

氣候變遷與土壤質量管理

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氣候的組成因素：熱、水、風三者，在台灣對土壤質量的最大影響因素就是水。台灣的地形，山高地狹，河流具下列特性：流路短、河床坡降大、流域面積小、比流量大、河川水量豐枯懸殊、河川洪峰流量大、洪峰到達時間短、河川含砂量高，對於水的管理有其困難度，也連帶的影響土壤質量管理。台灣地區年平均降雨量約為世界平均量之三倍多，降雨強度也大，台灣不同降雨延時的最大降雨量，約為世界降雨最大值的 89% 可知，所以對應的集水區逕流量亦偏大，坡地沖蝕相當嚴重。氣候變遷下，大氣圈水平衡系統變異趨大，近年局部地區降雨強度逐漸增大，土壤沖蝕問題更加惡化，造成坡地土壤功能的退化，影響層面既大且深遠，也對坡地農業經營相對增加困難。平地農業也遭遇一些困難，農業經營離不開水，氣候變遷也有機會碰上乾早期，農業經營如何渡過乾旱災情風險也是土壤質量管理之重點。水資源調配與土壤管理方法可以應用，降低氣候變遷帶來的糧食安全風險，但台灣農業的詭譎經營型態與農民的適應性，增加風險發生機率。因為缺水改變農業經營型態也會影響土壤質量問題，例如：土壤有機質的損失，可能造成引發一聯串的土壤品質退化問題，甚至影響國民健康（雲林北部塵暴問題）。豪大雨發生增加平地農田低窪地的淹水機率，造成農作物全滅機率加大；久澇與土壤透水性不佳，根域氧氣不足，造成旱作產量不理想原因。全球海平面上昇，沿海地區的農田遭受海水入侵影響機率加大，農田缺水、地層下陷與海水入侵因素，擴大了沿海地區鹽分地面積與增加土壤鹽分累積量。因應氣候變遷土壤改良工作急迫性不可忽略。

Climate change and the management of soil quality and quantity in Taiwan

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Meteorology deals with heat, water and wind. The most important factor affected soil quality and quantity management in Taiwan agriculture production is water. The topography of Taiwan has very steep and high mountain ranges located in the central part of narrow-wide terrain, Taiwan's rivers have the following characteristics: short flow path, large river bed gradient, smaller drainage area, soaring river peak flow, shortly peak arrival time, densely water sediments. These causes that make the water management of Taiwan have its difficulty and the associated impact on soil quality and quantity management. The average annual precipitation is 2,500 mm; it reaches 3,000 to 5,000 mm in the mountainous regions. Taiwan's average annual rainfall is about three times higher than that of the world. Most of the precipitation concentrates in the summer season. The maximum one hour precipitation reaches 300 mm, the maximum one day precipitation reaches 1,748 mm which is 93.4% of the world record (1,870mm). In comparison with the records in the world, the one-hour to 3-day maximum precipitations in Taiwan are approximately 85 to 93% of the world records. These evidences projected into the seriously runoff as well as soil erosion problems in the surface of watersheds in the hillland of Taiwan. The water balance system of the atmosphere variation becomes larger and larger recently, corresponding to some places have higher rainfall intensity and even breaking the historic record. These made more serious soil erosion problems and degradation of soil function in hillland. It affected so widely and deeply in the live hood of Taiwan and increased the difficulty of slopeland agriculture management. We also encountered some difficulties in the plain region agriculture management. Agricultural management can not operate without water and how to overcome the drought risk during the growth period is important. Allocation of water resources sophisticatedly with soil management can increase the possibility of success to pass the food insecurity risk caused by climate change, but the treacherous agricultural management pattern and adaptability of farmers in Taiwan increase the risk of food security incidence. Water shortage changes agriculture land-use pattern as well as soil quality. The

soil organic matter loss caused by climate changes will be tricked on series soil qualities degradation problems, even affected the public health, for example: the sand dust storm of the north border of Yunlin County. Occurrence of heavy rains increase the flooding probability of farmland on the plains regions, resulting in increased risk of upland crop damages. It is common to find that the farmland with poor soil permeability in long periods of rainfall lacked of oxygen in the root system environment. It caused fatal of upland crops' yields or poor yields. Global sea level rising increasing the possibility of sea water intrusion, shortage of irrigation water, land sinking expand the acreage of saline soil and increase the soil salinity. Soil reclamation projects can not be ignored to cope with climate change.

