



Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Distribution of the heavy metal in urban soils

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ABSTRACT

Soil is the natural body under the specific soil condition, after a long history of soil formation development, and is gradually formed. Urban soil is an important part of the city ecological environment, plays a vital role on the stability of urban ecosystem. The first aspect is the effect of the way of utilizing soil on the heavy metal in Urban Soils, the difference of content of heavy metal in urban soils and configuration in the different functional zone; physical geography such as mineral in soil, character, pH, organic, distribution of the heavy metal in urban soils in the special upright direction.

Keywords: urban soils, heavy metal pollution, geography environment

INTRODUCTION

Urban soil is due to human activity causing severe environment change which drives the process of natural soil under natural ecological system to the artificial ecosystem under the serious influence of the artificial factor of special soil formation. Urban soil has some features of mixing, filling pile up, buried, pollutants and atmospheric precipitation, moisture migration, with 2% of the land area, urban land space loads with more than 80 % of the industrial pollutants and life's special function requirements, which makes the urban soil considerable difference with natural soil in their farming soil. Urban soil environmental quality has great influence to urban greening, urban environmental quality and human health. Since the late 70s, highly urbanized and large industrialized European countries, began attracting attention in urban soils, had launched study on special offerings, classification, restoration of the urban soil and so on. Firstly, United Kingdom carried out some study in London and other large cities on soil and other large cities on soil and heavy metals such as lead, copper, zinc and cadmium of dust, found that heavy metal pollution of the soil is related to industrial activities, car tail gas emission and so on.

Germany soil science society established the Working Group on urban soil in 1988, United States such as New York City began a series of studies on urban soil. Germany soil science society established the Working Group on urban soil in 1988, United States such as New York City began a series of studies on urban soil.

1998 in Germany in Montreal held the 16th annual meeting of international association of soil, the urban and suburban soil subject international working group(SUITMA) was first to be set, namely urban, industrial and mining and traffic land soil working group, and in 2000, the first international meeting was held in Germany. More than 300 delegates, including China, attended the meeting. This meeting marks the global urban soil academic research into the area of urban environment. China's urban soil research is deepening and development of the urban soil research of Ganlin Zhang (2001), comments on first city, industrial, traffic and mine international conference articles for horn, has developed related research of city soil research, formed more huge of city soil research team, by the core of CAS by soil and geography, Zhejiang University, Nanjing Agricultural University, et al, and comprehensive department of urban construction, environmental protection and local schools as the main body, to carry out more discipline widely research for ecological environment problem of city soil.

Soil heavy metal pollution in cities is a cause to rise in the urban soil study, and also one of the main content of urban soil study. Urban soil in time and space variability of soil heavy metal distribution is obvious. There will be a significant change in the short distances, differences of urban industrial layout and industrial structure in the horizontal direction, will produce different effects, in vertical direction, the different functional areas on the soil profile layering are confusion, layering obviously. Soil heavy metal surface gathering, water moving and sinking phenomenon, alien, invader and landfill ingredient complex increase the differences. On time sequence due to the accelerating urbanization, industrial structure adjustment, the strengthening of environmental protection, the use of new materials and new technology will also make the soil heavy metal content distribution have great changes in a short time. The relationship of soil heavy metal pollution in cities with natural and human environment of a city's economic environment, natural environment and the leading industry attracts the attention of academic, and academic achievement is more and more richer. Integrating the internal and external research, the relationship of urban soil heavy metal distribution and geographical environment can be summarized as: the land use in a different way, the soil heavy metal distribution differences in cities, that is, the different function of interval characteristics of different soil heavy metal pollution, differences between the city natural environment conditions, deposition of soil heavy metal migration effect, in the soil profile forms unique time balance model and the characteristics of vertical distribution, the type difference and distribution features of urban soil heavy metals are also affected by the city's economic environment, the leading industry. For example, mining and metallurgy soil heavy metal pollution in cities is relatively heavy, composition is specific, the regional difference is lesser, comprehensive urban soil heavy metal pollution composition is complex, regional differences are larger, etc.

SOIL HEAVY METAL DISTRIBUTION DIFFERENCES OF DIFFERENT FUNCTIONAL AREAS OF CITY

The activities of the different functional areas in the city are not identical, soil heavy metal sources exists bigger difference, pollution level and the latent harm is also different, so the urban soil study often starts from urban functional area division. The center of the city is on a large scale of industry and human settlement and intensive business activities, city industrial zone, residential areas and business district is the foundation of the city, and also is the core of the city. Urban scenic spot, and urban green space as built up area are the extension of urban function, but the former is the basic to keep the natural soil, and the characteristics of the ecological environment, the later is under the artificial modification an important part of urbanization; The former is the grade of the city, the later is the quality of the city. High and new technology industrial park become a new urban functional area, has experiment and demonstration effect on urban industrial structure adjustment and city location, especially in China, it has become an important part of the city, even the economic center of the city. Therefore, many scientists at home and abroad divide urban soil into different function on the basis of industrial area, residential area, commercial area, development zone and urban green space and scenic spot to study on soil heavy metal. Especially some developed countries in Europe and the United States are very close to note the different functional areas of heavy metal pollution in cities, and have carried on the survey and mapped for many urban soil heavy metal pollution condition. For urban soil heavy metal partitions, according to the characters of urban structure, urban soil can be divided into industrial, commercial and life service partition; According to the way of the urban land different utilization, urban soil can be divided into industrial land, the land for agriculture and forestry, according to the city activity content, urban soil can be divided into different areas such as mining and metallurgy production, clothes and electronic processing, services for research.

Urban soil heavy metals in different functional areas distribution research include two aspects. On the one hand, it is the comparison of characteristics of heavy metal content and form in the different functional areas of soil, on the other hand is the analysis of different functional areas of soil heavy metals pollution. Urban soil is strongly affected by human, urban soil heavy metal content is in general higher than the surrounding agricultural and forestry soil, urbanization process accelerates the exogenous input rate of soil heavy metals. Urban soil exogenous heavy metal mainly comes from family activities, waste management, transportation, manufacturing, mining and smelting industry, power plants, petrochemical fuel combustion, et al. The research in Bangkok, Thailand and Brazil U berland city has shown that soil Cd, Cu, Pb and Zn is derived from human input. In Palermo, Italy city soil Pb, Zn, Cu and Hg of green space and park is respectively 4.6 times, 1.1 times, 1.9 times and 9.7 times of the background value. Statistical analysis shows that the Pb, Zn, Cu, Sb and Hg are exogenous pollution. Many studies suggest Pb mainly comes from the combustion of leaded gasoline emissions such as motor vehicle exhaust. Additive Zn is contained in motor vehicle tyre, the Zn dust of tyre wear is the main source of Zn in the soil, city traffic is the main source of Cu, Zn and Pb pollution in the urban soil.

Chinese scholars on urban distribution of soil heavy metals in different functional areas also have a lot of research. Wu Xinmin (2003) analyzes the Nanjing urban soil heavy metal pollution situation and has concluded that the index of heavy metal pollution in cities has significant difference in different functional areas, pollution intensity of mining and metallurgy industrial zone is the highest, the second is the business district and the old residential areas,

the pollution of scenic areas and the new development zone is lighter, heavy metal pollution of new citizen square in recent years, is not obvious. Li Xiaoqing et al(2006), divide the Shanghai Baoshan district into agricultural, commercial and industrial zone, the soil heavy metal pollution degree is industrial > business district > agricultural region, further analysis is that emissions in industrial production are the important reason to aggravate soil heavy metal pollution of the industrial area. Ma Jianhua (2007) divides soil heavy metal pollution zone of Henan Kaifeng into industrial zone, traffic concentration area, cultural and educational area and the new built up area, analysis is that soil heavy metal pollution of the industrial and traffic concentration areas is prominent, and has a tendency to increase gradually.

NATURAL GEOGRAPHICAL FACTORS ON THE IMPACT OF URBAN SOIL HEAVY METAL ACCUMULATION

Soil mineral composition, texture pH, organic matter and soil environment are often the cause of heavy metal accumulation. Some scholars have survey and drawing on urban natural geographical environment and soil heavy metal accumulation, think that urban natural geographical environment is close to the degree of soil heavy metal pollution. Kelly, et al, analyze the source of soil heavy metal pollution of urban and suburban areas and think: In the same land use mode, soil heavy metal pollution is showed obvious identity, but there is one big difference of pollution level between different elements. Natural geographical environment is often the decisive factor of soil heavy metal accumulation. Julit thinks sources of pollution in the city are more, it can release large amount of heavy metals into the atmosphere and soil, so the enrichment capacity of soil plant to the heavy metal pollutants tends to affect the degree of pollution.

Soil physical and chemical properties on the impact of the spatial distribution of soil heavy metals

According to the principle of adsorption dynamics, different metal elements into the soil, combining with the soil form is affected by physical and chemical properties of soil, soil adsorption ability of foreign chemicals is often relative to their own number of mineral composition, clay content, organic matter, cation exchange capacity and soil forming environment. For example, soil Pb adsorption may mainly include ion exchange reaction and chemical precipitation, forming more metal compounds of exchange state combining with carbonate state.

The future trend

Synthesizing domestic and international relevant research of natural geographical environment on the urban soil heavy metal accumulation effects, we think the following three aspects are geographical scholars to need efforts in the direction of the future: 1) Using of GIS, geographical statistical techniques application condition of heavy metals in urban soil and soil ecosystem seeks effective, long-term monitoring, control of urban soil quality information for more time. 2) Deeply study on behavior of heavy metals in urban gas, soil and water environmental system, makes great efforts to seek balance of urban soil heavy metal pollution source collection, to provide data for urban ecosystem sustainability, providing a scientific basis for reasonable industrial layout and urban function. 3) Study on exogenous purification ability of heavy metals of urban soil physical and chemical properties, looking for threshold of soil heavy metal pollution in city, to avoid pollution of the "time bomb" effect.

CONCLUSION

Synthesizing domestic and international distribution of heavy metals in urban soils and geological conditions research results, we can get three points: 1) Urban soil heavy metal content is strongly affected by human city activities. The more intense human activities are, the higher content of heavy metals in urban soils is. There is urban area > suburb, industrial area > agricultural area > forestry area, traffic downtown > residential landscapes. As to the intensity of human activities and relational model related to the function of soil heavy metal contents needs further accumulated and rich. 2) Heavy metal pollution in urban soils is very complex, coal, oil, industrial type, residents of city will bring heavy metal pollution in urban soils, but major pollution sources of different functional zones are different, interval characteristics of soil heavy metal pollution is significantly different. The study on the relationship between the accumulation of heavy metals in urban soils and heavy metal pollution of the city, due to complex form and wide sources of heavy metal pollution in cities, has not been reported. 3) Natural geographical factors have a positive impact on urban soil heavy metal accumulation. Urban soil heavy metal accumulation is influenced by soil physical and chemical properties of soil environment and itself.

Synthesizing domestic and international distribution of heavy metals in urban soils and geological conditions research results, we put forward three suggestions: 1) The divide of distribution district of heavy metals in urban soils and sites sampling has subjective color, comprehensive understanding of the source of heavy metals in urban ecosystems, forming urban soil zoning of normative and applicable standard requires a lot of basic research and further exploration of the mechanism. 2) In today's context of accelerating the urbanization process, we should develop some research on source of heavy metal contamination in urban soils, such as contents, forms, and

bioavailability in the field of environmental science, at the same time, carrying out research on the relationship between geography and distribution of heavy metals in urban soils, in theory, exploring the city economy, readjustment of industrial structure and migration, transformation and risk of heavy metals in the soil-air-water system. 3) According to the largest capacity characteristics of heavy metals of the geographical location of the city for urban heavy metals, it should be reasonable layout for city functions, scientific urban orientation, maintaining sustainable urban development.

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