智慧揚帆 深耕農業

　　智慧科技導入傳統農學教育，達到永續農業現代化的願景，是臺灣農業發展的重要基石。傳承百年的嘉大「農學院」地處雲嘉南最重要的農業生產區域，擁有嘉義農林、嘉義農專及嘉義技術學院的悠久歷史，傑出校友遍布海內外事業有成。時代變遷，現有農藝、園藝、森林暨自然資源、木質材料與設計、動物科學、生物農業科技、景觀與植物醫學 8 個學系、1 個博士學位學程及農業推廣中心、動物試驗場及園藝技藝中心附屬單位，具有堅實的教學研究基礎，接軌智慧發展的動能，揚帆迎接農業新世代。

● **結合人工智慧（AI）、大數據（IR）及物聯網（IoT）的智農時代**

　　配合國家新農業政策，嘉大「農學院」與農業相關部會，輔導雲嘉南地區農民，栽種出高品質農產品，利用人工智慧（AI）影像辨識系統提升監測效率；田間機器人替代傳統作業，有效減少人力及提升精準度，除培訓學生強化實務經驗，亦協助農民即時管控農作物生長與健康評估，減少栽培過程中所面臨的風險；另外也結合大數據分析（IR）及物聯網（IoT）應用於農業生產、讓政府端及第一線農民有效掌控各類農產栽植總量，減少農產品產銷失衡。

　　109 年嘉大與上櫃公司廣積科技股份有限公司簽署建置智慧農業戰情中心系統產學合作，初期由嘉大提供草莓溫室，針對室內栽培場域，裝設廣積科技設計的智慧環境監控系統，並搭配 IoT 網路服務技術，透過廣積

AGS100 閘道器系統作為邊緣運算設備做資料蒐集，將草莓溫室內栽培作業環境參數，如環境中土壤、溫度或濕度等，上傳至戰情中心伺服器資料庫系統進行研究分析，建置農業資料庫。未來該中心將逐步與農學院各研究領域的實驗溫室及試驗場連線，除蒐集資料建立大數據資料庫外，也可藉由遠端操控作業，進行溫濕度監控、澆水、施肥、飲水及飼料投放等智能化自動作業，節省人力及精準調使用量，邁向智慧農業新世代。

● **農業為立國之本，新農業發展生態與科技並存**

「農學」是一門「顯學」，不但具有「生產、生活、生態」的永續經營目標，更可兼顧理論與實際之「教學、研究與推廣服務」之科學。嘉大「農學院」在永續農業發展的農藝與園藝科學上，講求生態、有機及自然等友善耕作方式，深耕良性循環的生態經營，輔助農民栽培出優質的農產品，並且透過智慧生產與數位服務專業人才之培育能力所需，提供多元的發展及選擇。嘉大農學院又以「學生農場」為基地，推動農村景觀再生與發展規劃，提升休閒農業優化旅遊及跨領域結合區域的產業。而生物技術於農業發展的重要性，可補足傳統農業科學所欠缺之現代生物技術專長，由生物技術及分子生物學應用於現今智慧/精準農業領域，結合動植物基因轉殖、植物組織培養、農業微生物之開發與利用、DNA 疫苗及農業分子檢測等更可減少學用落差，提升學生就業力。

臺灣是世界第二大蝴蝶蘭出口國，全球市占率高達三成以上，年產值超過60億新台幣，而臺灣國際蘭展也是世界三大蘭展之一，舉世聞名。臺灣蘭業有今日的規模其關鍵在於阿里山山下的嘉義大學，更有「撐起臺灣蘭業半邊天」之美名。嘉大園藝學系有國內首屈一指的蘭花生技特色學程及園藝技藝中心，培育出能與產業鏈結並立即接軌的蘭花專業人才，國內不少知名蘭園經營管理者及核心幹部均為該學系畢業校友，堪稱培育蘭花人才的搖籃。

● **落實資源永續經營教學 強化學生無縫接軌能力**

嘉大「農學院」於林業重點上，以新創「精準林業經營技術體系」建立資源經營調查及經營方案規劃之技能；育林領域加強對臺灣保育類植物組織培養技術的應用發展；保育方面在石虎及玄彩蝠等研究更是國內生態領域翹楚。木材科學則以技術智慧再創技術巔峰，由木材加工、木材產業經濟、木質產品設計與國際木材貿易等共同推動國際交流夥伴與不同海外實習體驗，瞭解木質家具產業營運之前瞻與未來，達到可帶薪海外實習並取得文憑，順利與國際接軌，贏得產學合一之先機。動物產業專業知識與智慧技術在理論與實務並重原則，著重基礎智能，強化動物營養、生理、遺傳與育種、禽畜生產及牧場經營與動物產品加工利用等更能符合市場所需。

● **農業公費專班培養現代農業接班人**

配合行政院農委會推動的「新世代農業工作者培育方案」政策，嘉大

「農學院」率先協助政府建構在學 4 年農業公費生，畢業後從事農業至少 4 年的人才培育體系，以教育具現代化農牧場經營管理及行銷推廣專業素養與能力的從業人員，展現教育與政策結合之連貫性，提高年輕人口農業就業比例。國內目前多所大學承接此項培育專才重任，嘉大地處雲嘉南最重要的農業生產區域，具深厚的農學教育基礎，更是責無旁貸。將智慧科技導入傳統農學教育，達到農業現代化之願景，成為臺灣農業發展的重要基石。

Smart Technology Taking Root in Agriculture

Incorporating smart technology into traditional agricultural education is key to shaping the future of Taiwan's agriculture, characterized by modernization and sustainability. Founded for over a century, the NCYU College of Agriculture is located in the agricultural hub of the Yunlin-Chiayi-Tainan region. The university is the result of the long-time merger of Kagi Agricultural and Forestry School, National Chiayi Institute of Agriculture, and National Chiayi Institute of Technology. It boasts a wealth of outstanding alumni known for their remarkable achievements all over the world. After decades of evolution, the university comprises eight departments (including including Agronomy, Horticultural Science, Forestry and Natural Resources, Wood Materials and Design, Animal Science, BioAgricultural Science, Landscape Architecture and Plant Medicine), one Ph.D. Program, and affiliated units such as the Center of Agricultural Extension, Animal Experiment Farm, and Horticultural Technology Center. With solid teaching and research experience, the university is dedicated to redefining agriculture with the groundbreaking smart technology.

- **A Smart Farming Future Characterized by Artificial Intelligence (AI), Big Data (IR) and Internet Of Things (IoT)**

In conjunction with the country's new agricultural policy, the NCYU College of Agriculture has been collaborating with the agricultural authorities in offering guidance to farmers in the Yunlin-Chiayi-Tainan region in growing high-quality agricultural products and improving monitoring efficiency by using artificial intelligence (AI) image recognition system; and improving traditional

farming practices with field robots, which effectively reduces labor work and enhances accuracy. In addition to enhancing students' practical experience, it has been assisting farmers in real-time control of crop growth and health assessment, and thus reducing the risks in cultivation. Furthermore, application of big data analysis (IR) and Internet of Things (IoT) to agricultural production enables the government and farmers to effectively measure the amounts of various agricultural products and prevent an imbalance of production and sales of agricultural products.

In 2020, NCYU signed an agreement with iBase Technology Inc., an OTC company, on conducting an academic-industrial cooperation project to establish the Smart Agriculture Command Center System. In the earlier phase, the strawberry greenhouse, one of NCYU's indoor cultivation facilities, is installed with the smart environmental monitoring system designed by iBase Technology. Data is collected through the IoT network technology and iBase Technology's AGS100 gateway system as the edge computing equipment. Cultivation environment parameters within the strawberry greenhouse, e.g. soil, temperature or humidity in the surroundings, is uploaded to the server database system of the Command Center for further analysis. It can also be used to enrich the agricultural database. In the future, the center is expected to work with experimental greenhouses and test fields in various research fields of the College of Agriculture on a gradual basis. Apart from collecting data to set up a big database, intelligent automatic operations ranging from temperature and humidity monitoring, watering, fertilization, and drinking water and feed dispensing will be carried out

through remote control, thus unveiling the new era of smart agriculture by reducing labor work and precisely adjusting usage.

- **Agriculture is the Foundation of a Country: Ecology and Technology Coexisting in the New Agricultural Age**

Agriculture is a practical science that aims to achieve the goal of sustainable management in "production, life, ecology" by putting theory into practice through "education, research and promotion services." To reach the goal of sustainable agricultural development in terms of agronomy and horticultural sciences, the NCYU College of Agriculture is commited to developing eco-friendly, organic and natural farming methods to create virtuous cycles of ecological management, and assisti farmers in cultivating high-quality agricultural products. It also provides diversified career development and choices through training professionals with smart production and digital service skills. With "student farm" as the base, the NCYU College of Agriculture hopes to promote rural landscape regeneration and development planning, and optimize tourism and cross-field integration of regional industries by promoting leisure agriculture. Biotechnology and molecular biology are adopted in the field of smart/precision agriculture, as biotechnology is employed in terms of agricultural development to integrate traditional agricultural science with modern biotechnological perspectives. Complete with animal and plant gene transfer, plant tissue culture, development and utilization of agricultural microorganisms, DNA vaccines, agricultural

molecular testing, etc., it is expected to help reduce the education-job mismatch, and enhance students' employability.

Taiwan is the world's second largest exporter of Phalaenopsis, with a global market share of more than 30%, and an annual output value worth more than NT$6 billion. The world-known Taiwan International Orchid Show is one of the world's three largest orchid exhibitions. Located at the foot of Alishan, NCYU, who plays an important role in the development of orchid industry of Taiwan, is reputed to "hold up half the sky for Taiwan's orchid industry." The nationally known Program of Orchid Biotechnology and Horticultural Technology Center, established under the NCYU Department of Horticultural Science, have been nurturing orchid professionals who align with expectations and meet demands of the workplace. As many managers and cadres of well-known orchid gardens in Taiwan are its alumni, the department can be called the cradle of orchid professionals.

● **Facilitating Education on Sustainable Resource Management to Enhance Students' Competitiveness in the Job Market**

In terms of forestry, the "precision forestry management technology system" was newly created at the NCYU College of Agriculture to nurture skills for resource management investigation and management plan planning. In the field of afforestation, they hope to facilitate the application and development of tissue culture technology for conservation plants in Taiwan. In terms of conservation, the College of Agriculture is one of the leaders in ecology studies on leopard cats

and dark woolly bats in Taiwan. Wood science reaches another breakthrough with technological wisdom. To shed light on the foresight and future of the wood furniture industry, they have been facilitating international exchange partnership and overseas internships through wood processing, wood industry economy, wood product design, international wood trade, etc. The objective is to provide participants with paid overseas internships and diplomas, and help enhance their international employability, and bridge the gap between academia and industry. As both theory and practice in professional knowledge and smart technology matter in the animal industry, they hope to focus on basic intelligence, animal nutrition, physiology, genetics and breeding, livestock production and pasture management, and animal product processing and utilization, among others. All these allow the students to stay attuned to market demands.

- **Publicly Funded Agricultural Programs to Train Agricultural Professionals of the Next Generation**

In conjunction with the "New Generation of Agricultural Worker Development Project" implemented by the Council of Agriculture, Executive Yuan, the NCYU College of Agriculture spearheaded in assisting the government to construct a four-year publicly funded professional training system for students who are required to be engaged in farming for at least four years after graduation. It is targeted to nurture practitioners with professional knowledge and competencies in modern farming and pasture management and marketing, bridge the gap between education and policy, and increase the proportion of young people engaged in farming. As many universities in Taiwan have taken the task

to cultivate agricultural professionals, NCYU, which is located in the agricultural hub of the Yunlin-Chiayi-Tainan region with a solid foundation in agronomy education, sees it as its responsibility to do so. Incorporating smart technology into traditional agricultural education is key to shaping the future of Taiwan's agriculture, characterized by modernization and sustainability.