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Azadirachta indica leafs absorbs heavy metal (Lead)

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Abstract
Trees plays essential role to cleanse the Environmental pollution. Especially *Azadirachta indica* (Neem tree) Leafs absorbs heavy metal like Lead from vehicular emitted smoke. The aim of this article is to aware public from environmental pollution especially on road by vehicular smoke and should be controlled by plantation of *Azadirachta indica* (Neem tree) to both side of road.

Keywords: *Azadirachta indica*, lead, vehicular smoke

Introduction
Trees plays essential role to cleanse the Environmental pollution. Neem (*Azadirachta indica*) is a tree in the mahogany family Meliaceae. It is one of two species in the genus Azadirachta and is native to the Indian subcontinent. It is typically grown in tropical and semi-tropical regions. Its fruits and seeds are the source of neem oil. Neem is a fast-growing tree that can reach a height of 15-20 metres. It is evergreen, but in severe drought it may shed most or nearly all of its leaves. The branches are wide and spreading. The fairly dense crown is roundish and may reach a diameter of 20–25 metres. The Neem tree is noted for its drought resistance. Normally it thrives in areas with sub-arid to sub-humid conditions, with an annual rainfall of 400-1,200 millimetres. It can grow in regions with an annual rainfall below 400 mm, but in such cases it depends largely on ground water levels. Neem can grow in many different types of soil, but it thrives best on well drained deep and sandy soils. It is a typical tropical to subtropical tree and exists at annual mean temperatures of 21–32 °C. It can tolerate high to very high temperatures and does not tolerate temperature below 4 °C. Neem is one of a very few shade-giving trees that thrive in drought-prone areas e.g. the dry coastal, southern districts of India and Pakistan. The trees are not at all delicate about water quality and thrive on the merest trickle of water, whatever the quality. In India and tropical countries where the Indian Diaspora has reached, it is very common to see Neem trees used for shade lining streets, around temples, schools and other such public buildings or in most people's back yards. In very dry areas the trees are planted on large tracts of land. Neem leaves are dried in India and placed in cupboards to prevent insects eating the clothes, and also in tins where rice is stored [1-4].

The tender shoots and flowers of the neem tree are eaten as a vegetable in India. A soup like dish called Veppampoo charu (Tamil) (translated as "neem flower rasam") made of the flower of neem is prepared in Tamil Nadu. In Bengal, young neem leaves are fried in oil with tiny pieces of egg plant (brinjal). The dish is called neem begun bhaja and is the first item during a Bengali meal that acts as an appetizer. It is eaten with rice. In Myanmar, young neem leaves and flower buds are boiled with tamarind fruit to soften its bitterness and eaten as a vegetable. Pickled neem leaves are also eaten with tomato and fish paste sauce in Myanmar [5-6]. Products made from neem trees have been used in the traditional medicine of India for centuries. Insufficient research has been done to assess such purported benefits of neem. In adults, no specific doses have been established, and short-term use of neem appears to be safe, while long-term use may harm the kidneys or liver; in small children, neem oil is toxic and can lead to death Neem may also cause miscarriages, infertility, and low blood sugar [7-8].

The neem tree has importance for its anti-desertification properties and possibly as a good carbon dioxide sink. Neem extract is added to fertilizers (urea) as a nitrification inhibitor. Neem leaves can be occasionally used as forage for ruminants and rabbits. The bio pesticide

produced by extraction from the tree seeds contains limonoid triterpenes. Currently, the extraction process has disadvantages such as contamination with fungi and heterogeneity in the content of limonoids due to genetic, climatic, and geographical variations. To overcome these problems, production of limonoids from plant cell suspension and hairy root cultures in bioreactors has been studied, including the development of a two-stage bioreactor process that enhances growth and production of limonoids with cell suspension cultures of A. indica [9-17].

Applications of neem oil in the preparation of polymeric resins have been documented in the recent reports. The synthesis of various alkyd resins from neem oil is reported using a monoglyceride (MG) route and their utilization for the preparation of PU coatings. The alkyds are prepared from reaction of conventional divalent acid materials like phthalic and maleic anhydrides with MG of neem oil [18].

Motor vehicle smoke emission is source of road side pollution. Motor vehicles have impacted on the metabolism of roadside plants due to emission of trace elements. Research has established people exposed to trace elements such as lead (Pb), Cadmium (Cd), Arsenic (As), manganese (Mg) and nickel (Ni) develop alterations in nervous system functions, with neuro physiological consequences constituting a health hazard [19-23].

Research showed heavy metals can be harmful to roadside plants, animals, and human settlements situated closer to a roads. Trees in urban areas can improve the quality of air through respiration and uptake of gases and particles Urban trees are important to man and the environments, and can be damaged when exposed to trace elements The mechanism of elemental uptake by plants is based on root uptake and foliar absorption, including deposition of particulate matter on the plant leaves. The uptake of trace elements by trees depends on the reserves of nutrients in soil and its bioavailability The exposure of roadside plants to traffic emissions can changes in foliar anatomy and caused injury The stem bark and leaves contain compounds with proven antiseptic, antiviral, antipyretic, anti-inflammatory, anti-malaria, anti-infertility, anti-ulcer and antifungal uses [24-31].

High values of Pb when compared to control are because all the sample points were in the areas of high traffic density. The traffic situation in this area might be regarded as a source of Pb in the roadside dust. Wear and corrosion of vehicle parts might also be one of the potential sources of heavy metals. Results of analysis of variance confirmed a significant difference in Pb content in the seven sampling points. Concentrations of Pb in the dust samples from the study area were higher than that reported by 32 of 48 µg/g, and was also higher than the range of 1.01–2.9 µg/g reported [32].

Street dust and neem tree samples (*Azadirachta indica*) from Maiduguri Metropolis, Borno State, Nigeria were collected for the determination of trace elements. The highest concentrations of metals were found to be higher at the seven sampling points, while the lowest levels were observed in the street dust samples from the control sites. The concentrations of all the metals in plant samples were significantly highest in the leaves of *Azadirachta indica*, while the stem bark shows the least values. Levels of chromium (Cr), lead (Pb), nickel (Ni), cobalt (Co), cadmium (Cd) and arsenic (As) in plant samples exceeded the world health organization standard limits for medicinal plants. At the same time, the traffic situation in the area of study might be regarded as a source of heavy metal content in the roadside dust and plant samples [33].

Exposure to high lead levels can severely damage the brain and kidneys and ultimately cause death, miscarriage in pregnant women, and damage organs responsible for sperm production in men. They also have strong tendency for Bioaccumulation in the living tissues through processes like breathing workplace air and eating contaminated food grown in soil containing heavy metals [34-36].

Soil, vegetation and atmospheric pollution have been a serious problem in recent years in Lafia, especially among the communities living along the major highways due to increase in industrialization and vehicular movements. The level of heavy metals (Cd, Cr, Ni, Pb and Zn) in Neem tree leaves, bark and soil along major roads in Lafia were determined using digestion and atomic absorption spectrophotometer methods. The leaves, trunk bark and soil samples were collected along Makurdi road (Tudun Kauri), Jos road (National Supply), Nasarawa state polytechnic site and Obi road (Maraba Akunza). The aim was to assess the level of the metals in the samples. The mean concentration of metals in the various locations along roads varied between Pb (0.028 to 0.570 mg/kg), Zn (0.061 to 1.326 mg/kg), Ni (0.028 to 0.261 mg/kg), Cr (0.013 to 0.201 mg/kg). Samples from Makurdi road (Tudun Kauri) indicated higher level of Zn, while sample from Jos road indicated the highest level of Pb. Levels of Cr and Ni in the various locations were obtained in minute quantities and were largely undetected in most of the samples. However, levels of all the metals obtained from the various locations along the major roads were below the WHO/FDA maximum permissible levels of heavy metals in plants. The Neem plant (*Azadirachta indica*) could be a good bioindicator of Pb and Zn. The results of this study have indicated the presence of trace metals analyzed at varying degrees in samples of Neem tree leaves, trunk bark and soil, along major roads in Lafia in the order: Zn > Pb > Ni > Cr > Cd. Samples from Makurdi road (Tudun Kauri) showed highest contamination by metals, followed by samples from Nasarawa state polytechnic site with hazardous metals like Pb. Even though the levels of all metals analyzed fall below the maximum tolerable level of heavy metals in plants established by CODEX (WHO/FAD), this research work further confirms the increased danger of environmental pollution along highways due to vehicular emission. An investigation on removal of $Pb^{2+}$from waste water by use of powders of non-conventional absorbents like Neem leaves (NLP), peepal leaves (PLP) and Amla leaves (ALP) at different adsorbent/metal ion ratios, pH, contact time, metal ion concentration was investigated by using batch method. During the investigation it was observed that maximum amount of lead adsorption occurs at pH: 6.0., temperature 30˚C ± 2˚C. The equilibrium of lead adsorption was attained in about 60 min. The adsorption depends upon the availability of number of active sites. De-sorption probably took place at around 40˚C ± 2˚C and at higher temperature values. Powders of Neem leaves were found to be most effective adsorbents followed by the powders of Amla leaves and Peepal leaves. The study on performance of low-cost adsorbent such as Neem leaves powder in the removal of Cadmium (II) and Lead (II) ion from aqueous solution is performed. In present study Neem Leaves Powder adsorbent prepared using chemical activation process and the surface area measured. The adsorbent material adopted was found to be an efficient media for removal of Cadmium (II) and Lead (II) ion with different parameter like Adsorbent dosages, Concentration and contact time etc. Soil, vegetation and atmospheric pollution have been a serious problem in recent years in Lafia,

especially among the communities living along the major highways due to increase in industrialization and vehicular movements. The level of heavy metals (Cd, Cr, Ni, Pb and Zn) in Neem tree leaves, bark and soil along major roads in Lafia were determined using digestion and atomic absorption spectrophotometer methods. The heavy metal content in neem (*Azadirachta indica*) samples were analysed using ICP-OES technique and different samples such as neem leaf, neem wood and neem gum were collected from the university of Sharjah, university city. The environmental pollution can be monitored using metal content in different neem samples easily grown in UAE. The metal contents of Fe, Mn, Co, Ni, Cu, Zn, Cr, Cd, Pb, Mo, As, B, Ca were analyzed using ICP-OES method. The average metal concentrations of different samples in ppm were Fe (155.48), Mn (8.63), Co (0.12), Ni (1.42), Cu (7.11), Zn (5.91), Cr (0.63), Cd (0.02), Pb (0.50), Mo (0.91), As (1.85), B (68.09), Ca (10832.07) respectively. The environmental pollution arises from different ways such as hazard gases released into the atmosphere due to factories, contaminated water release in seas (or) river and deposition of heavy metals in soils, plants. These contaminations affect the earth atmosphere, leads to climate change, increase salinity of sea water and heavy metal deposition. The neem plants absorb carbon dioxide and maintain the balance between the CO_2 and O_2 on the earth atmosphere. By using the photosynthesis, these plants produce more amount of oxygen by absorbing CO_2. These plants were acted excellent air filters and absorb polluted gaseous present in the environment and other advantages of neem plants, they can survive in heat, water pollution and used as a soil fertilizer [37-40].

Conclusion

Trees plays essential role to cleanse the Environmental pollution. Especially *Azadirachta indica* (Neem tree) Leafs absorbs heavy metal like Lead from vehicular emitted smoke. So we should more planted *Azadirachta indica* (Neem) trees to the both side of road for control the concentration of Lead present in the vehicular smoke. The aim of this article is to aware public from environmental pollution especially on road by vehicular smoke and should be controlled by plantation of *Azadirachta indica* (Neem tree) to both side of road.

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