

計畫名稱：台灣地區不同土綱土壤中重金屬總量檢測分析

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成果摘要

土地是所有環境物質之最終歸宿也是環境污染物質囤積最多的地方，所以，為了追求人類之永續發展，土地資源之完善規劃與管理是有其必要性與迫切性。土壤本身即富有各種有機質及無機質且種類與質地也不盡相同，如要瞭解土壤受污染之程度，必須先瞭解土壤特性及所含物質之背景含量。

全世界的土壤共分有機質土(Histosols)、灰燼土(Andisols)、淋澱土(Spodosols)、極育土(Ultisols)、冰凍土(Gelisols)、弱育土(Inceptisols)、氧化物土(Oxisols)、膨轉土(Vertisols)、旱境土(Aridisols)、黑沃土(Mollisols)、淋溶土(Alfisols)與新成土(Entisols)等(Soil Survey Staff, 1999)十二種分類綱目(Category)，目前臺灣地區土壤除冰凍土外共包含其他十一種土綱。故本計畫是針對全台灣中十一種土綱，並運用王水全量消化法及微波消化法調查分析其中銅、鋅、鉛、鎘、鎳、鉻六種金屬之背景濃度調查。

黑沃土樣品以鉻為主且有逼近土壤監測基準值之虞。王水消化分析鎳含量介於40~60 mg/Kg，鉻介於110~150 mg/Kg，銅約10~30 mg/Kg左右，鋅約40~70 mg/Kg左右，鎘則小於1 mg/Kg，鉛介於10~20 mg/Kg。微波消化分析其中以鉻值較高，鎳其次。鎳含量約90~100 mg/Kg，鉻介於330~440mg/Kg，銅約15~20 mg/Kg左右，鋅約70~90 mg/Kg左右，鎘則無法測出，鉛為10 mg/Kg以下。其中鉛分析值在FLAA較高。有機質土樣品採六種金屬重金屬含量較低。各層變化較大。王水消化分析鎳含量介於4~20 mg/Kg，鉻介於0~20 mg/Kg，銅約10以下 mg/Kg，鋅約20~80 mg/Kg間，鎘則小於2mg/Kg，鉛介於10~40 mg/Kg。微波消化分析鎳含量30 mg/Kg以下，鉻介於0~20 mg/Kg，銅約10 mg/Kg以下，鋅約10~70 mg/Kg間，鉛介於10~30 mg/Kg。淋溶土樣品六種金屬重金屬含量以鋅為主。王水消化分析鎳含量介於20~60 mg/Kg，鉻介於20~40 mg/Kg，銅約10~20 mg/Kg左右，鋅變化最大80~250 mg/Kg左右，鎘則小於1 mg/Kg，鉛介於20~40 mg/Kg。微波消化分析鎳含量介於20~50 mg/Kg，鉻介於20~70 mg/Kg，銅約10~20 mg/Kg左右，鋅為70~100 mg/Kg左右，鉛介於20~40 mg/Kg。旱境土樣品六種金屬以鋅為主。王水消化分析鎳含量介於30~60 mg/Kg，鉻介於20~50 mg/Kg，銅約10~20 mg/Kg左右，鋅介於80~120 mg/Kg左右，鎘則小於1 mg/Kg，鉛介於20~30 mg/Kg。微波消化分析鎳含量介於20~50 mg/Kg，鉻介於40~60 mg/Kg，銅約10~20 mg/Kg左右，鋅介於70~90 mg/Kg左右，鉛介於20~30 mg/Kg。

膨轉土樣品六種金屬含量以鉻為主。王水消化分析鎳含量介於80~120 mg/Kg表層濃度較低，鉻介於170~330 mg/Kg表層濃度較低，銅約40~60 mg/Kg左右，鋅變化最大40~60 mg/Kg左右，鎘則介於1~1.5 mg/Kg，鉛為5~30 mg/Kg左右。微波消化分析鎳含量介於70~120 mg/Kg表層濃度較低，鉻介於170~310 mg/Kg表層濃度較低，銅約50 mg/Kg左右，鋅約50 mg/Kg左右，鉛為0~20 mg/Kg左右。極育土樣品六種金屬含量不高，以鉻為主。王水消化分析鎳含量介於20~60 mg/Kg，鉻介於40~70 mg/Kg，銅約10~20 mg/Kg左右，鋅變化最大30~300 mg/Kg底層農地最大，鎘則小於1 mg/Kg，鉛介於20~30 mg/Kg。微波消化分析鎳含量介於20~50 mg/Kg，鉻介於30~200 mg/Kg，銅約10~20 mg/Kg左右，鋅為40~50 mg/Kg，鉛介於10~25 mg/Kg。新成土樣品六種金屬以鋅為主且表層居多。往水消化分析鎳含量為30~70 mg/Kg左右，鉻介於20~80 mg/Kg，銅約10~40 mg/Kg左右，鋅變化最大90~450 mg/Kg左右底層含量較大，鎘則小於1 mg/Kg，鉛介於20~40 mg/Kg。微波消化分析鎳含量為20~40 mg/Kg左右，鉻介於30~70 mg/Kg，銅約10~20 mg/Kg左右，鋅70~100 mg/Kg左右底層含量較大，無測得鎘，鉛介於10~30 mg/Kg。

王水全量消化及微波消化方法之分析結果比較知，除黑沃土及有機質土微波消化較王水消化回收效果明顯差異外，其餘土綱土壤效果相同，但大致而言微波消化較王水消化分析數據較高些。

Land is the final destination of many different types of pollutants. It is possible that severe accumulation of pollutants and contaminants in soil due to poor planning and management of Land. In Taiwan, there is an urgent need to manage the land properly with rational strategy and policy. Soil is full of organic and inorganic materials. The composition of soil varies according to different biological areas and backgrounds. It is essential to understand the backgrounds. It is essential to understand the background composition of natural soil before one can actually make correct judgment on case of soil or land contamination. The types of soil are categorized into twelve groups: Histosols, Oxisols, Vertisols, Aridisols, Mollisols, it is common to find all other eleven categories in Taiwan. This project aims for using both aqua regia digestion and microwave-HF total digestion techniques for investigating the contents of Cu, Zn, Pb, Cd, Ni, Taiwan, in order to establish the information regarding the background levels of these elements.

Mollisols shows the highest level of Cr, with the concentration near the regulatory limit. Based on the aqua regia digestion technique, Ni is found to be 40~60mg/kg, Cr to be 110~150mg/kg, Cu 10~30mg/kg, Zn 40~70mg/kg, Cd to be less than 1mg/kg, and Pb 10~20mg/kg. The results from microwave technique shows higher Cr value, with Ni to be the for analysis, results from flame Aa show higher concentration of Pb. No Cadmium was found using flame AA in Mollisols. Besides Mollisols, all other ten categories of soil found in Taiwan are analyzed by both digestion techniques in conjunction with both ICMS and flame AA Methods. Results are all reported accordingly.

We believe that data shown in this report will be beneficial for further applications regarding management of land and judgment of soil contamination. Even agricultural activity and policy will gain fruitful information from this study.

關閉視窗