As per UGC guidelines an electronic bar code is provided to seure your paper

International Journal for Modern Trends in Science and Technology, 8(04):420-423, 2022

ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST0804071
Available online at: http://www.ijmtst.com/vol8issue04.html

Impact of Cement Dust and Organic Spray on Phyllosphere Microflora of Maize

Dr. Anita Sharma

Assistant Professor, Botany, Maheshwari Girls PG College, Jaipur, Rajasthan

To Cite this Article
Dr. Anita Sharma. Impact of Cement Dust and Organic Spray on Phyllosphere Microflora of Maize. International Journal for Modern Trends in Science and Technology 2022, 8(04), pp. 420-423. https://doi.org/10.46501/IJMTST0804071

Article Info
Received: 17 March 2022; Accepted: 13 April 2022; Published: 23 April 2022.

ABSTRACT

This study investigated the impact of cement-dust and organic spray pollution on phyllosphere microflora of maize and the fertility status of agricultural soils to ascertain their health and suitability for maize cropping. Relevant soil nutrients and enzyme activities were determined from 12 control soil, 12 NPK-treated polluted soil and 12 un-amended polluted soil samples, using standard soil analytical and biochemical procedures. Soil microbial biomass-carbon was quantified by chloroform-fumigation-extraction (CFE) method. Cultivable aerobic bacterial count was determined on Tryptic Soy Agar (TSA) while cultivable fungal quantitation was performed on Czapek-Dox agar. Corn (Zea mays) yield served to evaluate pollutant effect on tested parameters. Principal component analysis (PCA) extracted two components, PC1 and PC2, from nine studied dependent variables (DVs) which explained 68.33% variability about the data. Number and membership of extracted components were confirmed by two clusters obtained by agglomerative hierarchical cluster analysis (AHCA). Multivariate analysis of covariance revealed significant effect of soil type on the combined DVs when the effect of the covariate (planting period) was controlled. One-way analysis of covariance (one-way ANOVA) revealed non-significant effect of planting period but a significant main effect of soil type on corn yield when controlling for the effect of the covariate. Relative to control soil, per cent loss in corn yield was 55.69% in cement dust-polluted soil but reduced to 36.07% in polluted soils treated with NPK. The research findings have shown that cement dust pollution and organic spray significantly reduced corn yield and the stress may persist in agricultural soils amended with fertilizer.

KEYWORDS: maize, cement, dust, pollutant, spray, phyllosphere, microflora, cropping, fertilizer

1. INTRODUCTION

Maize (/meɪz/ MAYZ; *Zea mays* subsp. mays, from Spanish: maíz after Taino: mahiz), also known as corn (North American and Australian English), is a cereal grain first domesticated by indigenous peoples in southern Mexico about 10,000 years ago.[1][2] The leafy stalk of the plant produces pollen inflorescences (or "tassels") and separate ovuliferous inflorescences called ears that when fertilized yield kernels or seeds, which are fruits.[3][4]. Maize has become a staple food in many parts of the world, with the total production of maize surpassing that of wheat or rice. In addition to being consumed directly by humans (often in the form of masa), maize is also used for corn ethanol, animal feed and other maize products, such as corn starch and corn syrup.[5] The six major types of maize are dent corn, flint corn, pod corn, popcorn, flour corn, and sweet corn.[6] Sugar-rich varieties called sweet corn are usually grown for human consumption as kernels, while field corn varieties are used for animal feed, various corn-based

human food uses (including grinding into cornmeal or masa, pressing into corn oil, and fermentation and distillation into alcoholic beverages like bourbon whiskey), and as chemical feedstocks. Maize is also used in making ethanol and other biofuels. Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain.[7] In 2014, total world production was 1.04 billion tonnes. Maize is the most widely grown grain crop throughout the Americas, with 361 million metric tons grown in the United States alone in 2014.[8] Genetically modified maize made up 85% of the maize planted in the United States in 2009.[9] Subsidies in the United States help to account for its high level of cultivation of maize and its position as the largest producer in the world.[10]

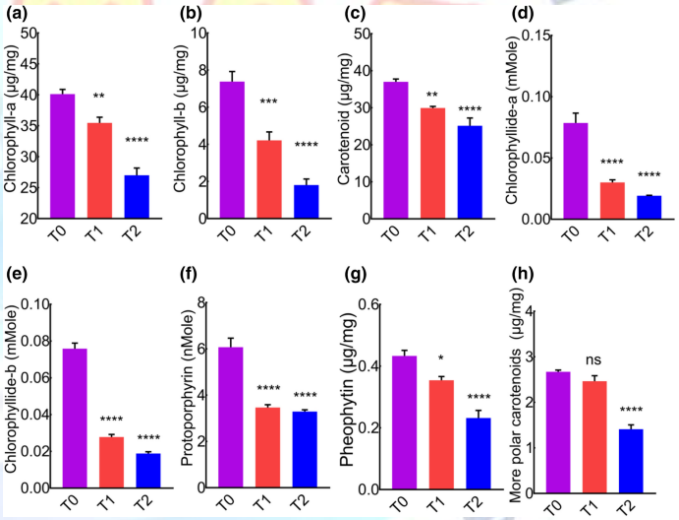
Illustration showing male and female maize flowers

2. METHODOLOGY

The maize seeds were pre-planted in perforated small bowls. After eleven days of germinating, the seedlings were transplanted into bigger perforated bowls of 25 cm in diameters and 22 cm in depths containing loamy soil. The seedlings were treated with different 2, 4 and 6 grams of cement dust and orgaic spray regularly on the aerial parts of each plant. Each treatment was replicated five times and the experiment was arranged in a randomized complete block design. All plants were watered daily with stream water. The experiment lasted for eight weeks. Plants were measured for plant height, number of leaves, leaf area, fresh and dry weights. The leaf area was measured with a leaf area meter. Root, shoots and leaves were separated for drying in an oven at 80°C for 24hrs. Roots, shoots and total plant weight of oven-dried samples were measured by electrical balance. Leaf chlorophyll content was determined by grinding the leaves per treatment and using 70% ethanol as a solvent in extracting the chlorophyll from the leaves. The content extracted was then determined using spectrophotometer and the main absorbance and transmittance was determined. Statistical analysis package for the social sciences (SPSS) of version 20. Analysis of variance (ANOVA) was used.

3. DISCUSSION

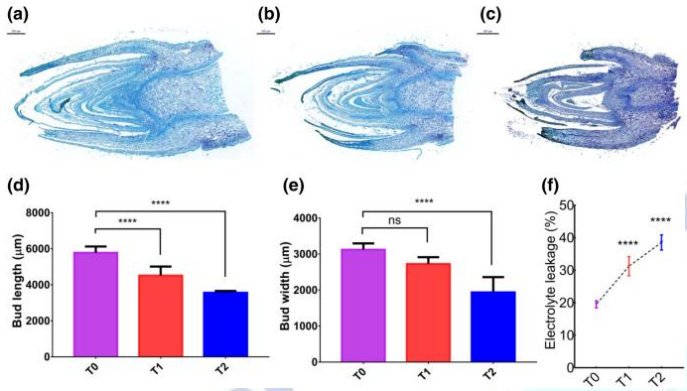
From the study, all the growth parameters were affected by the cement dust and organic spray. The plant height was significantly affected by the concentration of the cement dust and organic spray. It was reported the decreased in plant height of *Zea mays* was due to the decrease in the phytomass and net primary production in response to the cement dust and organic chemical spray. [3]



Cement dust and organic spray ruining pigments in maize

It was also reported that cement particles in the soil can adversely affect plant survival and growth. The number of leaves was significantly affected by the cement dust and organic spray when compared to the control . This was also supported that cement dust and organic sprays containing oxides of calcium, potassium and sodium is a common air pollutant affecting plants which induce premature leaf fall. Leaf number reduction may be due to decreased leaf production rate, senescence, stomatal damage, reduce growth and yield of plant .Most apparent effect of stress induced by dust and organic

spray, described in maize is leaf damage. Pollutants have devastating effects on plants when taken by direct absorption through leaves or by water through the roots.[5,6]



Novel damages in buds of maize by cement and foliar spray

The leaf area was also significantly different from the control . The pollutants cause reductions in leaf area which result in reduced absorbed radiations and subsequently in reduced photosynthetic rate. The fresh and dry weights were also reduced by the effect of cement dust and organic spray.[7]

Maize wilting and yellowing due to cement dust and organic spray

Reduction in dry weight may be attributed to the inhibition of chlorophyll formation and damage of leaf tissue which decrease photosynthetic activity and poor growth apparently reduced the dry matter ,The chlorophyll content of the leaves was significantly affected by the cement dust and spray [12]. The chloroplast damaged by the incorporation of the cement dust on leaf caused a reduction in chlorophyll concentration in the plant as done by organic spray also. Leaves covered with cement dust receive less light for photosynthesis and this interferes with gas exchange between the leaf and air. This causes a reduction of leaf stomatal conduct and also affected plant biomass formation and yield. The organic spray particles block stomatal pores. The yield of maize was significantly reduced .[8]

4. RESULTS AND CONCLUSION

Morphological characters of *Zea mays* L. was studied at different concentrations of cement dust and organic spray and compared with the control plant. The data obtained indicated that plant height, number of leaves, leaf area, fresh and dry weight, chlorophyll content and yield were affected by cement dust pollution. [11]

The plants grown in the control were healthy than the treated plants. As the concentration of the cement dust increases, there was a reduction in the plant growth. A loss in the chlorophyll in the leaves of plants exposed to severe air pollution support the fact that the chloroplast is the primary site of attack by air pollutants and decreases pigment content in the cells of polluted leaves. It is also clear that cement dust pollution as well as organic spray is an operative ecological factor causing deterioration in the quality of the environment.[9]

Maize crop damage by cement dust and organic spray

It could be concluded that the growth of the plants were found to be affected by cement dust and organic spray which might be due to the presence of different toxic pollutants in cement dust and spray[10]

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] Addo, M.A., Darko, E.O., Gordon, C. and Nyarko, B.J.B. (2013). Contamination of soils and loss of productivity of Cowpea (Vigna unguiculata L.) caused by cement dust pollution, Inter. J. Res. Ln Chem. and Env., 3(1): 272-282.

[2] Afzal, M., Nasir, Z., Bashir, M.H. and Khan, B. S. (2009). Analysis of Plant resistance in some genotype of maize against Chilo partellus Swinhoe (Pyralidae: Lepidoptera). Pakistan Journal of Botany, 41: 421- 428.

[3] Dineva, S.B. (2004). Comparative studies of the leaf morphology and structure of white ash Fraxinus Americana L. and London plane tree Platanus acerifolia Willd growing in polluted area. Dendrobiology, 52: 3-8.

[4] Ediagbonyan, T.F, Ukpebor E.E. and Okiemien, F.E. (2013). Spatiotemporal distribution of inhalable and respirable particulate matter in rural atmosphere of Nigeria. Environmental Skeptics and Critics, 2(1): 20-29.

[5] Gillette, D.G. (1984). Concern about atmospheric pollution. In: Treshow M (ed.) Air pollution and Plant Life, pp 7-13. New York: John Wiley and Sons.

[6] Ikram, U., Mohammed, A. and Arifa, F. (2010). Chemical and nutritional properties of some maize (Zea mays L.) varieties grown in NWFP. Pakistan. Pakistan Journal of Nutrition. 9(11): 1113-1117.

[7] Joshi, N., Chauhan A. and Joshi P.C. (2009). Impact of industrial air pollutants on some biochemical parameters and yield in wheat and mustard plants.

[8] Khan, M.I.H., Siddiqui, T.O. and Khan, S. (1982). Ratio of ray and fusiform initials in some Jasminum species. Ind. Journal of For., 5: 317-318.

[9] Naidoo, G. and Chirkoot, D. (2004). The effects of coal dust on photosynthetic performance of the mangrove, Avicennia marima in Richards Bay, South Africa. Environmental Pollution, 127(3): 359-366.

[10] Pandey, D.D and Simba, A.K. (1989). Effect of cement kiln dust on chlorophyll in gram leaves. Indian Journal of Ecology, 16: 178-179.

[11] Pandey, D.D, Nirala, A.K. and Gaulam, R.R. (1999). Impact of stone crusher dust pollution on maize crop. Indian Journal Environ. Ecoplan., 2; 43-46.

[12] Prasad, M.S. and Inamdar, J.A. (1990). Effect of cement kiln dust pollution on groundnut. Indian Bot. Cont. 7(4): 159-162.