Journal of Global Biosciences ISSN 2320-1355
Vol. 2(3), 2013, pp. 57-60 http://mutagens.co.in/jgb.html

MORPHOLOGICAL EFFECT OF DIFFERENT DOSES OF LEAD ON *BRASSICA CAMPESTRIS*

Thakur, Anjana and Avinash Tiwari

Ecology Laboratory,
SOS in Botany, Jiwaji University Gwalior.

Abstract

A pot experiment was conducted to study the effect of different doses of Lead on *Brassica campestris* plant. Lead was applied as lead nitrate into the soil at 10 ppm, 20 ppm and 50 ppm dose. The results showed that at 10 ppm and 20 ppm dose Lead treated plants had good growth than control plants and minimum growth was found in plants treated with 50 ppm dose.

Keywords: *Brassica campestris*, Dose, Lead, Morphology.

INTRODUCTION

Brassica campestris (rapeseed) is an annunal crop belongs to the family *Brassicaceae* with 75- 100 cm in height. Flowers are actinomorphic with golden yellow petals [1]. The seed yields the most important edible oil, which is the main cooking medium in Northern India and the leaves of young plants are used as green vegetables. Rapid growth in population and massive industrialization has resulted in pollution of biosphere with toxic heavy metals. Heavy metals are metals and metalloids which are toxic at low concentration. e.g., Lead, Nickel, Cadmium, Mercury, Zinc etc. Lead contamination in environment caused due to industrial processes that involve the use of lead such as mining, smelting, manufacture of pesticides and fertilizers, dumping of municipal sewage, sheeting, cables, solders, lead crystal glassware, ammunitions [2]. Many commercial products and materials also contain lead e.g., paints, ceramic glazes, television glass, batteries, medical equipment, and some electrical equipment. The uses of lead for roofing and the production of ammunition have increased during previous years [3]. Pb has also been reported to be present in most of the cosmetic samples. Cd was also recorded in bathing soap, shampoo, shaving cream and talcum powder [4]. *Brassica* species is considered to be good hyperaccumulator and is effective in the removal of Cd, Pb, Cr, Ni etc, from soil [5]. The species has also been reported to reduce leaching of heavy metals from soil by over 98%. *Brassica juncea* (Indian mustard), a high biomass plant that can accumulate Pb, Cr, Cd, Cu, Ni, Zn, Sr, B, and Se. So this experiment was conducted to study the morphological effect of different doses of Pb on *B. Campestris* [6].

MATERIALS AND METHODS

Plant species: *Brassica campestris.*

Dose of Pb: 10 ppm, 20 ppm and 50 ppm into the soil using $PbNO_3$.

Sampling: Plants were sampled for morphological parameters after every 30 days.

Sowing time: 13 October 2010

The experiment was conducted during October month 2010- 2011 in the Medicinal Plant Garden of SOS in Botany, Jiwaji University Gwalior, MP. Well drained 10 kg soil from a depth of 25 cm was filled into each plastic pot. Each pot was artificially contaminated with lead nitrate $PbNO_3$ for three doses of Pb- 10, 20 & 50 ppm. A control pot was also maintained. The treatment schedule contained *Brassica campestris* (cv. Toria) plants. Each treatment was replicated three times. Urea, Potassium chloride and Calcium sulphates were applied at 120, 83 and 70 mg/kg of soil respectively. DAP (diammonium phosphate) was applied at pre-flowering stage. Water was given 50 ml/kg of soil twice in a week. Plants were sampled for morphological study like height of plant, root length, flowering time and pod formation.

I Sampling: 30 DAS

II Sampling: 60 DAS

III Sampling: Harvest

RESULT AND DISCUSSION:

The height of plants was 13.28 cm, which increased to 14.62 cm at 10 ppm dose. At 20 ppm dose, the height decreased to 14.21 cm and was 11.68 cm at 50 ppm dose. At 60 DAS the height of control plants was 54.19 cm. It increased to 55.28 cm at 10 ppm dose. At 20 ppm dose, height further increased to 56.58 cm and then decreased to 51.16 cm at 50 ppm dose. At harvest the height of control plants was 93.28 cm. The height increased to 97.26 cm at 10 ppm

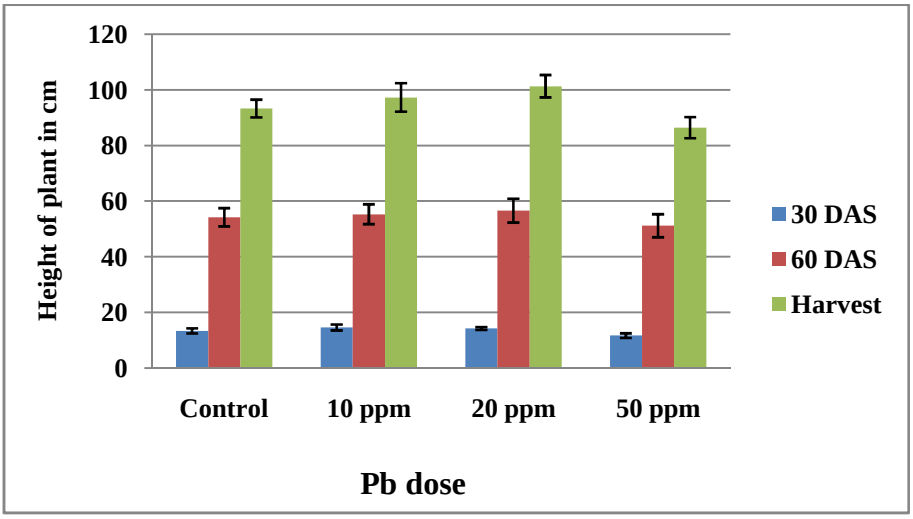
dose and to 101.29 cm at 20 ppm dose and it reduced to 86.39 cm at 50 ppm dose (Table- 1, Graph- 1).

The root length of control plants was 12.87 cm. It was greater i.e., 14.38 cm at 10 ppm dose and at 20 ppm dose i.e., 15.64 cm. At 50 ppm dose the root length was less i.e., 10.39 cm. At 60 DAS the root length of control plants was 22.71 cm. At 10 ppm dose it increased to 25.18 cm and to 26.20 cm at 20 ppm dose and at 50 ppm dose it was 16.43 cm. At harvest the root length of control plants was 34.11 cm. It was more i.e., 38.29 cm at 10 ppm dose. At 20 ppm dose, the length was even more i.e., 39.81 cm, but at 50 ppm dose it decreased to 32.48 cm (Table- 2, Graph- 2).

The flowering time in control plants, at 10 ppm dose and 20 ppm dose was approximately same i.e., 51.66 days in control, 51.33 days at 10 ppm dose and 51.66 days at 20 ppm dose. The flowering time increased to 58.33 days at 50 ppm dose (Table- 3, Graph- 3).

Table 1: Height (cm) of *Brassica campestris* var. Toria plants

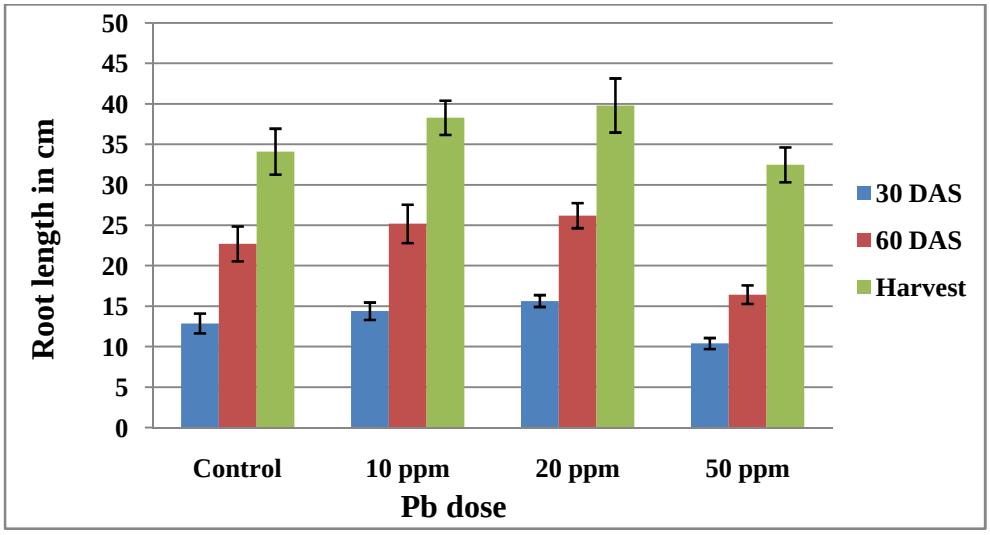
Plant sampling	Control	Height of plant at different doses of Pb		
		10 ppm	20 ppm	50 ppm
30 DAS	13.38 ± 0.89	14.62 ± 1.05	14.21 ± 0.52	11.68 ± 0.85
60 DAS	54.19 ± 3.27	55.28 ± 3.56	56.58 ± 4.29	51.16 ± 4.14
Harvest	93.28 ± 3.18	97.26 ± 5.12	101.29 ± 4.01	86.39 ± 3.78



Graph 1: Height (cm) of *Brassica campestris* var. Toria plants

Table 2: Root length (cm) of *Brassica campestris* var. Toria plants

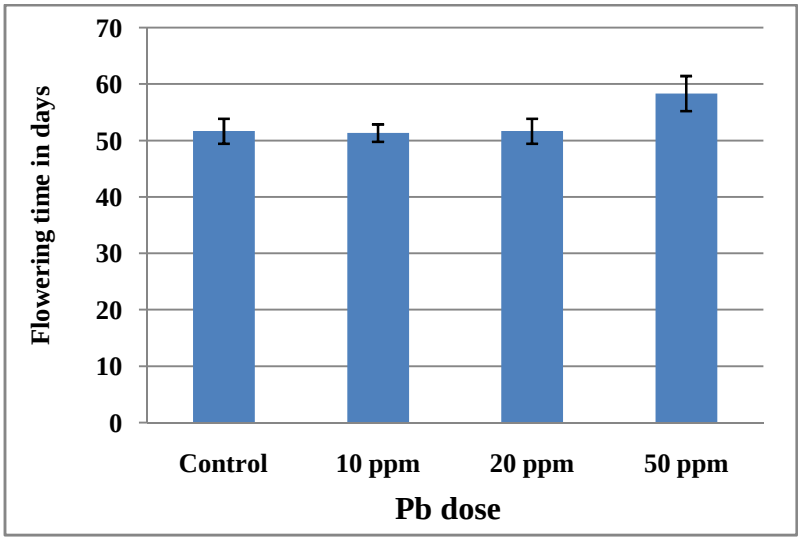
Plant sampling	Control	Root length at different doses of Pb		
		10 ppm	20 ppm	50 ppm
30 DAS	12.87 ± 1.23	14.38 ± 1.08	15.64 ± 0.73	10.39 ± 0.68
60 DAS	22.71 ± 2.15	25.18 ± 2.38	26.20 ± 1.56	16.43 ± 1.15
Harvest	34.11 ± 2.83	38.29 ± 2.12	39.81 ± 3.34	32.48 ± 2.15



Graph 2: Root length (cm) of *Brassica campestris* var. Toria plants

Table 3: Floweing time (days) of *Brassica campestris* var. Toria plants

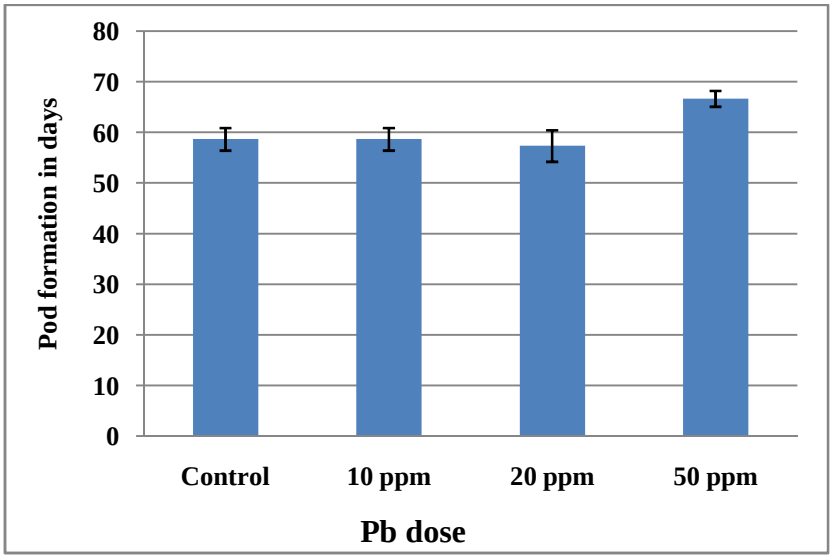
Plant sampling	Control	Flowering Time at different doses of Pb		
		10 ppm	20 ppm	50 ppm
	51.66 ± 2.22	51.33 ± 1.55	51.66 ± 2.22	58.33 ± 3.11



Graph 3: Floweing time (days) of *Brassica campestris* var. Toria plants

Table 4: Pod formation (days) of *Brassica campestris* var. Toria plants

Plant sampling	Control	Pod Formation at different doses of Pb		
		10 ppm	20 ppm	50 ppm
	58.66 ± 2.22	58.66 ± 2.22	57.33 ± 3.11	66.66 ± 1.55



Graph 4: Pod formation (days) of *Brassica campestris* var. Toria plants

In control and 10 ppm dose plants the pod formation time was same 58.66 days and at 20 ppm dose it reduced to 57.33 days. But at 50 ppm dose the pod formation was delayed i.e., 66.66 days (Table- 4, Graph- 4).

CONCLUSION

The results concluded that 10 ppm and 20 ppm dose Pb treated plants showed good growth than control plants and minimum growth was found in plants treated with 50 ppm dose. The flowering time and pod formation took at almost similar time in control, 10 ppm and 20 ppm dose. But as the Pb dose increased to 50 ppm, it delayed flowering time and pod formation.

ACKNOWLEDGEMENT

The authors would like to thank School of Studies in Zoology, and School of Studies in Botany, Jiwaji University Gwalior for their support.

REFERENCE

1. http://www.agroatlas.ru/en/content/weeds/*Brassica_campestris*/
2. http://www.lenntech.com/periodic/elements/pb.htm
3. http://www.yale.edu/ynhti/curriculum/units/1997/7/97.07.05.x.html
4. Chauhan, A. and Bhadauaria, R., 2004, Heavy metals in cosmetic presented in “National Seminar and Training Workshop on Impact on Biodiversity Conservation and Ecofunctional Status in SOS Botany Dept. Jiwaji University Gwalior (Jan 15-17).
5. Kumar, P. B. A. N., Dushenkov, V., Motto, H. and Raskin, I., 1995, Phytoextraction: The use of plants to remove heavy metals from soils. Environmental Science and Technology., 29(5), 1232-1238.
6. NandKumar, P. B. A., Dushenkov, V., Motto, H. and Raskin, I., 1995, The use of plants to remove heavy metals from soils. Environmental Science Technology., 29, 1232- 1238.