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RESEARCH ARTICLE

STUDIES ON THE SANGANOUR OODAI EFFLUENT ON GERMINATION AND SEEDLING GROWTH OF CAPSICUM ANNUM

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ABSTRACT

The major open drainage sanganour oodai system, Which has intricate linkage with storm water supply domestic sewage and industrial effluent disposal, water samples from collected and analyzed for physical-chemical parameters to assess the water quality of the Sanganur oodai systems. The study revealed that physical-chemical parameter like PH,EC,TDS,DO,BOD,COD, and the effect of the effluent on the crop plant (*Capsicum annum*) has been investigated the days of emergence, germination percentage ,shoot length, root volume, biochemical parameters ,protein, carbohydrates , and. N, P, and K, values were observed.

INTRODUCTION

Coimbatore is called as the textile city and cotton city are covered by many small textile dyeing units. These units discharge their waste water into the nearby land or nearby water body. The effluent soil causes heavy damage to the crops grown on them. Rajannan and oblisamy(1979)The growing competition for water and declining freshwater resources, the utilization of marginal quality water for agriculture has posed a new challenge for environmental management. In water scarce areas there are competing demands from different sectors for the limited available water resources. The disposal of industrial effluents water resources unsuitable for other uses [1-4]. Industrial effluents often contain various toxic metals, harmful gases, and several organic and inorganic compounds [5]. The industrial waste containing hazardous pollutants and they are discharging into rivers, streams and on the land. The major important industries polluting the water bodies are identified as tanneries, chemical, refineries, sugars mills, textile dye and paper pulp industries [6]. The industry is using more than 8000 chemicals in various processes of textile manufacture, including dyeing and printing [7]. The present study an attempt has been made to understand the effect of effluent on seed germination and seedling growth in (*Capsicum annum*).

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MATERIALS AND METHODS

The effluent was collected from a Sanganour oodai unit located in the out skirts of Coimbatore city in plastic cans and the physic -chemical analysis of the effluent was estimated using standard methods. The following parameters such as colour, temperature, PH, EC, total dissolved solids, total suspended solids, alkalinity, BOD, COD, nitrogen, chloride, sulphate, zinc, chromium, copper, oil and a grease were analysed. Red loamy soil was filled with pots having capacity of 7kg.

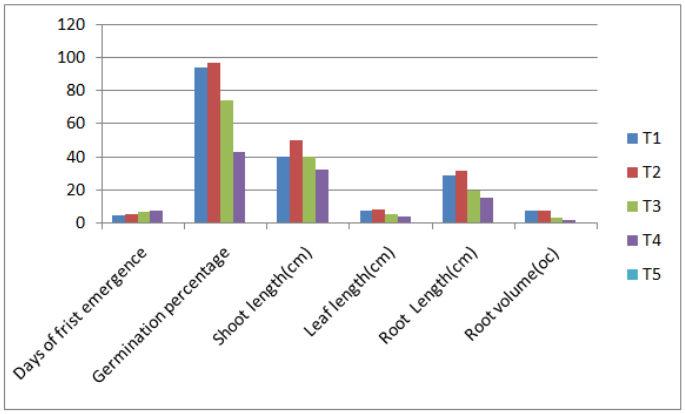
Healthy seeds of *Capsicum annum*. were selected and sown in pots and used different concentrations of effluent the experiment comprised a randomized block design with five treatments, each replicated three times the treatments were, T1 -Control - no effluent, T2- 25% concentrated effluent, T3 - 50% concentrated effluent, T4- 75% concentrated effluent, T5- 100% concentrated effluent. The germination percentage and the first emergence of seedlings; 30 days,60 days and 90 days after sowing , five plant samples from each treatment were collected randomly and fresh weight was recorded. The same samples were then air dried and then oven dried at 60 c and weight was recorded for Dry Matter Production (DMP). Other biometrical parameters like shoot length, root length and root volume were also recorded .The biochemical parameters such as protein, carbohydrate content, N,P and K were also analysed .

Physico-Chemical Characters of Sanganur Oodai Effluent

PARAMETERS	VALUES
PH	8.9
EC(dsm^{-1})	0.69
Colour	Black
Temperature (c)	48
BOD(mg It^{-1})	610
COD (mg It^{-1})	732
Total suspended solids (mg It^{-1})	1.795
Total Dissolved solids (mg It^{-1})	4.312
Total Alikalinity (mg It^{-1})	478
Chloride (mg It^{-1})	231
Sulphate (mg It^{-1})	420
Nitrate (mg It^{-1})	15.8
Chromium (mg It^{-1})	11.20
Zinc (mg It^{-}	18.5
Copper (mg It^{-1})	11.5
Oil an Grease (mg It^{-1})	212

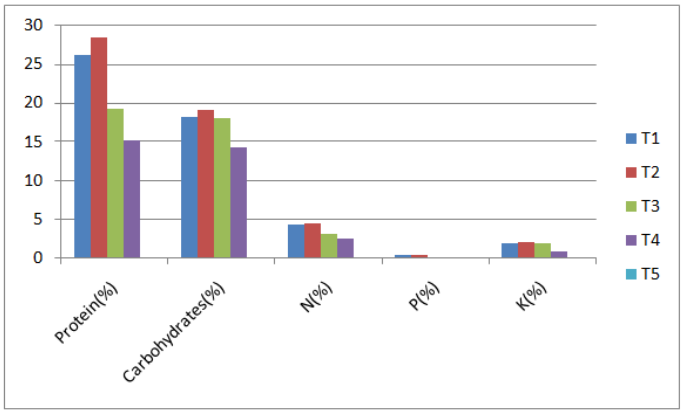
Consolitated values for the various biometric parameters of capsicum annum

Treatments	Days of first emergence	Germination percentage	Shoot length (cm)	Leaf length (cm)	Root Length (cm)	Root volume (oc)
T^1	4.55	94.62	40.24	7.40	28.66	7.2
T^2	5.02	97.28	50.02	7.68	31.35	7.5
T^3	6.28	74.22	40.28	5.20	19.28	3.2
T^4	7.28	42.72	32.25	3.28	15.20	1.5
T^5	0	0	0	0	0	0



Consolidated Values For the Various Biochemical Parameters of Capsicum Annum

Treatments	Protein (%)	Carbohydrates (%)	N (%)	P (%)	K (%)
T^1	26.42	18.20	4.30	0.38	1.90
T^2	28.42	19.21	4.50	0.41	2.15
T^3	19.40	18.15	3.10	0.21	1.90
T^4	15.20	14.28	2.55	0.15	0.92
T^5	0	0	0	0	0



RESULTS AND DISCUSSION

The seawage was highly alkaline nature (PH 8.6),and rich in total dissolved solids (4312mg It-1) and total suspended solids (1795mg It-1) (Table 1) resulting in high BOD and COD which are higher than recommended tolerance of 1S tolerance limits1981(Indian Standards 2490-1981).the electrical conductivity value was 0.69 dsm-1 Comparing to the recommended Indian Standards,The values of basic nutrients such as nitrate(18.2 mg 1t-1), choloride (231mg 1t-1) and metallic components like choromiam (11.08 mg 1t-1),zinc (19.4 mg 1t-1), and copper(10.8 mg 1t-1) were and above tolerance limit. The capsicum annum seeds germination found in 75 percent concentration (T4) and it was completely inhibited at 100 percent (raw) sewage (T5). The days for first emergence of the control seeds (T5) treated seed was 7.3 days after sowing High osmotic pressure that results due to the high salt concentration in the sewage might be the major cause for a rapid decrease in germination (Hayward & Waddleigh1949; Behera&Misra 1982 ;) The delay in seed germination in concentrated sewage might be due to inhibition of enzyme activity (Agarwal et al 1981)

Plant height

Except plants treated with 25 per cent concentration (T2) sewage ,all the other treatments had a negative effect on the shoot and root length of the seeding when compared to control .in 25 per cent concentration (T2) the shoot and root length recorded (50.02cm and 31.25cm respectively). The seeds failed to germinate ay 100 percent concentration (T5) and there the least shoot and root length were observed at 75 percent concentration (T4) level,(32.25cm and 15.20cm respectively) the results of Rao and Nandhakumar(1983) confirmed the present findings ,who reported that the relative reduction in root and shoot length of the seedlings treated with higher concentration of sewage might be due to the physiological stresses because of high salinity .

LEAF LENGTH AND ROOT VOLUME

The leaf length and root volume of the seedlings decreased with increasing concentrations of the sewage water. The leaf length ranged from 3.62cm (T 2) to 1.28cm (T4). The leaf length and root volume were found to be more in25 percent concentration (T2) level (7.68cm and 7.55 respectively) A considerable reduction in leaf length of baddy seedlings affected by liquor factory effluent was reported by Raza and vijayakumari(1989)

PROTEIN AND CARBOHYDRATES CONTENT

There was a gradual decreased in protein content from 28.4g(T1) to 15.4g (T4)and carbohydrate from 19.20(T1) to 14.28 g(T4) as the sewage concentration increased. The maximum increase was recorded at 25 percent concentration (T) (28.4g and 19.2g respectively) and decrease was recorded at 75percent concentration (T4) (15.4&14.2g respectively) (Table3) Muthuchelian et al (1988) also recorded similar results in phaselusmungo seedling treated with sewage water

Nitrogen, phosphorous and potassium contents

The Minimum Values Were Observed At 75 Per Cent Concentration (T4) for all the three nutrients, (2.55% , 0.15% and 0.92%) because there was no seed germination recorded at 100 percent concentration (T5). Twenty five percent concentration (T2) recorded the increased level of N, P and K (4.50%, 0.41% AND 2.15%) compared to the control (T1) (4.30 %, 0.58% and 1.90% respectively). The decline in N,P and K may be due to the inability of the plant to absorb the nutrient from the effluent treated soil. This may be due to the accumulation of heavy metals in the roots which may prevent the uptake of these nutrients by the plants. The results obtained in the experiments of present investigation lead to conclude that the textile dyeing effluent at lower concentration enhances growth. After proper dilution they may be used for irrigation of crops.

Conclusion

Textile dye industrial untreated effluent significantly influence growth parameters of capsicum annum crop due to the overload of chemicals but subsequently treated effluent did not affect the growth parameters due to the less toxic chemical content in the treated effluent. The final outlet showed only trace amount of chemical compound released this did not cause any major problems to the growth of the capsicum annum crop.

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