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Bamboo Shoot Cultivation in Taiwan

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In the lush landscapes of Taiwan, bamboo holds a revered place in both culture and commerce. But beneath its serene exterior lies a story of scientific innovation, agricultural perseverance, and the ongoing quest for sustainable cultivation practices.

At the heart of this narrative is Professor Li-Chun Huang, a pioneering scientist from Academia Sinica. In 1986, she embarked on a groundbreaking journey by utilizing tissue culture techniques on *Bambusa oldhamii* and *Dendrocalamus latiflorus*, two prominent species of bamboo. Her vision was to revolutionize bamboo cultivation, and her efforts led to the creation of a new generation of bamboo with a growth rate twice as fast as traditional methods.

Li-Chun Huang

Propagules

However, Professor Huang's breakthrough faced initial challenges when governmental sectors failed to effectively develop her research over a span of three years. Undeterred, she turned to

the agricultural sector, seeking out farmers willing to embrace her innovative approach. It was here that Chen-Kuo Chang, a determined farmer, answered her call. In 1994, he planted the tissue cultures on his farm, marking the beginning of a remarkable journey in bamboo cultivation.

The tissue culture bamboo thrived under Chen-Kuo Chang's care, showcasing remarkable growth from the moment it was planted on his farm in February 1986. Academia Sinica promptly published the tissue culture results in December 1986, coinciding with the early stages of growth on Chang's farm. This swift dissemination of knowledge and implementation of techniques facilitated the significant development of the bamboo tissue culture.

Moreover, Chang's innovative approach extended beyond tissue culture. He pioneered the technique of temporary air-layering, which proved to be a game-changer in bamboo cultivation. This method, developed by Chang himself, accelerated the growth rate of the bamboo by an astonishing 300%, surpassing even the rapid growth observed with tissue culture. The introduction of temporary air-layering not only revolutionized bamboo propagation but also further distinguished Chang's cultivation practices, setting a new standard in the industry.

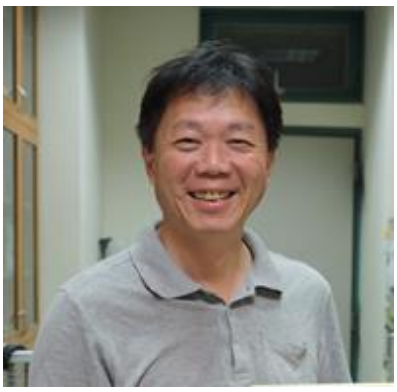
Additionally, the tissue culture bamboo under Chen-Kuo Chang's management exhibited remarkable productivity, producing 45% more bamboo shoots compared to traditional bamboo breeds. This significant increase in bamboo shoot production highlighted the efficacy of Chang's comprehensive approach to bamboo cultivation, combining cutting-edge techniques like tissue culture with his pioneering methods such as temporary air-layering. As a result, Chang's bamboo plantation became a model of innovation and sustainability in the bamboo industry, attracting attention and admiration from scholars, farmers, and government officials alike.

Under Chang's meticulous management, the quantity of bamboo harvested reached unprecedented levels, reaching up to 12 tons per hectare. This remarkable yield was accompanied by exceptional quality, with bamboo shoots boasting a degree of sweetness (brix) around 7.8 and a desirable hardness rating of 3.9. Chang's dedication to optimizing every aspect of bamboo cultivation, from propagation techniques to farm management, resulted in a paradigm shift in the industry, cementing his legacy as a pioneer in sustainable and high-yield bamboo farming practices.

Chen-Kuo Chang among his bamboo.

Despite advancements in bamboo cultivation, the bamboo mosaic virus (BaMV) remained a significant threat to Taiwan's bamboo industry. Professors Yao-Heiu Hsu from Chun-Hsing University and Na-Sheng Lin from Academia Sinica, along with their protégé Professor Chung-Chi Hu, dedicated their careers to understanding BaMV. Their groundbreaking research uncovered new transmission pathways of the virus mediated by insects, published in "Transmission of Bamboo mosaic virus in Bamboos Mediated by Insects in the Order Diptera" in Frontiers in Microbiology. This critical knowledge not only protected bamboo plantations from devastating viral infections but also ensured the industry's resilience and competitiveness. Yao-Heiu Hsu and Na-Sheng Lin's pioneering contributions underscored the vital role of scientific research in safeguarding agricultural sectors and preserving Taiwan's bamboo shoot competitive advantage.





Yao-Heiu Hsu Na-Sheng Lin Chung-Chi Hu


Yet, despite the breakthrough research, the virus continues to afflict up to 80% of commercial bamboo forests. Misinformation and reluctance among farmers to adopt virus-free planting practices remain significant barriers to combating the spread of BaMV.

As the industry grapples with these challenges, a new mystery emerges: the sudden blossoming of *Bambusa oldhamii*. Professors Hsu and Lin, eager to unravel this phenomenon, find themselves at a crossroads as they retire from their esteemed careers, leaving behind a legacy of dedication to bamboo

Looking ahead, the future of bamboo cultivation in Taiwan hangs in the balance. While the quality of Taiwanese bamboo shoots remains unparalleled, the industry faces pressing issues such as the lack of continued research and the scarcity of labor. The path forward requires a united effort from government, scholars, and farmers to navigate the complexities of sustainable cultivation practices and ensure the longevity of this cherished industry.

In the end, the story of bamboo in Taiwan is not just one of resilience and adaptation but also a testament to the enduring legacy of those who dared to innovate in pursuit of a greener tomorrow.

In the verdant landscapes of Taiwan, bamboo stands tall as a symbol of resilience and sustainability. Beyond its cultural significance and economic value, bamboo holds a secret weapon in the fight against climate change: its remarkable ability to sequester carbon dioxide from the atmosphere.

For over 30 years, as we have delved into the art of bamboo shoot harvesting, we have witnessed firsthand the transformative power of this remarkable grass.

Our journey began with a simple observation: bamboo possesses a unique capacity to enrich the soil rapidly. Its rapid metabolism and the copious amount of fallen leaves, meticulously collected to ensure they are virus-free, contribute to the soil's fertility. These organic materials decompose quickly, releasing vital nutrients that nourish the soil and support the growth of other plants in the ecosystem.

But our understanding of bamboo's environmental benefits extends beyond soil enrichment. In the face of natural calamities like floods, bamboo forests have emerged as resilient bastions, mitigating the devastating impact of water erosion. Contrary to expectations, the damage inflicted by floods on bamboo plantations was significantly less than anticipated, with losses limited to less than 20%. We attribute this remarkable resilience to the presence of earthworms and their castings, which proliferated in the aftermath of the flood, indicating the health of the soil beneath the bamboo canopy.

This revelation underscores the critical importance of healthy soil in bolstering the resilience of ecosystems against extreme weather events. Healthy soil acts as a natural defense mechanism, capable of buffering against the effects of droughts and floods, ensuring the long-term viability of bamboo plantations and the surrounding environment.

As we continue our journey, we remain committed to harnessing the potential of bamboo as a powerful ally in the fight against climate change. By promoting sustainable bamboo cultivation practices and nurturing healthy soil ecosystems, we aim to maximize the carbon sequestration potential of bamboo forests, contributing to global efforts to combat rising carbon dioxide levels and mitigate the impacts of climate change.

In the grand tapestry of nature, bamboo emerges not only as a symbol of cultural heritage and economic prosperity but also as a beacon of hope for a sustainable future. Through our collective efforts, we strive to unlock the full potential of bamboo as a carbon sink and protector of our precious planet.