphological changes. The present paper highlights the variation on morphological and ecophysiological parameters influenced by sewage water irrigation.

### Study site:

The Dehra Dun city is situated between 77°18'30" E longitude and 29°58'40" and 30°24'N latitude. It has an elevation of 760m above the sea level. The Song and Suswa are the two main rivers which flow South-East into Ganga. Besides the Rispana and Bindal are the important rivers running in between the city which merge with Song before it merges to the river Ganga.

The bulk of sewage waste water from Nagar Nigam is discharged out near Kanwali village about 5 Km away from the city. Around 1 million gallons of sewage water is released into the river Bindal everyday. A major portion of this sewage water is used for the irrigation purposes by the farmers and the remaining waste water merges with the Rispana river. The present study was carried out in 2004 in an agricultural field hired from a local farmer near the main discharge point of sewage water.

### MATERIALS AND METHODS

The sewage water was collected directly at the point of discharge in Doon valley in plastic canes, brought to the laboratory and kept at 6°C in refrigerator. The physico-chemical parameters of the effluent were estimated by APHA (1975) methods.

The certified seeds of the Basmati rice (*Oryza sativa* var. T-3) were procured from Government Agricultural Seed Store. Two hundred and sixty seeds screened for the germination capacity by standard methods. Germination was recorded by wet towel by planting the seeds on germination papers and incubating at 20°C in a BOD incubator for three days. After 3 days the length of hypocotyl was measured in a meter scale. The speed of germination index was calculated according to the formula

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