

摘要

95 年度本場共執行科技研究計畫 51 項，示範推廣計畫 21 項，接受委託試驗 16 項，茲將摘要擇錄如下：

稻作：依高級試驗結果，選出優良水稻品系花稈育 75 號參加 96 年區域試驗。肥效反應試驗結果顯示新品系花稈育 69 號、72 號及 79 號皆以每公頃施用氮素 120 公斤時稻穀產量最高。穗上發芽率檢定顯示稈稻品種在二期作易穗上發芽；第二期作的稈、私稻脫粒性檢定均屬中等。水稻豐歉試驗兩期作試驗結果，各品種均較歷年減產。有機稻田省工除草試驗第一期作試驗結果，機器除草處理之食味表現較佳。建立水稻現行品種優質栽培生理指標試驗，插秧至成熟期平均積溫及日射量，一期作分別為 $1772.7^{\circ}\text{C}\cdot\text{day}$ 、 $1354.2\text{MJ}/\text{m}^2$ ；二期作分別為 $1672.1^{\circ}\text{C}\cdot\text{day}$ 、 $1456\text{MJ}/\text{m}^2$ 。本年度持續收集花蓮地區之陸稻品種，總計約蒐集得到 220 種。水稻新品種示範分別於花蓮縣玉里鎮、富里鄉及宜蘭縣冬山鄉、礁溪鄉進行，示範品種為桃園 3 號、花蓮 20 號、高雄 145 號與台南 11 號。有機米產銷班經營輔導方面，花蓮地區一、二期作輔導花蓮市、玉里鎮及富里鄉等 7 班共 543 公頃；宜蘭地區一期作輔導礁溪鄉、三星鄉及羅東鎮 3 班共 69 公頃。輔導推動良質米生產改進計畫，花蓮縣於富里鄉、玉里鎮兩期作共執行 1,000 公頃；宜蘭縣於五結鄉、冬山鄉、礁溪鄉、三星鄉、員山鄉等一期作共執行 2,620 公頃。另於花蓮縣富里鄉、玉里鎮及宜蘭縣五結鄉輔導設立稻米產銷專業區四處，全年執行面積 1,431 公頃。

雜糧：落花生區域試試驗春作以南改系 173 號及花育 18 號，秋作以南改系 173 號之表現較佳。芋仔甘藷新品系 TLSP-024 號 94 年秋作及 95 年春作之平均公頃鮮塊根產量分別為 22,188 及 18,042 公斤。景觀作物百日草以 4 月及 8 月播種者之平均每株開花數較多，小油菊以 8 月播種者之開花數為最多；百日草之開花數以每公頃播種 8~10 公斤，小油菊以播種 10~12 公斤者之表現較佳。篩選適合於東部地區栽培之生質能源大豆品系，結果以印度種及中興一號品種之表現較佳；生質能源大豆利用機械播種及收穫約可降低生產成本 23%；能源作物大油菜之平均公頃籽實產量以桃園 4 號為最高。栽培有機食用甜玉米試驗，利用蘇力菌可濕性粉劑 600 倍可防治玉米螟為害；大豆有機栽培播種期試驗結果，春作以 3 月 15 日，秋作以 9 月 8 日之表現較佳。保健作物之開發利用研究結果顯示，長形山藥以塑膠管栽培之產量較高；保健植物之抗氧化能力以丹參較高；半枝蓮以每公頃施用 6

噸有機質肥料栽培之單株重最高。當歸在不同栽培環境下之產量表現以安通地區最高，Ferulic acid 含量以壽豐地區最高，Z-ligustilide 含量以安通地區最高；黃芩在不同栽培環境下之產量以吉安地區最高；黃芩苷含量以瑞穗及安通地區最高，黃芩素以吉安地區最高，漢黃芩素以卓溪地區最高。另已成功開發出當歸保健作物之複方飲品，經食品安全性評估結果為無毒性。

蔬菜：苦瓜一般組合力試驗，10 個雜交 F1 品系參試，以 2653 等 3 個品系表現較佳。苦瓜區域試驗以 WB33 品系較佳。山苦瓜 DNA 基源分析，分析 10 個山苦瓜樣品序列之歧異度及建立親緣關係，各樣品之 DNA 序列的相似度在 84%-99% 之間。以轉錄活化分析比較 24 種山苦瓜品系乙酸乙酯萃取物活化 PPAR γ 之能力，結果顯示 HM18、HM2381 等品系活化 PPAR γ 效果較佳。山蘇區域試驗，以 HA178 品系表現最佳。番茄育種方面，選出抗捲葉病毒病橙色小果型番茄優良新品系 CHT1417 命名為‘花蓮亞蔬 21 號’，並於 96 年 1 月 15 日取得植物品種權；兼抗晚疫病暨捲葉病毒病大果型番茄區域試驗，以 FMTT1047 品系平均產量最高。青蔥耐熱品種選育，產量及蔥白長度等性狀表現以 HAF10519 品系較佳。青蔥生產調節及外銷貯運技術之研究，採用剪刀去根，包裝於 5 或 10 公斤紙箱，再配合二氧化碳氣變處理於 5°C 冷藏可延長儲藏期。

花卉：百合品種改良，九個雜交品系以 FLME2-5 品系抽莖最早，抽莖率達 83.4% 為最高；優良雜交品系 92FA3-2，經開花株植株生育、開花特性及穩定性調查適合當盆花栽培。自荷蘭引進適合外銷用百合切花 6 品種之栽培與適應性觀察試驗，良好的田間栽培技術與肥培管理有助於提昇切花品質；經 4°C 冷藏 3 天及 7 天後瓶插壽命及切花品質仍佳。萱草種間雜交，總計雜交組合 32 個，獲得 91 個成熟果莢，種子於 8 月播種，共獲得 362 株幼苗。15 種薄荷品種精油，以氣相層析質譜儀進行組成份定性分析，最先測到的成分為 α -蒎烯，且所有品種均含有，其相對含量在 0.12 至 2.2% 之間。銀柳營養系比較，各品系之扦插存活率平均值為 85.7%，株高 181.7-198.5 公分，分枝數 4.1-6.6 枝。寒梅十二一重品種之種子以直播於潮濕介質中為宜，經 8 週以上之 5°C 低溫層積法處理，可顯著種子發芽率。過江藤、脈耳草及龍船花不同介質扦插試驗，其中過江藤於三種介質之扦插成活率均達 100%，脈耳草以珍珠石+蛭石、砂之扦插成活率達 90~100%；龍船花以珍珠石+蛭石、砂之扦插成活率達 86-93%。水生植物大海之星頂芽或中段插穗，於 4-10 月扦插者速率快，過長沙於 4-11 月扦插者可在 2-5 天內恢復生長。斑葉香蒲於 7 月種植之成活率為 100%。

果樹：利用 100°C 之石蠟液沾裹高接梨嫁接花苞，可提高花苞之著果與單株產量；花苞嫁接後利用遮雨小傘，可顯著增加著果數與單株產量。豐水梨採收後貯藏於 5~7°C 低溫環境下，櫥架壽命可延長為 10 週。宜蘭地區柑桔品種試種，果重以清見及 Dream Navel 平均 535.9 及 356.9 公克較重；糖度以 Fremont 柑及 P158-2 號平均達 13.5 及 11.9°Brix 較高。金柑健康芽系試作，單果重平均以 HF-1-3 號 18.4 公克最大；單株產量以 HF-1-9 號達 17.5 公斤最高。紅龍果果實採收後，以保留肉質莖莖段方式貯藏，可在 5°C 低溫貯藏 28 日。於文旦柚果實生理落果期後，剪除徒長枝、病蟲害枝，並短剪密生重疊枝條，可明顯降低果實酸度並提高糖酸比。降低貯藏溫度，可減緩文旦柚果實失重速率、減緩果皮厚度與果實硬度之下降速率。

生物技術：設計 CPMO、PRSV322、PAPAIN215、PAPAIN157 等引子，以進行基改木瓜 PCR 檢定，其中 CPMO 引子只能偵測到濃度 0.5ng/ μ L 以上之 DNA，其他引子則可偵測到濃度 0.2ng/ μ L 之 DNA。以菊花之舌瓣花為培植體，放入含 BA 2 mg/L，NAA0.1 或 0.5 mg/L 培養基中，以青心白等 3 個品種癒傷組織生長速度最快。綬草培植體在 1/2MS 基鹽濃度處理下，其培植體存活率最高達 70.8%，為最適之基鹽濃度處理；以高濃度 BA 處理及高濃度椰子水處理可獲得較多芽體數。紫蘭培植體於不含植物生長調節劑之 MS 培養下，可獲得 10 個芽體，較 1/2MS 或 1/4MS 處理為多。國蘭無菌播種 6 個月後始觀察到種子發芽，經 10 個月後以報歲中斑品種於低基鹽、高蔗糖濃度之發芽率 5.67% 最高。國蘭根莖在高基鹽濃度與蔗糖濃度中均有促進根莖生長之效果，利用 BA 及椰子水處理可誘導根莖發育為芽體。

農產品加工：開發養生小米粥即食餐包，並建立加工製程及技術和方法，產品主要食材為台東選 7 號小米、山藥零餘子、紫糯米等，並以立式殺菌軟袋為包材，應用水淋式殺菌方式進行殺菌，殺菌條件採全自動電腦控制梯度升溫升壓系統模式，產品達到商業殺菌之標準，通過枯草桿菌與保溫安全貯存試驗。並具備食用衛生、安全、便利、易貯存、好運輸等優點。

植物保護：本年度植物保護工作，就本轄區農友所栽培之作物在生育期中所發生之病蟲為害進行各項作物有機栽培、非農藥防治及生物製劑之試驗研究、示範推廣及農藥安全使用監測追蹤等工作。利用透明塑膠布與吸收紫外光塑膠布搭設隧道棚栽培草莓可有效降低草莓灰黴病罹病率至 30 與 28.8%。花胡瓜施用蚵殼粉及蓖麻粕可防治根瘤線蟲及立枯病並增產 60%。菠菜田區施用蚵殼粉及蓖麻粕，

種子以滅普寧粉衣消毒並噴施 70%鋅錳賽得 WP600 倍液 1 次可降低露菌病發生率。韭菜病蟲害標準管理示範區在防治成本上每公頃所需費用較農民慣行區減少 9,050 元。宜蘭地區青蔥甜菜夜蛾對因滅汀、得芬諾、蘇力菌、因得克等藥劑仍具高感受性，致死率均達 90%以上。將蓖麻粕和菸葉粕、蚵殼粉分別混合添加於栽培介質中再添加拮抗菌，可降低番茄幼苗疫病罹病率 13.3~40%，對甘藍幼苗立枯病可達 30~40%之防治效果。菸草浸液以 50 倍稀釋液防治十字花科黃條葉蚤具顯著效果。為有效防治梨赤星病，輪流施用三泰芬、芬瑞莫、比多農等藥劑，調查結果顯示梨赤星病已有效控制。水稻稻熱病非農藥防治第一期作以木黴菌 1000 倍防治效果最佳，第二期作防治穗與枝梗稻熱病以枯草桿菌防治效果最佳。以白殭菌 1×10^8 spores/ml 防治黃條葉蚤成蟲死亡率於第 6 天可達 60%。95 年度果實蠅密度監測結果平均最高密度 (92.1 隻/誘殺盒) 與去年 (94 年) 相當，顯示長期執行共同防治已呈現穩定的狀態。甜菜夜蛾田間密度監測結果 95 年度之週平均密度為 17.4 隻/誘蟲盒，防治區之密度及被害率皆較未共同防治區減少 50%以上。緬甸小鼠及野鼠監測與防治結果顯示防除率達 75.1%。為把握水稻病蟲害適期防治及轄區經濟作物疫情監測，計發佈作物病蟲害發生預報 12 次、警報 5 次及新聞稿 28 次。發佈氣象資訊及農作物防範措施達 30 次。執行紅火蟻鑑定 8 件以上，執行作物病蟲害監測及防治處方服務，計診斷作物 50 餘種 271 件。輔導花蓮縣及宜蘭縣蔬菜用藥安全，並核發吉園圃標章使用計 118 班。

土壤肥料：蔬菜有機栽培試驗結果顯示，龍鬚菜以台肥生技 1 號及欣農強壯 2 號加豆餅兩處理者之產量較高，而 19 種小胡瓜中則以新翠、新玉及 HA-1236 產量最高，為較適合有機栽培的品種。透過源頭管理生產有機農業適用堆肥之研究顯示，豬糞及羊糞堆肥中銅與鋅濃度隨堆肥時間而降低。以假堆稻殼介質配合養液滴灌系統栽培紅慧番茄時，增加磷肥用量雖無法顯著增產但可提高品質，而栽培 FMTT 957 品系番茄時，增加磷肥用量可同時增產與提高品質。炭化稻殼：土壤：稻殼堆肥為 1：2：1 處理之小胡瓜及甘藍發芽率為最高，小胡瓜苗期之生育以 1：0：1 者為最佳，甘藍苗期之生育則以 1：3：1 者為最佳。已選出最適合製作柚香茶之茶花比、烘培時間及茶樹品種，超過 90%的消費者喜歡或很喜歡，具有市場潛力。本年度作物營養診斷及土壤肥力分析總件數為 1,840 件，共服務農民 322 人次。

農業機械：進行青蔥田間作畦打洞作業裝置之研製改良，成功開發作畦打洞兼具施肥功能之機械，使達到一貫作業之目的。活動式支柱關節開發設計係將原

固定式支架加以設計改良，其中支架下方設有上下組合之活動關節，當颱風來襲前，讓作物支架伏貼在地表上，對預防降低颱風災害具顯著效果。蔬菜種子直播機模具及其相關組件加工，包括播種室主體及蓋板、種子箱及種子箱蓋及播種盤組，主要因應台灣地區各式不同蔬菜種子所需播種盤配合加工時用。本場亦配合開發相關機型加以應用計有播種作畦施肥一貫作業機、輕巧型自走式播種機及手推式直播機等可供使用，曳引機承載綠肥播種器之開發係針對一般綠肥作物加以設計之播種作業器，主要是舒解人工播種作業之辛勞，及提升播種作業時之均勻度。移植機之開發係利用本場研發之專利機型，具備有跨畦床作業之功能以及作業高度之調整，亦兼具有輪距調整之功能。

農業推廣教育訓練：為加速農業人力與農民組織發展，辦理農民專業訓練 5 場次，培訓 218 人。推動農民終身學習計畫，辦理核心資源教育訓練 4 班，參訓人員 159 人。產銷履歷制度宣導教育訓練共 3 班，參訓人員 73 人。製作數位教材一有機蔬菜採收後處理技術乙套。為積極落實推動新農業運動之農業漂鳥體驗，鼓勵青年留農築巢以引進農業生力軍，辦理 6 梯次農業體驗漂鳥營隊，共 120 位學員參加。為協助農民加速養成現代化農業經營管理技能，促進農業經營企業化，協助辦理蔬菜及果樹經營管理深耕計畫班各 2 梯次，計 126 人參訓。

農業經營管理：推動農業產銷班組訓及輔導工作，共計整合花蓮及宜蘭縣農業產銷班 403 班。輔導羅山有機村組織人力與經營業務之推動，並配合「東部永續花東縱谷優質農業推動方案計畫」的工作項目，營造富里鄉三生一體的羅山有機村。另為提升文旦產業競爭力持續推動文旦策略聯盟輔導工作，透過柚花季及柚樹認養系列活動以延長行銷週期並創造文旦之附加價值。為能傾聽農民聲音、建立溝通管道瞭解基層推動農業施政時所遭遇的問題，分別在花蓮及宜蘭兩縣召開「農業產銷班座談會」，共 18 場次計 1,815 人參加，回收農民意見並回答農民提問議題計 176 項。

農村生活改善：辦理營造農村健康生活及生產支援體系計畫，輔導轄區宜蘭縣、花蓮縣各級農會辦理「強化家政班功能」、「高齡者生活改善研習班」、「農家有機廢棄資源化處理班」共 160 班，以提升農村婦女經營管理知能、經濟能力及高齡者生活品質。舉辦家政推廣人員專業訓練「鄉村發展與農特產品行銷班」，以充實轄區家政推廣人員在鄉村發展、農特產品行銷管理及農特產品開發專業之知能，參加人數為 22 人。另輔導花蓮縣 8 班、宜蘭縣 7 班之農村婦女開創副業，創造農村就業機會，增加農村家庭收入。為增加百合的多元化利用，舉辦「花蓮區

百合料理創意競賽」，編印「百合創意料理」食譜，提供給休閒農業經營者，民宿業者及消費者參考。

農業資訊傳播：將試驗研究成果及產銷推廣活動訊息提供媒體刊登及播出，本年度於農委會辦理記者會 1 次，提送行政院農業委員會新聞發佈之試驗研究成果主題共 15 則，電視行銷新聞主題 7 則，提送地方新聞媒體新聞稿 72 則，經媒體採納發佈共 130 次。發行農業推廣雜誌共編印「花蓮區農業專訊」季刊 4 期、「花蓮區農情月刊」12 期及花蓮區農技報導 6 期。設立「花蓮區農業改良場全球資訊網(www.hdais.gov.tw)」，提供各項農業技術資訊，擴大服務層面以共享農業資源，累計上網瀏覽 5 萬餘人次，提昇農業資訊的 e 化應用。

為民服務：積極推動「以人民需求為中心」之單一窗口服務體系，以加強服務民眾，接待團體及人員 55 次，參訪人數計有 2,117 人。為將各項重要研究成果介紹給社會大眾，95 年度於春、秋兩季舉辦「農業科技研究成果暨農業體驗活動」及「青蔥產業發展研討會」、「作物產銷安全管理發展研討會」，由於成果展示及活動規劃內容豐富且活潑生動，共吸引超過 6,000 人參加各項活動。

Summary

In 2006, 51 research projects, 21 demonstration plans and 16 commissioned projects from other organizations were conducted. The results were summarized as follow:

On rice culture: According to the results of higher trials, a promising rice breeding line HKY75 was selected to attend the regional trail of 2007 set. The fertilizer test on the new breeding line HKY69, 72 and 79 showed that the highest yield was obtained on the application of nitrogen at 120 kg/ha. In the yield forecasting trial, the yield was lower than the past years in all varieties. On the research of organic rice culture, the machine-weeding treatment had better rice eating quality than conventional. On the research of rice physiological index for high quality product, the result showed that the average of accumulated temperature and accumulated radiation was 1772.7°C-day and 1354.2mJ/m² in first crop, and 1672.1°C-day and 1456 mJ/m² in the second crop. In total, 220 varieties of upland rice had been collected. The demonstration of new rice variety was conducted in both Hualien and Yilan County, and four varieties TY3, HL20, KH145 and TN11 were used. To promote organic rice production, a total of 543 and 69 hectares were grown respectively in Hualien and Yilan Counties. To enhance the production of good quality rice, a total of 1,000 and 2,620 hectares were set up respectively in Hualien and Yilan Counties. And four rice producing districts of good quality rice, a total of 1,431 hectares were guided to be established in Hualien and Yilan Counties.

On upland and special crops: Peanut breeding lines Nan-Kai-SI 173 and Hua-Yu 18 in the spring crop and Nan-Kai-SI 173 in the fall crop performed high yield potential in the regional yield trails. The yield of taro-like sweet potato line TLSP-024 was 22,188 and 18,042 kg/ha respectively in the fall crop of 2005 and in the spring crop of 2006. In the study of landscaping green manure, the common Zinnia was suitable to sow in April and August, and the Niger was suitable to sow in August. The ideal seed sowing quantity was 8 to 10 kg/ha for common Zinnia and 10 to 12 kg/ha for Niger. On the selection of energy crops suitable for growing in Hualien area, the results showed that soybean variety India and Chung-Hsing #1 had the highest yield capacity than other varieties. The rape cultivar Taoyuan No.4 had the highest yield. Soybean cultured by a mechanical farming system can reduce the production cost by 23%. The effect to

prevent the damage of the Asia corn borer in the organic cultivation of green sweet corn was good by the 600x *Bacillus thuringiensis* w.p. The cultivation of organic soybean was better to plant in March 15 for the spring crop and September 8 for the fall crop respectively. On the research of special crops in the eastern area, the results showed the yield of yam cultivar Hualien No. 3 with plastic-pipe practice was higher than the deep-plow practice. The antioxidant capacity was higher in the *Salvia miltiorrhiza* among 9 medicinal plants species, and the processing products such as drinks and the product of Dang-gui crop had been successfully developed.

On vegetables: Ten F1 bitter melon breeding lines were chosen to evaluate the general combining ability, and line 2653, 8153 and 5581 showed better performance than other lines. Ten bitter melon samples were analyzed by PAGE-2D and DNA analysis, the similarity was between 84 and 99%. To compare the PPAR γ activating capability of 24 wild bitter melons inbred lines, a transactivation assay was done. Line HM18 and HM 2381 had high activation of PPAR γ . On the regional trial of nest fern, breeding line HA178 had the highest yield among three areas. For tomato breeding, one orange cherry tomato line CHT1417 characterized with resistant to tomato leaf curl virus (*ToLCV*) had awarded the plant breeder's right and registered as a new variety "Hualien Asveg No. 21" in January 15, 2007. The yield of tomato breeding line FM11047 with resistant to late blight and tomato leaf curl virus was the highest. On the breeding of green onion, breeding line HAF10519 had good performance with higher yield and long blanched stems in summer season. On the study of the cultural regulation and export shipment of green onion, the results indicated that carbon dioxide storage under 5°C could keep better quality.

On flower crops: Among 9 hybrid lily lines, the earliest emergence line was FLME2-5, and emergence ration was 83.4%. On the other hand, the breeding line 92FA3-2 was evaluated suitable for a pot plant based on the growth habit, flowering characters and stability. There were six varieties of lily introduced from the Netherlands cultivated and evaluated in the observation trials. Good cultivation techniques could help to enhance the quality of lily cut flowers, and the quality could be maintained after stored in 4 °C for 3 and 7 days. The hybridization works of daylily varieties were conducted, and 32 crossing combinations had been done. There were 91 matured capsules harvested. The hybrid seeds were sown in August, and 362 plantlets were obtained thereafter. Different mint essential oils from 15 varieties were analyzed by

GC-MS to compare their composition. The results showed that α -pinene was the first component detected, and all varieties contained this component. The relative amount of α -pinene was between 0.12 and 2.2%. The comparison of Cat-tail Willow clones were conducted, the average survival rate for cuttings was 85.7%. The plant height lies between 181.7 and 198.5 cm, and the number of branches lies between 4.1 and 6.6. For flowering-quince, the result indicates that seeds of variety Shi-Er-Yi-Chong would be better to sow in humid media. With 5°C low-temperature stratification over 8 weeks, the germination rate was increased significantly. For cutting testing of *Phyla nodiflora*, *Hedyotis strigulosa* and *Clerodendrum kaempferi* in three different media, the cutting survival rate of *Phyla nodiflora* was the highest, 100% in all three media. For *Hedyotis strigulosa* and *Clerodendrum kaempferi* cutting, it would be better to use perlite with vermiculite and sand. The shoot cuttings of variegated giant bacopa (*Bacopa lanigera* ‘Variegata’) cultivated in April to October regrew apparently faster. For cutting of herb-of-grace (*Bacopa monnieri*) cultivated during April and November, it needed only 2-5 days to start to grow. The survival rate of variegated cattails (*Typha latifolia* ‘Variegata’) cultivated in July was 100%.

On fruit tree: The 100°C paraffin solution treatment on buds could increased the fruit number and yield of top-grafted pear, and the yield of top-grafted pear that flower buds protected by rain shelter umbrella was significantly higher than the unprotected control. The shelf life was extended to 10 weeks when fruits stored at 5-7°C. In Yilan area, Fremont and citrus line P158-2 showed higher sugar content, 13.5 and 11.9 °Brix respectively, than other cultivars. Some healthy bud-lines of kumquat were grown in Yilan area for trials. In average, line HF-1-3 had the largest fruit weight of 18.4 g, and line HF-1-9 had the highest yield of 17.5 kg/tree. It was shown that the soluble solid content and hardness of pitaya were not affected by maintaining the stem section, but the cross section area could keep fresh when the fruit was stored at 5°C after 28 days. Training the excessive growing shoots of Wentan pomelo after physiological fruit drop stage could decrease acidity level and increase sugar/acid ratio significantly.

On biotechnology: To improved the accuracy of PCR assay for GM papaya, primers CPMO, PRSV322, PAPA215, PAPAIN157, 35S463 and P4441/P4837 were designed. The PCR assay could only detect the sample DNA concentration above 0.5ng/μL by the CPMO primers, but it could reach the 0.2ng/μL level by using the other primers. The stephanotis of *chrysanthemum* were used as explants and BA 2mg/L,

NAA 0.1 or 0.5 mg/L were used as cultural medium to set up the regeneration system for chrysanthemum gene transformation. The results showed that 1/2MS and 20 to 30g/L sucrose concentrations treatments were fit for *Spiranthes sinensis*. The explants of *Spathoglottis plicata* grew well in MS medium without any plant growth regulator. In seed germination trial for *Cymbidium*, the results showed that seeds germination was observed 6 months after cultured *in vitro*. The germination rate is 5.67% after 10 months cultured on media with lower salt and higher sucrose content. The rhizomes of *Cymbidium* were grown well on media with high salt and high sucrose content. Medium supplemented with BA and coconut milk could induce shoot formation of *Cymbidium* rhizomes.

On processing of agricultural product: To develop the processing technology and manufacturing procedure for millet porridge, it was packed into standing retort pouches (PET/Al-foil / CPP) with ingredients as: glutinous millet, bulbils of Chinese yam, purple glutinous rice and so on. The advantage of the product were food hygiene, safe, convenient, easy storage and transportation.

On plant protection: The research projects and demonstration plans of organic cultivation, non-chemical controlling, biological pesticide preparation, and safety using of chemicals in crops were conducted in 2006. Under the tunnel protection with UV absorbent plastic sheet and transparent plastic sheet, the incidences of gray mold on strawberry were reduced to 30 and 28.8%, respectively. Application of oyster shell powder and castor cake could control the damping-off disease and increase production 60% on cucumber. Spinach downy mildew was controlled by spraying of Mancozeb together with Fosetyl-Al 10 days after germination. The cost for leek pest control on standard model area was NT\$ 9,050 lower than that on farmer customary practice area. Beet army worm larvae were still sensitive to pesticides Enamectin benzoate, Tebufenozide, *Bacillus thuringensis* and Indoxacarb. The highest effect was found in the treatment which mixed with castor cake, oyster shell powder, and antagonist in the culture medium. The medium could reduce the incidence of the *Pythophthora* disease of tomato 13.3 to 40%, and increase survival rate of cabbage seedling about 30 to 40%. *Phyllotreta striolata* was effectively controlled by treated with tobacco extract. In order to prevent the pear rust disease, Triadimefon, Fenarimol and Bitertanol were applied alternatively; the result showed that the pear rust disease was controlled effectively. For non-chemical controlling on rice, *Trichoderma harzium* got the highest controlling ratio

for leaf blast in the first crop, and *Bacillus subtilis* could get the highest controlling ratio for blast on panicles and on spikelet in the 2nd crop. The control rate could be up to 60% on 6th day by using 10^8 spores/mL of *Beauveria bassiana* on adults of striped leaf beetle. By whole area controlling scheme in Yilan County, the density of oriental fruit fly and damage ratio was reduced, and the density of beet armyworm of green onion was also reduced 50%. The population of Brumese mouse and wild mouse were surveyed before and after baiting, the controlling rate was 75.1%. In order to control pest at suitable time and monitor plant epidemic, the plant pest forecasts were issued 12 times, and the pest warning report and meteorological information were issued 5 and 28 times, respectively. More than 8 samples of suspected red imported fire ant were identified and control guidance was recommended. There were 271 cases of diagnosis and prescription conducted among 50 kinds of crops. In total, there were 118 product-cum-marketing groups using of GAP mark in Hualien and Yilan been assisted.

On soil and fertilizer: In organic culture research of chayote, two treatments with TFC No.1 bio-fertilizer and Shin-nung No.2 fertilizer together with soybean cake had higher yield. Nineteen cucumber cultivars were tested for organic culture. It showed that cultivars Chin-Tsuei, Chin-Yu, and HA-1236 had higher yield than other cultivars, and are suitable for organic culture. In the study of producing suitable compost for organic agriculture, the result showed that Zn and Cu content were decreased in both pig manure and goat manure with compost time. In the research of the medium for horticultural crops, the results indicated that the germination rate of cucumber and cabbage was the highest with the medium of carbonized rice hull: soil: rice hull compost (1:2:1), the growth of cucumber seedlings performed the best with the medium of carbonized rice hull: soil: rice hull compost (1:0:1), and the growth of cabbage seedlings performed the best with the medium of carbonized rice hull: soil: rice hull compost (1:3:1). The best processing procedure and baking time of the fragrant tea mixed with pomelo flower was found. More than 90% consumers like or like very much, the fragrant tea has high commercial potential. In total there were 1840 samples of soil and plant tissues from 322 farmers analyzed this year.

On agricultural machine: A ridge making and holing machine for green onion has been developed, it combines concurrently the holing, ridge making and fertilizer applying all in one. A fold joint pillar was developed based on the original regular type pillar. The fold joint pillar includes two parts. The upper part could be laid down before

the typhoon comes to attack, which let the crop fit perfectly on the ground's surface to reduce the typhoon disaster. In the mold development of vegetable seeding machine, it includes seeding case, seeding case lid, seeding channel, seed box, seed box lid, and seed discs. The seed disc has been developed to match the different vegetable seeds in Taiwan. A light self-propelled vegetable seeding machine, and a vegetable seeding machine combined with fertilizer applying and ridge making have been developed as well. A green manure seeding machine has been developed to alleviate the hard work of sowing, and raise the degree of sowing uniformity. A vegetable transplanting machine with the functions which can cross the bed and adjust the height and width of operation has been developed.

On agricultural extension, education and training: In order to enhance the agricultural manpower and the farmer organization development, 5 sessions of farmer's professional training courses had been handled, and 218 people had been trained. To impel the farmer lifelong learn plan, 4 classes of the core resource education and training program had been conducted, and 159 people had participated in. Also, 3 classes of the agricultural TGAP guidance education had been held, and 73 people had been trained. One set of digital teaching material of organic vegetable postharvest technology had been made. The COA New Agricultural Movement were animated by encouraging the youth to undergo agricultural experience and input new agricultural power. There were 6 teams of the Wandervogel camp been carried out, and 120 students had participated in. To accelerate the movement of modernization and commercialization for farmers, two advance courses on vegetable and fruit management were conducted, and 126 farmers were trained.

On agriculture management: To impel organization training and guidance, 403 agricultural production and marketing teams, in Hualien and Yilan Counties, had been integrated. To develop the Loshan organic village, counsel and training of organization and management had been provided. And build the Loshan organic village on "Production Function, Living Function and Ecology Function". To promote pomelo industry's competitiveness, the pomelo strategy alliance had been impelled continuously. The pomelo flower season and the series activities had also been held to prolong the marketing cycle and create the add-value for pomelo. To listen attentively the farmer's voice and establish the communication channel to understand the problems when impetus agriculture policies, 18 "Agricultural Consultant Meetings" were held in both

Hualien and Yilan Counties, and 1,815 people had participate in. There were in total 176 items of farmer's questions and commends been collected and answered.

On improvement of rural life: Plans of the rural healthy life and the production supporting system had been conducted. To improve rural women managing knowledge, economic ability, and aged person's life quality, the farmers' associations in Yilan and Hualien Counties had been assisted and guided. And 160 class about "Strengthening Home Economics Team Function", "Life Quality Improvement for Aged Person", and "Recycling Usage of Organic Waste" were conducted. To enrich the knowledge of home economics extension agents, the professional training "Rural Development and Agricultural Product Marketing" had been conducted, the number of participant was 22. To create the rural employment opportunity, and increase the rural household income, 8 home economics improvement clubs in Hualien County, 7 home economics improvement clubs in Yilan County had been counseled and guided to develop the sideline production. To increase the diversify usage of lily, a competition "Creative Cook of Lily" had been conducted in Hualien. And a book "The Creative Ingredient Recipes of Lily" had been published. It is available for the leisure agriculture managers, the pension industry managers, and the consumers.

On agricultural information dissemination: The information about the recent research achievements, and the production and marketing promotion activities were offered to the media for broadcasting. In this year one press conference had been held in Council of Agriculture. In total there were 15 items of research achievement, 7 items of TV marketing news, and 72 agriculture news had been released to COA and the media. The media had adopted and issued 130 times of the news. Agricultural extension magazines had been published including "Hualien District Agricultural Special Proceeding" 4 issues, "Hualien District Agriculture Monthly" 12 issues, and "Hualien District Agricultural Technique Pamphlet" 6 issues. To expand the service and promote the computerization application of agricultural information, "Hualien District Agricultural Research and Extension Station Worldwide Web (www.hdais.gov.tw)" had been set up, and 50 thousand people had accessed.

On serve for the people: To strengthen the service for the populace and farmers, a one-stop information counter service system had been set up. The Station had received 55 themes of visiting and 2,117 people this year. Two "Open Day" activities had been held respectively in spring and autumn, which were conducted to introduce the

achievement to the public. Two symposia “The Development of Green Onion Industry” and “The Management and Development of Safety Crop Production and Marketing” were held as well. As a result, the demonstration of the achievements and the activities was generous and vivid, and 6,000 people had participated in.