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Journal Name:	**Chemical Science International Journal**
Manuscript Number:	**Ms_CSIJ_45223**
Title of the Manuscript:	**DETERMINATION OF HEAVY METALS IN SOIL AND PLANTS ALONG MAJOR ROAD IN HONG LOCAL GOVERNMENT AREA, ADAMAWASTATE**
Type of the Article	

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
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PART 1: Review Comments

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Compulsory REVISION comments	**The work needs major revision due to problems in statistical analysis and discussion.** Dear Ms. Ruma Bag, I am sending you the review of the manuscript **CSIJ_45223**, titled: **Determination of heavy metals in soil and plants along major road in Hong local government area, Adamawastate**. My general opinion is that the work is interesting, considering the importance of the effect of roadside soil and plants contamination by heavy metals and their inclusion in food chain. However, the work needs major revision due to problems in statistical analysis and discussion. In following text I would give some remarks and suggestions for the improvement of the work. ***General remarks:*** 1) References and citation are not formatted according to Author's guidelines (http://www.sciencedomain.org/journal/53/authors-instruction) 2) Throughout the text some authors has been cited by their first name and it should be cited by last (family) name. The whole text including section References should be checked for this error. 3) The treatments regarding different distances from the road are described in the section Material and methods, but the results of their effect on heavy metal concentrations in soil and plants are not presented. 4) Considerable amount of text is dedicated to the negative effect of heavy metals on human health. However, this subject is not the topic of the work. This is particularly problem in the section Results and discussion. This part of discussion should be considerably reduced and related to obtained results, while the additional information on the influence of heavy metals on human health could be presented, if necessary, in section Introduction. ***TITLE*** "Determination of heavy metals in soil and plants along major road in Hong local government area, Adamawastate, Nigeria" ***ABSTRACT*** Page 1: "Soil samples were taken ~~at a variable distances of~~ 10 m, 20 m and 30 m away from the edge of the road, at the ~~varying~~ depth of 0-10 cm, 10-20 cm and 20-30 cm. ~~also~~ ~~p~~Plants' samples were randomly collected within the vicinity where the soil samples were taken and were~~as~~ analyzed using Atomic Absorption Spectrophotometer" Page 1: The discussion about transfer factor should be clarified as the differences in plant species could be expected between sites. As the cause of these differences could be based on differences in plant species that were analyzed, and differences in their ability to transfer	

	heavy metals in shoot, the discussion about differences between sites in transfer factor should be omitted. Also, comparison of obtained soil concentrations of Cr and Co show that these concentrations are far from presented permissible limits in United Kingdom and United States. In fact, only in Damdrai this element was even detected. So, this site is far from being declared as contaminated. Page 1 **Key words** The repetition of words from the title in Key words should be omitted. I would suggest: heavy metals, accumulation, transfer factor, roadside. **INTRODUCTION** Page 2 “Excess ~~of~~ metal pollutants deposited on soils may go deep to the root zone and ~~which can~~ be absorbed by plants through their roots and through the food chain could be passed from plants further ~~they pass on~~ to animals and human beings (Atayese *et al.,* 2009)” Page 2 In citation the last(family) name should be used instead of first name “and biomagnifications (Abdulmajeed *et al.,* 2013).” Page 2 “...are soil, air and fertilizers~~nutrient solutions~~ from ...“ **MATERIALS AND METHODS** Page 3 The depth of samples from various distances from the road should be given. “Twenty gram of three composite soil samples (taken ~~at a distance~~ 10 m away from the edge of the road at ~~varying~~ depth of 0-10, 10-20 and 20-30 cm ~~each~~) were randomly collected from each sample location with the aid of stainless steel spoon, washed with soap and rinsed with distilled water after each sampling (Alexander, 2015). Also, at each sample location another three twenty gram ~~of three~~ surface soil samples were randomly collected at ~~variable~~ distances of 10 m, 20 m, and 30 m away from the edge of the road, making a total of twenty four (24) soil samples. “ Page 3 The procedure of tool cleaning is repeated. The text could be simplified. “These were washed with soap and rinsed with distilled water after each sampling as described by Alexander, (2015).” Page 3 “Hong lies between coordinates 10°13’54’’N 12° 55’49’’E and 10.23°N 12.93° E.” Page 3	

	Clarify “Also, a total of twelve (12) fresh plant leave samples three each were randomly collected from the vicinity of the sampling points where the soil samples were collected. These samples were collected using a clean stainless-steel pair of scissors (Okonkwo and Maribe, 2004), placed in paper bags, labeled and taken to the laboratory for pre-treatment and analysis.” Sample preparation Page 4 “Soil samples from each site were homogenized and air dried, crushed and grounded and then ~~was~~ sieved through 0.2 mm sieve (Alexander 2015).” Page 4 “Plant samples were~~was~~ rinsed with distilled water to remove any attached soil particles. ~~,~~ T~~t~~he plant samples were cut in to smaller portions before placing in a large clean crucible where they were~~are~~ oven dried at 100^{0}C for 48h. The dried plant samples were~~was~~ grinded into fine particles using clean acid washed mortar and pestle (Awofolo 2005)” Sample digestion Page 4 “... then cooled.” Page 4 “... filtered through~~w~~ a Whatman ...” Page 4 “... was weighed in~~to~~ “high form” porcelain crucible. ~~,~~ T~~t~~he crucible with the sample ...” Transfer factor Page 5 “The transfer factor for examined heavy metal is calculated as ratio between its~~the~~ concentration ~~of heavy metals~~ in plant parts ~~to~~and its~~the~~ concentration ~~present~~ in the soil.” Page 5 “Values higher than ~~>~~1 indicate that plants are enriched in elements from soil (accumulator), ratios around 1 indicate that plants are not influenced by elements (indicator), and values lower than~~<~~ 1 show that plants exclude the element from soil (excluder)” Data analysis Page 5 It should be notified which test was used to test the significance of differences between	

	treatments. “The obtained data were subjected to analysis of variance (ANOVA) by SPSS version 17 to determine the differences in the concentration of each metal between different sites and the results were presented in the form of means ±SD of triplicate determination.” **RESULTS AND DISCUSSION** Page 5 This sentence should be omitted, as well known fact that needs no further explanation. “The pH of a solution is ~~a measure of the~~negative logarithm of molar concentration of hydrogen ions in the solution and as such is a measure of the acidity or basicity of the solution.” Page 5 This part of the text should be revised in order to omit discussion on the matters that are not based on measurements presented in the work. So, the origin of the neutral reaction of the soil can not be discussed by the content of carbonate, ash and cinder, since the results on them are not presented. Especially, the anthropogenic influence can not be discussed. However, high pH can cause formation of heavy metal compounds of low solubility, causing their precipitation and inhibiting their translocation, which is important from the aspect of phytoremediation. The same stands for the contribution of alkaline components in the air. Even the results regarding effect of different distances on examined parameters in soil and plant material that could be used in this case are announced in the section Material and methods, but are not presented. The works you cited could be included in the discussion as information about results obtained by other authors, like: “According to Kim *et al*. (2010), alkaline components in the atmosphere can affect soil pH”, if you find it convenient, but the importance of this influence is still very questionable. “The pH of the roadside soil of the studied area ranged from 7.1±0.6 -7.5±0.7 (Table 1) close to neutral value indicating that roadside soil is most neutral to the high contents of carbonate, ash and cinder of anthropogenic origin. Similar value (7.5 – 8.0) was observed by Mafuyai *et al., (*2015) in Jos Nigeria. This could be attributed to the alkaline components in the atmosphere which can eventually deposit on the ground and affect pH in the soil (Kim *et al.,* 2010).” Page 5 “... which are~~is~~ relatively high values, ~~an~~ indicati~~ng~~ng~~ve of~~ the considerable presence ...” Page 5 As it was the case for pH, this sentence should be omitted, as well known fact that needs no further explanation. “Electrical conductivity is a quantitative measure of the ability of a substance to pass electric current. This ability depends largely on the quantity and solubility of salts present in it.” Page 6 “... Tables 1 and 3, respectively. There was observed high ~~High elemental~~ concentration ~~was observed in~~ of Fe, followed by Mn, Mg, Pb, Cd, Zn, Co, Cu, Cr and Ni in all the four	

	examined ~~different sampling~~ areas for both soil and plant samples." Page 6 "The high concentration of Fe observed in both soil and plant samples (Tables 1 and 3) are in concordance with results of Chibuike and Obiora (2014) and Carrero *et al*. (2010), who found ~~is a true reflection of Nigerian soil because it has been reported~~ that Fe occurs at high concentration in Nigerian soil ~~(Chibuike and Obiora, 2014; Carrero *et al*., 2010)~~. ~~However~~Also, the values obtained in the study collaborates the reports of Akbar *et al*.~~,~~ (2006)." Page 6 "... among the sample areas at the level of p=~~<~~ ~~0~~.05 ~~level~~ for both ..." Page 6 This part should be clarified, particularly part about "did not originated from common anthropogenic sources". "This suggests that, the indicated heavy metal pollutants in road side soil of Hong did not originated from common anthropogenic sources, probably emission from automobile, motor vehicle tire rubber exacerbated by poor road surfaces and construction works as well as lubricating oils, soldering work, discharge from battery, vulcanizing work and the welding of metals are the major sources of these metals." Page 6-7 The first sentence is questionable, since the concentrations found in soil and plant samples are below presented limitations. Also, there have not been presented any results obtained in this study related to the negative effect of heavy metals in roadside soils and plants on human health. This whole part is discussing about health hazard that could be expected from heavy metals in excess quantities. It consumes almost third portion of the section, but it is not the subject of the work. Its place is in the section Introduction, and in the section Results and discussion problem that heavy metals can cause should be presented partly, only in the context of discussing the results you got and the subject of the work. Additionally, there is no need of broad discussion on this matter since the concentrations found in the soil and plant material is not exciding cited limitations. So, in examined sites the accumulation of examined heavy metals is not a considerable problem. So, I would suggest this part to be considerably reduced and put in the context of the discussion of obtained results. The corrections I made are just to help the authors in future work. "The health implication of these heavy metals in roadside soils and plants are quite obvious. In e~~E~~xcess quantities,~~ of~~ metal pollutants deposited on soils may be transformed and transported to plants and from plants they may pass ~~on~~ to animals and human beings through food chain (Suzuki and Ono, 2008). ~~Heavy metal~~ E~~e~~xposure of ~~to~~ humans to heavy metals occurs through three primary routes, namely: inhalation, ingestion and skin absorption. According to Reena *et al*., (2011) heavy metals disrupt metabolic functions in two ways: a) t~~T~~hey accumulate and thereby disrupt function in vital organs and glands such as the heart, brain, kidneys, bone, liver, etc. and b) t~~T~~hey displace the vital nutritional minerals from their original place, thereby, hindering their biological function. In general, heavy metals in~~with~~ high concentrations in the human body~~environment~~ result	

	in health problems adversely affecting the nervous, renal, reproductive systems, blood forming and cardiovascular. The consequences of heavy metal intoxicationpollution include reduced intelligence, attention deficit and contribution to cardiovascular disease in adults, as well as behavioral abnormality (Jarup, 2003). Although individual metals exhibit specific signs of their toxicity, the following have been reported as some general signs have been reported to be associated with, iron, cadmium, zinc, copper poisoning and lead, like : dDepression and pneumonia when aerosols, volatile vapoursvapors and fumes are in-haled. The nature of the effects can be toxic (acute or chronic), carcinogenic, neurotoxic, muta-genic or teratogenic (Ernst, 2002). Gastrointestinal (GI) disorders, diarrhea, hemoglobinuria causing a rust-red colourcolor to stool, ataxia, paralysis, stomatitis, tremor, vomiting and convulsion (Duruibe *et al*., 2007). In humans, heavy trace metals, such as Pb, may affect the brain and cause retarded growth, especially in children. It also causes damage to nervous system, kidneys, learning ability, ability to synthesize protein, red blood cells and nerves (Fan *et al*., 2012). In addition to these toxic effects, it has also been reported that cadmium may play a role in the development of heart disease and hypertension (Elinder, 1996; Radojevice and Bashkin, 1999)." Pages 9-10, Tables 2, 3 "... Hong major road (mg/kKg)" Page 9, Table 2 The last two columns named Ni and Cu should be deleted. The results of test regarding the significance of differences between treatments should be presented. In that case, for samples where a metal was not detected, the value of metal concentration should be considered to be zero. The further discussion should be based on the results of that test. Page 10 Regarding presented results, such general conclusion could not be made. It might be a fact in some cases that should be notified but based on test of the statistical significance between examined depths. May be test made between total average values at the level of examined depths (total average values of examined depths calculated form values from all sites) for each examined element would show differences between depths with more statistical significance. The same could be made for distances. "The results of the variation in heavy metal concentrations in roadside soil at different depth of 0-10 cm, 10-20 cm and 20-30 cm revealed that the concentrations of these heavy metals decreased with an increasing depth (Table 2)." Page 10 The results of measurement of heavy metal concentrations in soil and plant samples regarding the examined distances from the road should be presented. "Also the concentrations of these heavy metals decrease with an increasing distances (10 m, 20 m and 30m) away from the edge of the road which collaborate with the report of Zhang *et a*l., (2017)." Page 13, Table 5 It should be clarified why the asterisk mark (*) was put in the table. References citation should be unified. Page 14	

At this point it should be emphasized among all examined elements, only concentration of iron, could be considered to pose a threat for animal and human health since only its concentration is below limitations defined by India and WHO/FAO. Beside transfer factor, which is for iron among the smallest, the effect of generally high concentration of iron in soil should be emphasized as reasons for high concentrations of iron in plant samples, as well. Also, the importance of accumulation of heavy metals in livestock grassing beside road should be discussed. Thus, the availability and uptake of element are important but the discussion should go on in course of the evaluation of risk of found concentrations of examined elements on livestock and humans.

"The concentrations of Cd, Pb, Zn, Cr, Mg, Mn, Co, Ni and Cu in plants sample obtained in this study were lower with the exception of Cd which was higher than in Alexander (2015), Pb higher than in Zhuang *et al*., (2015), Fe higher than in Tsafe *et al*., (2012) and higher than limit defined by WHO/FAO (2011).This variation however, is a function of the availability and uptake of a particular plant species to a given element referred to as the transfer factor of metal."

Page 15

"The transfer factor is a function of different factors such as the soil organic matter, soil pH, soil particle size,~~ and~~ metal concentration and availability and plant species characteristics."

Page 15

The fact that values of transfer factor are mostly higher than 0.5 should not be conclusively attributed to low retention rate, because concentrations of examined metals and differences between examined depths are relatively small and it is probable that root system is developed in whole 30 cm – surface layer. Also, characteristics of plant species used in work are not discussed. Transfer factor is related to the mobility of element in soil, but it is considerably related to the plant's ability to uptake element from the soil solution and transfers it from roots to shoot. This should be notified if the factors affecting transfer factor are discussed.

"Most of the values of TF at the study area super pass 0.5~~,~~ T~~t~~his implies that generally the bioaccumulation of heavy metal in plant was high, which ~~this~~ could be attributed to the low retention rate of the metal in soil.~~,~~ T~~t~~herefore heavy metal~~it~~ is more mobile in the soil with the exception of Fe for the whole study area and Shiwa for Pb (Table 6)."

Page 15

"... places were contaminated with these~~is~~ metals."

CONCLUSION

Page 16

The high concentrations of iron should be mentioned in conclusion too.

Pages 16-21

References should be formatted according to Author's guidelines (http://www.sciencedomain.org/journal/53/authors-instruction)

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Minor REVISION comments		
Optional/General comments		

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

Name:	***Branislav Kovačević***
Department, University & Country	***University of Novi Sad, Serbia***