

五股區綠竹筍產區擴大灌溉服務創新工法之應用與效益分析

Application and Benefits analysis of Innovative Techniques in Expanding Irrigation Services in the Green Bamboo Shoot Production Area of Wugu District

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摘要

農業生產需要穩定的水源供應，因此面對氣候變遷及降雨豐枯劇烈變化情境，農田水利建設對於農業生產的影響越發重要。以新北市五股區為例，綠竹筍是當地的優良農產品，過往非屬農田水利會的灌區範圍，未有完善的灌溉設施，農民始終面臨著灌溉水源不穩定的挑戰，加以該區域為坡地地形，腹地狹小無法設置大型之蓄水設施，因此以分散式之思維，設置維護簡便之小型取水、輸水、蓄水設施，以解決該區域灌溉面臨之問題。

藉由設置創新的分散式坑溝集水設施，利用降雨時蒐集坑溝中的地表逕流，並結合田間管路設施，將水資源輸送至農民位於田間的蓄水塔，除解決灌溉水源不穩定之問題，並減少坑溝侵蝕及下游洪泛風險，而於雨勢較大、溪水較多時，亦可將堆積於坑溝集水設施上方之枯枝、落葉等雜物透過沖刷方式帶走，降低人力維護需求。此外，透過無動力揚水設施加壓，不須額外電力即可將低處的坑溝水源輸送至高處，揚水過程中經洩水閘排出的水流，亦會回收至分水設施提供後續使用。除前述設施建置外，考量從農人口高齡化，且為進一步節省水源，另建置綠竹筍智慧灌溉示範區，採用更節省水資源及更省力的智慧灌溉模式協助農民進行田間管理，經評估智慧灌溉組單位面積用水量僅為慣行灌溉組的 34.5 %、單位種植面積的產值更是提升了 55%。此外，智慧灌溉系統導入，亦可降低農民巡視田間引灌水源的人力負擔，提高坡地農作安全性與便利性。

因應氣候變遷及農業環境改變，需有創新思維方能達成農業永續發展，五股區綠竹筍產區擴大灌溉服務採用分散式坑溝集水設施及無動力揚水輸水方式，即為遵循前述原則所推動的創新作為，以因地制宜的創新方法，提供穩定之灌溉水源，並降低對當地環

境的擾動，在提升農業生產的同時，實現農業及環境永續的目標。

關鍵詞：氣候變遷、分散式灌溉系統、智慧灌溉、永續發展

A stable water supply system is crucial to agricultural production. Therefore, the impact of agricultural water conservancy construction on agricultural production under climate change and the increasing difference in rainfall between wet and dry seasons becomes even more critical. Taking Wugu District in New Taipei City as an example, green bamboo shoots are a prominent agricultural product. In the past, Wugu District was not within the irrigation area managed by the Agricultural Water Conservancy Association, and there was a lack of adequate irrigation facilities. As a result, farmers have consistently faced the challenge of unstable irrigation water sources. Moreover, the area's hilly terrain and limited space make it impractical to install large-scale water storage facilities. Therefore, by adopting a decentralized approach, setting up small-scale water intake, transmission, and storage facilities that are easy to maintain can address the irrigation challenges faced in that area.

Through the innovative setup of decentralized gully water collection systems, surface runoff during rainfall periods is collected and transported through pipelines to water storage tanks situated in farmland areas. This approach not only stabilizes irrigation water supply but also reduces erosion in ditches and minimizes flood risks in downstream areas. During heavy rainfall or high flowrate periods, debris accumulated above the facilities can be flushed away, reducing the need for manual maintenance. Additionally, through the use of non-powered lifting equipment, water from lower-lying ditches can be transported to higher elevations without additional electricity usage. The water discharged during the lifting process is also recycled back to the catchment facilities for subsequent use. Furthermore, considering the aging population of farmers and aiming to further conserve water resources, a smart irrigation demonstration area for green bamboo shoots has been established to assist farmers in field management. Results show that the smart irrigation system area uses reduced water usage per unit area by 65.5% compared to conventional irrigation methods, while increasing the output value by 55%.

With regards to climate change and evolving agricultural environments, innovative thinking is essential to achieving sustainable agricultural development goals. In expanding irrigation services for green bamboo shoot production in Wugu District, the adoption of decentralized gully water collection systems and non-powered lift water transmission methods represents an innovative approach driven by the principles mentioned earlier. It involves adopting context-specific innovative approaches to provide stable irrigation water while minimizing disruption to local environments, thereby realizing the objectives of sustainability.

Keywords : climate change 、 decentralized irrigation systems 、 smart irrigation systems, Sustainable development