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EFFECT OF CARPET INDUSTRY EFFLUENT ON GROWTH OF TOMATO (*Solanum lycopersicum* L.)

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ABSTRACT

Effluents of carpet industry discharged on land and into water bodies induced environmental pollution. However, these are used for crop production because those effluents contain several plant nutrients. The aim of the present study is to observe the effect of carpet industry effluent on growth of very important vegetable crop tomato (*Solanum lycopersicum* L.). Effluent of carpet industry was procured from district Bhadohi and used in this study. A pot experiment was conducted adopting completely Randomized Design with five treatments and three replications in the natural open weather conditions for 60 days during the plant season. Five concentrations viz; 0%, 25%, 50%, 75% and 100% were used for present experiment. Zero percent concentration was treated as control. Observations related to growth (shoot length, root length, number of leaves and branches) were recorded at different growth stages. Results reveal that plant growth parameters gradually decreased with increase in effluent concentrations and the maximum growth was recorded at 0% concentration level whereas minimum was with 100% concentration.

KEYWORDS: Carpet Industry Effluent, Tomato, Shoot Length, Root Length, Number of Leaves

Industrialization plays a very important role in the growth and development of any country. However, environmental pollution has also been its byproduct. It is well established that effluents are non degradable. When these pollutants become accumulated in animals through food chain, they become biomagnified in their cells. Carpet industry effluent includes as large variety of dyes and chemicals addition that make the environmental changes for carpet industry not only as liquid waste but also its chemical composition. Carpet effluents are high volume of water that eventually results, suspended solids. They can contaminate water with oil, grease and waxes while some many contain heavy metal such as chromium, copper, zinc and mercury. Industrial waste water is discharged untreated either on land or into water bodies. Resultantly this waste water pollutes the water resources and ultimately the agricultural land (Arjun *et al*., 2013).

The use of industrial effluents for irrigation has emerged in the recent past as important way of utilizing effluent, taking the advantage of the presence of the considerable quantities of N, P, K and Ca along with other essential nutrients (Niroula 2003). Effluents discharged from the industries have either beneficial or harmful effect on germination, growth and development of agricultural crops (Ramana *et al*., 2002) (Saravanamoorthy and Ranjithakumari, 2007).

Previous studies suggested that effluents form industries inhibit seed germination and seedling growth. Wins *et al*., (2010) studied the effect of textile effluent on germination and growth of *Vigna mungo* L. (Black gram). At lower concentrations, the germination ratio and growth were relatively higher than the control, but with the increase in the effluent concentration these parameters were decreased. The best germination and seedling growth was observed at 25% concentration along with the growth promoting effect, significantly better than control.

Sasikala *et al*. (2013) studied the impact of dye effluent at various concentrations (4%, 8%, 10%, 12% and 16%) on seed germination of black gram for a period of fifteen days. They reported gradual decrease in the shoot and root length of the seedlings with the increase in the dye effluent concentrations.

Therefore, it is necessary to study the impact of these effluents on crop system before they are recommended for irrigation (Thamizhiniya *et al*., 2009). After assessment of the beneficial and harmful effect of the different concentration of effluents on crops, suitable dilution can be used as liquid fertilizer. In this present study, attempt has been made to identify the effect of carpet industry effluent on growth of tomato.

MATERIALS AND METHODS

Effluent Collection

For present study, carpet industries effluent containing municipal sewage were collected from Ghosia town of district Sant Ravidas Nagar, Bhadohi. Bhadohi district is situated in Latitudes 25˚23'north and Longitudes 82˚34' East at the distance about thirty miles from west of Varanasi, twelve miles north-east of Gopiganj and about three miles south of the river Varuna. The district is known by the name "Carpet city" as it is home to the largest hand-knotted carpet weaving industry hubs in South Asia. The location map is given in figure 1.

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Figure 1: Location map of Bhadohi region

To find out the effect of carpet industry effluent on the growth of tomato, a pot experiment was conducted adopting Completely Randomized Design with five treatments and three replications in the natural open weather conditions for 60 days during the plant season. Pots were filled with normal soil without any effluent treatment. The seedling of tomato (*Solanum lycoperisicum* L.) was obtained from Indian Institute of Vegetable Research (IIVR), Varanasi. Seedling was transplanted in the second week of September in the pots. Five concentrations of effluent viz; 0%, 25%, 50%, 75% and 100% were used for present experiment. Zero per cent concentration was treated as control. All the pots were uniformly watered with distilled water whenever required. In treated pots, effluent of various concentrations was given at the interval of 15 days. The data pertaining to plant growth was recorded after 15, 30, 45 and 60 days of treatment. Plant height (shoot length, root length) was measured with the help of meter scale. Number of leaves and number of branches, per plant were counted. The experiment was terminated at 60 days after planting. At harvest the plants were carefully uprooted. The plant roots were gently teased to remove soil particles. The height of the stem and the lengths of the roots were measured.

RESULTS AND DISCUSSION

Effect of different concentrations of carpet industry effluent on the growth parameters under study have been presented in table 1, 2 and figure 2 and 3. Results presented in table 1 and 2 indicate that shoots and root length decreased with increasing concentrations of carpet industry effluent. Maximum length was recorded in zero percent concentration of effluent (control). As the concentration of effluent increased there is continuous decrease in shoot as well as root length. Minimum length was recorded with 100% effluent concentration as compared to control.

Figure 2 and 3 show that number of leaves and branches increase with the growth period up to 30 days and after that gradually decreased. Use of carpet industry effluent significantly affected the number of leaves and branches. The numbers decreased as the concentration of effluent increases. The maximum numbers were found with 0% concentration while minimum was with 100% concentration. It can be seen from the results that higher concentration of the effluent is not suitable for the plants growth. Results are supported by study of Subramani *et al*., (1998), they reported a progressive decrease in seedling growth with the increasing concentration of fertilizer factory effluent. Similar finding have also been reported by Mishra *et al*., (1996). According them, the lower concentration of tannery effluent had a marked growth promoting effect while higher concentration of effluent showed reduction in seed germination, seedling growth and chlorophyll content in some crops.

Table 1: Effect of Carpet Industry Effluent on Shoot Length of Tomato

Effluent concentration (%)	Shoot Length(cm)			
	After 15 days	After 30 days	After 45 days	After 60 days
0	63.50	82.67	88.67	91.67
25	56.93	78.67	81.67	85.33
50	55.67	76.50	78.67	80.33
75	53.67	73.67	74.00	78.67
100	48.00	71.50	71.00	74.67
SEm±	1.3109	1.118	0.667	0.694
CD (5%)	4.0391	3.445	2.054	2.138

Table 2: Effect of Carpet Industry Effluent on Root Length of Tomato

Effluent conc. (%)	Root length (cm) at harvest
0	**14.33**
25	**11.00**
50	**9.667**
75	**8.233**
100	**7.333**
SEm±	**0.7924**
CD (5%)	**2.965**

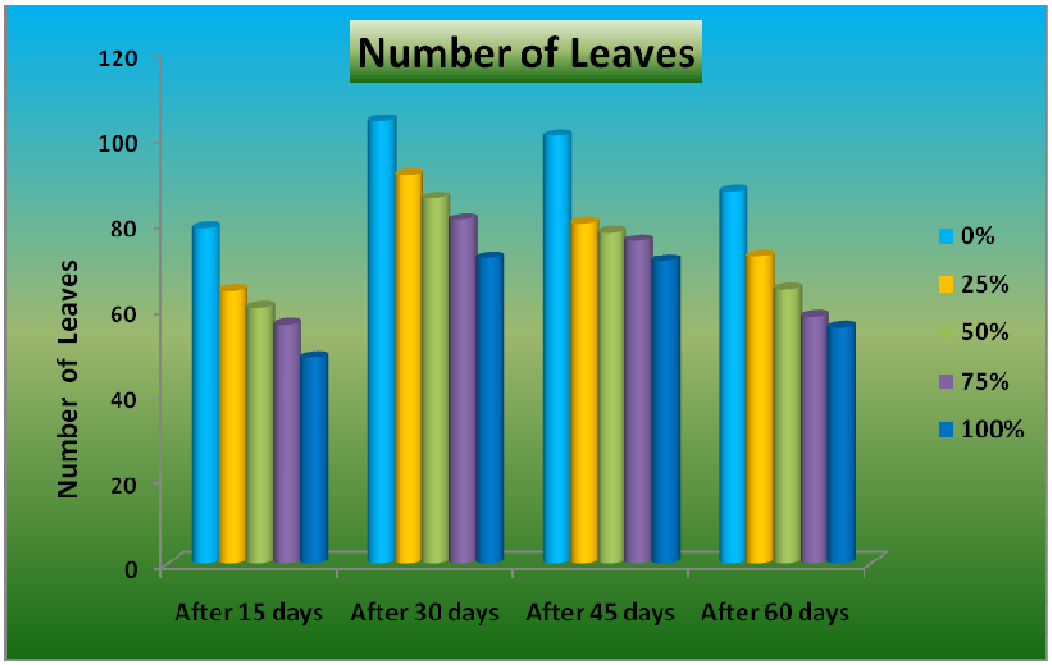

Figure 2: Effect of Carpet Industry Effluent on Number of Leaves of Tomato

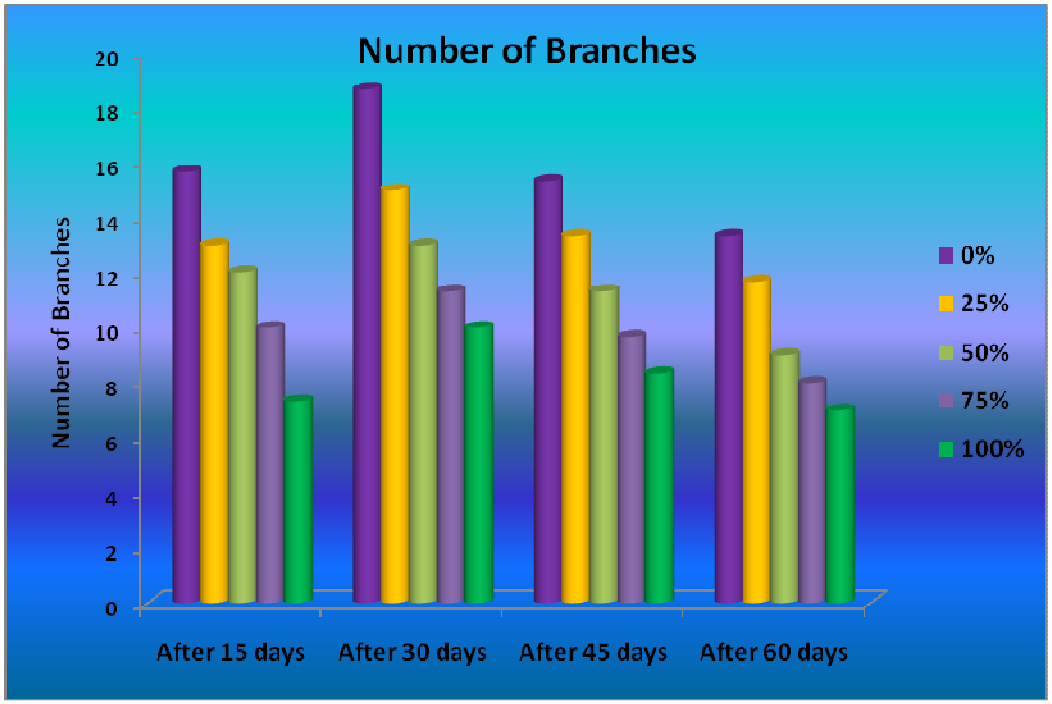

Figure 3: Effect of Carpet Industry Effluent on Number of Branches of Tomato

CONCLUSION

This study concluded that effluent of carpet industry affects the tomato plant growth such as shoot length, root length, number of leaves and number of branches. The higher concentration of effluent causes reduction in growth of tomato plant. Maximum growth is found in lower concentration of effluent and minimum growth in higher concentration of carpet industry effluent.

REFERENCES

Arjun Satish, Kadam., Kumar S., Kumar Y. and Sharma H.C., 2013. Effect of fertilizer factory effluent on wheat Crop: A case study. Acc. Int. J., **17**: 81-90.

Mishra P. and Bera A.K., 1996. Effect of tannery effluent on seed germination seedling growth in maize (Zea mays L.cv. Vikram). Environ. Ecol., **14**: 752-754.

Niroula B., 2003. Comparative effects of industrial effluents and sub-metropolian sewage of birat nagar on germination and seedling growth of rice and black gram. Our Nature, **1**:10-14.

Ramana S., Biswas A.K., Kundu S., Saha J.K. and Yadava R.B.R., 2002. Effect of distillery effluent on seed germination in some vegetable crops. Bioresour. Technol., **82**:273-275.

Saravanmoorthy M. and Ranjitha Kumari B., 2007. Effect of textile waste water on morpho-physiology and yield on two varieties of peanut (*Arachis hypogea* L.). J. Agr. Sci. Tech., **3**:335-343.

Sasikala T and Poongodi N., 2013. Impact of dye effluent of seed germination of black gram (*Vigna mungo* L. hepper). Indian J. Appl. Res., **3**: 47-50.

Subramani A., Sundaramoorthy P. and Lakshmanachary A.S., 1998. Impact of fertilizer factory effluent on the morphometrical and biochemical changes of cow pea (*Vigna ungiculta* L.). Adv. Pl. Sci., **11**: 137-141.

Thamizhiniyan P., Sivakumar P.V., Lenin M. and Sivaraman M., 2009. Sugar mill effluent toxicity in crop plants. J. Phytol., **1**: 68-74.

Wins Albina J. and Murugan M., 2010. Effect of textile mill effluent on growth and germination of black gram-*Vigna mungo* (L.) Hepper. Int. J. Pharma Bio. Sci., **1**:1-7.