花蓮區農業改良場年報 93:1-16

摘要

93 年度本場共執行科技研究計畫 64 項，示範推廣計畫 20 項，接受委託試驗 6 項，茲將摘要擇錄如下：

稻作：水稻新品種『花蓮 20 號』於 6 月命名通過。本品種爲中晚熟品種，米粒外觀優良及食味優良，產量與稻熱病抗性佳，全生育日數一、二期作分別爲 120 日與 110 日。一期作全省平均公頃稻穀產量 7,075 公斤，二期作全省平均公頃稻穀產量 5,568 公斤。93 年高級試驗選出花粳育 69 號參加 94 年組區域試驗。肥效反應試驗花粳育 44、50、53 號三品系，除花粳育 44 號以每公頃施用氮素 200 公斤產量最高，其餘皆以每公頃施用氮素 160 公斤產量最高。穗上發芽率檢定顯示粳稻品種在一、二期作皆易穗上發芽；秈稻品種穗上發芽較難。粳、秈稻第二期作脫粒性檢定均屬中等。水稻豐歉因素測定試驗，本年度兩期作各參試品種產量較歷年增產。水稻新品種示範中晚熟品種，在花蓮與宜蘭地區以台東 30 號表現最好，但心腹白較高，且二期作需注意白葉枯病；早熟品種則以台中 191 號表現較好。有機產銷班經營輔導部分，花蓮地區共輔導 5 班 566.56 公頃。宜蘭地區 3 班共 49.78 公頃。花東縱谷區良質米品質增進之研究，一期作試驗結果每公頃氮素 120 公斤及氧化鉀 100 公斤施肥處理時產量最高；不同肥料處理之食味值表現則以每公頃氮素 100 公斤及氧化鉀 80 公斤施肥處理時有最高之食味值，顯示減施氮肥將有提高食味值之趨勢。輔導良質米生產改進計畫，花蓮縣 4,766 公頃，宜蘭縣 2,733 公頃。

雜糧：落花生品種改良第三年品系比較試驗，結果以 HL87-19 及 HL87-20 等 2 品系表現較佳。落花生新品系區域試驗，93 年春作以南改系 170 號，秋作以農育 49 號之表現較佳。芋仔甘藷品種改良第二年品系比較試驗，平均公頃塊根產量 92 年秋作以 TLSP-019 及 93 年春作以 TLSP-024 之表現較佳。食用甘藷新品系區域試驗結果平均公頃塊根產量以 TYY81-142 之表現較佳。長形山藥選育試驗結果，以 HY74-02 品系之表現較佳，每公頃施用 15 公噸之有機質肥料可提高長形山藥之塊莖產量。景觀綠肥作物採種試驗結果，得知青葙每公斤生產成本爲 380 元、大波斯菊爲 1,475 元、黃波斯菊爲 1,200 元。東部保健作物開發利用之研究，黃岑栽培密度試驗結果以 1.2m×0.6m 之表現較佳，不同栽培環境對當歸產量之影響，試驗結果以安通地區的表現較佳。毛豆園雜草防治試驗，結果以每公頃施用 2.5 公升 38.72%施得圃 (Pendimethalin CS) 可抑制牛筋草、芒稷、馬齒莧及野莧等雜草。落花生園禾本科雜草防治試驗，結果以每公頃施用 0.75 公升之 4.4% Pantera (Quizalofop-P-tefuryl) EC 可殺死落花生園禾本科雜草如牛筋草、芒稷、馬唐及狗尾草等。

蔬菜：冬瓜以吉豐爲母本，其他自交系爲父本，產生雜交一代品系，選擇花蓮縣和宜蘭縣三個地點進行區域試驗，參試品系有 SFW01 與 SFW03 二種，雜交一代品系的生長勢均比純系的吉豐品種爲強，蔓長較長，葉數較多。所有參試品種(系)的果實外觀均爲長筒形，均具有白色蠟粉，在單株結果數方面，以 SFW01 最高，平均爲 4.7-7.0 個。產量方面，SFW03 品系的產量最高，每公頃 43.3-93.6 公噸。夏作山苦瓜品系比較試驗參試 4 個品系以 WB34 品

花蓮區農業改良場年報 93:1-16

系之表現最佳，單株結果數約 150 個，小區產量達 29.8 公斤。春作區域試驗結果 WB9 品系之每公頃產量爲 22.3 公噸比對照品種 F1327 爲多。夏作試驗結果 WB9 品系每公頃產量爲 17.3 公噸比對照品種 F1327 爲多 WB9 於 93 年 12 月 29 日經命名審查委員評審通過命名爲「花蓮一號」。抗晚疫病番茄新品系區域試驗中，92 年秋作之調查結果，每公頃平均產量方面，以 FMTT795 的 48.8 公噸最高。抗番茄捲葉病毒病大果番茄新品系區域試驗中，每公頃平均產量方面，92 年秋作以 FMTT965 的 38.5 公噸最高， 93 年春作以 FMTT965 的 35.4 公噸最高。花蓮區番茄新品系區域試驗，選出富含 β-胡蘿蔔素之優良小果番茄新品系 CHT1201，於 93 年 12 月 29 日通過命名爲「花蓮亞蔬十四號」。青蔥耐熱育種之研究，品系 HAF10532 及 HAF10530 之產量較高，每公頃平均產量分別爲 36.6 及 37.5 公噸，蔥白長 20.4～21.0 公分。箭竹筍常溫下櫥架壽命爲 1-3 日，貯存於 10℃環境下櫥架壽命爲 3-5 日，5℃環境則爲 5-7 日。貯存期間品質劣變現象爲酵素性褐變導致產品喪失商品價值，而利用 5℃低溫保存可有效延長產品櫥架壽命。山蘇蕨菜品系比較試驗結果葉片數以 HN69 及 HN178 生長最快，產量以 HN178 最高。

花卉：百合品種改良以原生台灣百合爲母本，亞洲型和東方型百合爲父本，進行百合遠緣雜交育種，爲克服種間雜交障礙，利用子房培養及胚珠培養技術，可獲得雜交後裔；本年度有 3 個雜交組合培養成功，有 8 個胚珠發芽，將成功發育的胚珠經癒傷組織繼代培養後，目前已有 16 株發育完整的後代小植株。另 92 年度入選雜交九品系，經調查分析後將開花特性穩定之品系，再利用組織培養進行大量繁殖，共有 1, 345 株移至田間種植。園藝休閒作物資源開發，甜薰衣草宿根栽培，以 25 公分高度修剪處理者較佳，萌芽率爲 46%。利用水蒸氣蒸餾法萃取薰衣草精油，比較不同品種間之差異，結果以德克斯特品種產能最高，15 公斤新鮮莖葉以 20 公升蒸餾水萃取，可獲得 200 毫升精油。香草植物在休閒農業之應用，建構完成 1 公頃的休閒香草植物園區，以河道環繞作爲外圍區隔，內圍以腳踏車道及步道作爲，將繁殖的香草植物種苗種植於園區內，生育狀況良好，已展現出香草植物之魅力與風貌；創造轄區內休閒農業的觀光商機與體驗農業生產的旅遊景點。宜蘭地區特有花卉改良共蒐集楊柳科植物 5 種，有赤柳、雲龍柳、黃龍柳、石化柳及米柳，其切枝均可供作花藝利用。在銀柳周年栽培可行性探討之試驗，提早插植銀柳，因低溫致使銀柳扦插存活率較低，且生育初期受阻，因此株高及 120 公分以上切枝數較正常期插植之處理爲少，且不能提早採收。在採收後處理試驗，銀柳儲藏於 0℃及 5℃下其保鮮效果較 10℃爲佳。在寒梅方面，綜合試驗之結果，寒梅之長壽祿品種的扦插效率並不穩定，會隨著氣候環境的變異而上下起伏，不同部位之插穗均可利用於扦插繁殖，以莖頂段之插穗效益最佳。原生觀賞植物種原累積至今年約蒐集得 330 種，椒草之扦插成活率可達到 100% ，插穗則以莖基段較佳，園藝利用以 3-5 吋之小型觀葉盆栽較適合，成盆約需要 3-4 個月的時間，盆栽之肥料管理以輕肥爲宜。石吊蘭之扦插成活率亦可達到 100% ，插穗則以莖頂段較佳，園藝利用以 5 吋之吊盆盆栽較適合，成盆的時間較長，約需要 6-8 個月，盆栽之肥料管理亦以輕肥爲宜。水生植物虎耳每月進行一次頂芽及中段的 3 吋盆扦插栽培，以探討週年性生產小品盆栽的可行性。5～9 月扦插者生長速

花蓮區農業改良場年報 93:1-16

率最快，頂芽扦插 3～5 天即恢復生長，1 週左右即達成品，而中段亦只需 6～8 天即恢復生長，3 週之內即可出貨。因此要生產虎耳小品盆栽，最好在 5～9 月虎耳恢復生長速率最快的時期進行生產，以降低時間成本。

果樹：連續第 2 年進行瑞穗鄉鶴岡地區同一果園內樹齡 20 年與 40 年之文旦果實品質分析，結果顯示不同樹齡對文旦果實品質之影響並不明顯，而綜合 92 年度與 93 年度調查結果也發現，樹齡可能並非影響花蓮地區文旦產量與果實大小之主要因子。加蜜蛋黃果扦插繁殖，使用 3,000ppm IBA 處理插穗基部明顯促進扦插成活率。

宜蘭地區柑桔品種試作，計有南柑 20 號等 12 個品種(系)，開花結果期介於 3 月上～下旬之間，經調查結果數以 Fremont 單株平均 162.5 粒最多，成熟期較早的品種為興津 3 號及南柑 20 號，果實糖度以 Fremont 及 P158-2 號均達 11.6°Brix 較高，茂谷柑果實糖度亦達 10.8°Brix，均具有栽培價值。適合花蓮縣種植之柑桔新品種為明尼桔柚，使用廣東檸檬為砧木種類者，其地上部具有最多的分枝數。花蓮地區明尼桔柚採收適期應為一月中旬至二月上旬。

蒐集蓮霧 4 個品種(系)之實生芽體，高接樹齡屬 3 年生，調查果重以鳳試所 73-1 號 148.5 公克最大，果實糖度測定以阿塗大粒種上半部為 11.6°Brix，下半部高達 13.9°Brix，具有栽培價值。探討不同果實套袋材質對蓮霧果實裂果之影響，裂果率以果實套網袋區 26.7%最低，而以果實套紙袋加浸水區之裂果率 53.3%最高，各處理間裂果率差異顯著。

生物技術：建立金柑健康苗生產與繁殖體系，繁殖砧木用酸桔苗 1855 株，自行培育實生苗及嫁接，每株成本費 14 元，每公頃可節省種苗成本費用 43,000 元。辦理金柑無病毒健康苗母樹原種培育 100 棵及芽接健康苗 656 株。蒐集酸桔等 6 種不同砧木嫁接金柑健康芽體，以酸桔莖粗 5.8 公分及株高 172.5 公分大於其他砧木，加強金柑樹型建立、整枝修剪、草生栽培等改善管理措施具有初步效果，值得擴大辦理。

生技摘要

百合農桿菌轉殖時以 LA2 品種共培養 3 天褐化率為 15.7% -16.0% 優於 LG41 品種（50.7% -52.5% ）。LD3 培養基前培養處理褐化率 45.8% -54.0% 優於 PI-10 培養基前培養處理（74.0% -90.9% ）。以基因槍進行轉殖，褐化率以 DFR1AGUS 載體最高，CHIAGFP 最低。利用農桿菌轉殖將花色反義基因轉殖菸草，轉殖植株有花色變淡現象，PCR 檢測轉殖植株基因組中的確有花色基因被增幅放大。轉殖含 Bt 基因之 PBI121AC 或 PBI121IC 兩種質體進入番茄中，含有此基因之農桿菌結果顯示篩選後再生率為 8-27%，再生芽數為 2.0-5.9 芽，以含 AS 100 μM 共培養處理，PBI121AC 質體轉殖者篩選後再生芽數較多。收集 10 區之疑似基因改造之木瓜種苗葉片樣本及 2 區網室栽培對照品種，開發以 GUS 基因化學染色法及 PCR 技術偵測基因改造木瓜中之 GUS 基因，9 區之樣本有 GUS 基因化學染色反應及 GUS 基因之 978 b.p. 片段被增幅放大，網室對照則無。本年度選拔出觀果鳳梨 15 個變異株系，經過數次繼代培養後，各自產生數量不一的不定芽，5 個月之後，其中有 5 個株系的枝條新生葉片仍然具有嵌紋性狀，有 3 個株系則恢復為綠色。至於其餘 7 個變異株系，其變異現象仍未固定，因此選拔工作仍需持續進行。普拉特草組培苗使用馴化盒或盆栽直接放置於溫室中的處理 ，各處理

花蓮區農業改良場年報 93:1-16

間出瓶存活率無顯著差異。在變異觀察方面發現 13 個變異枝條，變異率以 2OGy 及 4OGy 爲最高，其中以葉片 1/2 面積發生白色變異最具觀賞價值，且變異較爲穩定，但其生長勢弱且生長緩慢。在寒梅培植體試驗，IBAO.5pm 仍處理可獲得發根率最高達 64%，且根呈粗細適當、鬚根多，但其出瓶存活率低，經馴化盒處理較不經馴化盒處理高些 ，且差異顯著。

農產品加工：運用花蓮地區特有的農產原料已完成下列研究： 小米；以台東選七號小米爲原料，研發玻璃瓶與殺菌袋裝小米粥產品，其製程係將小米預糊化後、充填、脫氣、密封包裝、殺菌即成可常溫保存的產品。風味方面發展出養生小米粥及小米甜粥。 麵包果；以最適加工方法研發麵包果果實膳食纖維量產加工技術，開發出色澤高貴金黃色麵包果粉體，並加工利用於製作高膳食纖維休閒小點及黃金麻糬等產品。 文旦花；使用有機溶劑萃取出文旦花精油經分析比對，其成份可提供各種精油及化粧品類加工之天然原料。在傳統食材方面；爲開發紅麴養生保健食品之食材，已建立紅麴固態及液態製麴加工流程，並已篩選出 Monacolin K 含量達 800ppm 以上、而 Citrinin 低於 10ppm 以下之紅麴菌株。在稻米利用方面；利用稻米胚芽辨識擷取機，開發出具稻米胚芽之食材，可供作保健食品加工之材料。

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爲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，並規劃轄區內植物疫情之偵測、監測及預警系統，以期提高病蟲害防治管理效益與產品品質，並維護消費者之健康，並可使花蓮地區兼顧農業發展與農業環境資源永續利用。水稻苗徒長病抑病土防治率可達 80%，稻熱病則以亞磷酸可達 55%防治效果。韭菜銹病於氣溫 26℃以上發生率低，根蟎之發生與降雨量成正比。以腐質酸可防治蘿菜青枯病，配合芽孢桿菌 B190 可有效提高蘿菜鮮重。應用芽孢桿菌 B190 及改良劑可明顯抑制洋香瓜白粉病，以層析儀可測出抗生物質 iturinA。以篩選出之拮抗細菌可有效促進番茄及甜椒生長，文旦未發現潰瘍病，黑星病發生率甚低，黑點病及薊馬發生普遍。銀葉粉蝨於田間主要爲聚集型分佈，且集中於上午活動。白殭菌可有效防治水稻水象鼻蟲。東方果實蠅共同防治結果顯示密度皆較前兩年爲低，爲害率同時減少。青蔥甜菜夜蛾共同防治區之密度其爲害率較對照區減少 50%。緬甸小鼠及野鼠監測與防治結果顯示防除率達 94.3%。爲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、警報及新聞稿共計 18 次。發佈氣象資訊及農作物防範措施達 30 次。針對地區主要法定檢疫害蟲設置偵測點，結果顯示本轄區無該類檢疫害蟲。並執行紅火蟻鑑定 50 件以上，並宣導 18 場次。執行作物病蟲害監測及防治處方服務，計診斷作物 50 種 193 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 84 班。

土壤肥料：利用市售之多段式定時器，配合加壓馬達、進水逆止閥等可建立一套簡單、便宜且適用於假堆稻殼栽培介質之養液供給系統。在番茄品質方面，提高鉀肥濃度能提高紅牛頓番茄之糖度及酸度，但不同品種之番茄對高鉀肥之反應不同。以蘿菜、葉用甘藷、韭菜、龍鬚菜及紅鳳菜等五種宿根性蔬菜分別於生育盛期進行淹水 48、24、12 小時及不淹水(對照)處理，結果顯示以蘿菜最耐淹水，於生育盛期進行淹水 48 小時之產量甚至比不淹水者增

花蓮區農業改良場年報 93:1-16

產 27.1%，紅鳳菜則最不耐淹水，其次依序爲葉用甘藷、韭菜及龍鬚菜，分別減產 59.2%、38.7%、26.0%及 25.5%。葉用甘藷於插植成活後進行畦面灌溉 24 小時模擬颱風淹水之情形，將水排乾後進行不同之施肥處理，結果每公頃產量以施用氮：氧化鉀＝84：24 公斤，於一週後再施一次者之 5,662 公斤爲最高。另外，將相同施用量堆肥集中條施，小胡瓜可較平均撒施者增產 2.0 至 11.2%。本年度「土壤及植物營養診斷服務」共辦理 2,003 件診斷服務，其中植體分析 915 件，土壤分析 714 件，另外有機資材及堆肥之分析亦有 374 件，除提供分析資料外，同時亦進行作物營養及土壤肥力狀況之診斷分析，提供農民施肥建議及參考。

農業機械：蔬菜種子直播機研製改良，農機研製與開發項目包括有二項重點，在田間機械方面以施肥作畦播種田間一貫作業機，本機主要構造包括整地、攪拌裝置、施肥裝置、作畦開溝裝置、傳動機構裝置、播種裝置等五大部分。經由本機作業可同時完成施肥、作畦、播種一貫作業，在播種機具使用對白蘿蔔、菠菜、蕹菜、萵苣、葉萵苣、胡蘿蔔、白菜及向日葵等皆有良好播種效果。在加工機械方面以文旦加工進行整體規畫研製，其中包括文旦前期作業，亦即分級大小再行去皮之部分，目前開發完成立式Ⅱ型文旦自動去皮機，先行利用三段式分級，經由一定規格大小再行去皮之工作，目前開發之自動去皮機採取三組可更換式切刀與進料盤，配合不同規格之大小文旦進行加工，本機經由 110V 之電力配合空壓機、控制裝置等機構，並配合 17 年生文旦進行相關試驗。在產學合作部分有蔬菜田間種子直播機之研製改良，本項研製改良重點，以進行模具開發爲主，包括三組模具播種室及播種室活動蓋板、開溝導板及種子箱與種子箱蓋，其中播種室活動蓋板與開溝導引及種子箱與種子箱蓋利用共模之方式進行開發，播種室部分則與部分機體作結合，並強化其結構部分，其中前端部分將螺帽安裝在內部以利聯結，機體部分則利用不同調節孔，方便控制其作業深度，爲配合不同功能展現也選擇不同材料配合射出成型，其中種子箱蓋部分利用透明 PE，使作業中能觀察種子箱內部種子情形。在蔬菜種苗生產自動化方面本年度輔導種苗數量 288.68 萬株。在推廣國產新型農機方面本場開發Ⅲ型施肥機推廣 40 台及辦理秧苗箱自動疊棧機示範觀摩。本年度在技術轉移方面辦理作畦施肥一貫作業機具製造方法，並取得一項新型曳引機附掛作畦施肥結構專利。

Summary

In 2004, 64research projects and 20 demonstration plans were conducted, 6 commissioned project from other organizations were accepted. The results were summarized as follow:

On rice; A new rice variety, Hualien No.20, was allowed to registed in June, 2004. The variety contained the characters of good-eating quality, good appearance, high yield and better resistance to rice blast. The days from transplanting to harvest is 120 days in the first crop and 110 days in the second crop. And the average yield is 7075 kg/ha in the first crop, and 5568 kg/ha in the second crop.

HKY69 was submitted to attend the regional yield trail of 2005. The fertilizer test on breeding line HKY50、53 had shown that the highest yield was obtained on the application of nitrogen at 160

花蓮區農業改良場年報 93:1-16

kg/ha, and HKY44 was obtained at 200 kg/ha. The panicle sprouting rate is higher in the first and second crop for Japonica type of rice. It's lower for Indica type of rice in both crops. In shattering character, most variety are graded in middle scales for Indica and Japonica type of rice. In yield forecasting trial, the yields are better than the past years in every variety. In new varieties extension, TT30 are suitable for Hualien and Ilan area. To promote organic rice production, a total of 566.56 and 49.78 hectares were grown, respectively in Halien and Ilan Counties. To enhance the production of good quality rice, a total of 4,766 and 2,733 hectares were guided respectively in Halien and Ilan Counties.

In the research of promoting the quality of rice in the valley of Hualien and Taitung, the yield are the highest in 120 kg/ha-Nitrogen and 100 kg/ha-K_2O, but the quality of rice are the highest in 100 kg/ha-Nitrogen and 80 kg/ha-K_2O.

On upland and special crops：The third-year trial for peanut was conducted and 2 breeding lines of HL89-19 and HL87-20 performed higher yield potential than the control. On regional trials, two breeding lines Nan-kai-si 170 and Nung-yu 49 performed better than others in the spring crop and fall crop. The second-year trial of taro-like sweet potato was conducted and a breeding line TLSP-024 performed better than others. On table-used sweet potatoes, the results of regional trial indicated that TYY81-142 has the highest yield potential. On yam selection program, breeding line HY74-02 has the highest yield potential, and the rate of 15 tons per hectare of organic fertilizer application could promote the tuber yield of yam. The experiment on the seed production of green manure for landscape was performed, the results showed that the productive cost of feather cockscomb, Cosmos bipinnatus Cav. and Cosmos sulphureus Cav. were 380, 1475 and 1200, NT$ per kilogram, respectively. On the research of health plants, the best planting spacing for Seutellaria baicalensis is 60 cm per row and Argelica spp. has the better yield potential planting in the An-Tong area. The rate of 2.5L per hectare for 38.72% Pendimethalin CS was effective to prevent the occurrence of goosegrass, jnnglerice, pigweed and slender amaranth in the vegetable soybean field and the rate of 0.75L per hectare for 4.4% Pantera (Quizalofop-P-tefuryl) EC was effectiue to prevent the occurrence of goosegrass, junglerice, southern crabgrass and green bristle grass in the peanut field.

On vegetables：To breed new F1 varieties of wax gourd, crossings between variety Chifong and other pure lines were conducted. Two F1 breeding lines SFW01 and SFW03 together with two controlled varieties Chifong and Green Tiger were cultivated to make local trials. The experiments were conducted in three locations in Hualien and Ilan counties. The growth rate of F1 hybrids was more vigorous than that of pure-line variety Chifong, with longer stems and more leaves. All the tested plants produced long cylindrical fruits, with white wax on the surface. Breeding line SFW01 has the highest number of fruit setting, which was from 4.7 to 7.0 per plant in average. On yield

花蓮區農業改良場年報 93:1-16

potential, SFW03 got the highest yield with 43.3 to 93.6 metric tons per hectare. The hybrid vigor was found to be clear in this experiment. The 2004 summer crop new variety comparison test of wild bitter gourds has the results as: variety WB34 is the best of all, with small-area production above 29 kilograms and single plant fruiting number of 149.The experiment result of spring crop wild bitter gourds at three regions this year is: Production of WB9 is 22.3 tons/ha, this is much better than the comparison variety F1327. For summer crop, the result's at three regions is: variety WB9's production is 17.3 tons/ha, this is significantly more than the controlled variety F1327.WB9 was registered in Dec 29 2004 as a new variety Hualien #1，. Regional trial of tomato new lines with resistance to late blight was made, FMTT795 has highest yield in autumn crop, 2003. Another regional trial of tomato new lines with resistance to tomato leaf curl virus (TLCV) was also made, FMTT965 has highest yield in spring crop, 2003 and spring crop, 2004. The cherry tomato line with high β-carotene content CHT1201 was registered in December 29, 2004 as a new variety 'Hualien Asveg # 14'.Studies on breeding of green onion, results of horticultural characteristics showed the HAF10532 and HAF10530, new lines of hybrid progeny, have good performance under summer season with higher yield, 20.4-24.0 cm length of blanched. Deterioration of usawa cane shoot product was induced by browning reaction and decay. The shelf life of usawa cane shoot was 1 to 3 days, and it extended to 5 to 7 days that stored at 5℃.Results of variety comparison test of Asplenium nidus L. are：HN69 and HN178 have the most speediest growth of leaf number, and HN178 has the highest production.

On flower crops: To create new lily varieties, crossings between Lilium formosanum and Asiatic/oriental lilies were conducted. Tissue culture techniques, including ovary culture and ovule culture, were used to overcome crossing barriers between different species. Therefore, many hybrid progenies were obtained. There were three crossing combinations, 93FLRS1, 93FLRS2, and 93FLRS3, successfully done. 16 plants were developed thereafter. Another nine crossing combinations which were obtained last year had developed into plants. After analysis of the flowering characteristics, plants with better performance were mass propagated and a total of 1,345 plants were cultivated in the field for further trials. The aromatic plants were collected continuously, and were cultivated in an experimental garden. Observation and propagation were conducted. A perennial cultivation system, which was based on different pruning methods, was tested for lavender. It showed that a 25 cm pruning was suitable for lavender, which could enhance the shooting rate of adventitious buds to 46%. An investigation was conducted to compare the essential oil content among different lavender cultivars. The essential oil was extracted from fresh plants by water vapor. The application of aromatic plants for leisure agriculture, a one-hectare aromatic garden was constructed, which was surrounded water routes for discrimination. The aromatic plants were planted in the garden by a special design. Some other recreation facilities were placed around

花蓮區農業改良場年報 93:1-16

for children. The establishment of this garden was a new approach, which directs the management of fallow fields into leisure agriculture field. We had collected 5 varieties of Salix family in this year. They were applied in flower arrangement. In the early planting of Cat-tail willow to early harvested experiment, the results showed that the survival ratio of cattages and early growth of Cat-tail willow were decreased by chilling. And the plant height and over 120 cm branches were less in the early planting treatments than normal planting treatment. The results of the post harvested experiment showed that 0℃and 5℃ treatments were better than 10℃ treatment wherever with bactericide or not. The different cuttage test was using the variety of flower-quince "Chang-Shou-Lu (CSL)" tested in month of January, April and July. From this study, the survival ratios were unstable of CSL under varying meteorological conditions. All the different cuttings may use for propagation of flower-quince, but that must be have growth vigor of cutting wood. The performance of callus forming rate and cutting survival rate of apical-bud-cuttage is higher and much higher. The germplasm collection of native ornamental plants had accumulated approx. 330 kinds up to now. As to Peperomia japonica Makino, the survival rate of cuttage could reach 100%. The base of stalk is better for cutting. The requirement for cuttage media is not so critical in this case. For horticultural application, 3-5 inches of miniature pot-plant is more suitable. It takes approx. 3-4 months to complete a pot · Light fertilizer is adequate for pot-plant fertilizing management. The cuttage survival rate of Lysionotus pauciflorus Maxim var. pauciflorus can reach 100%, too. The top of stalk is better for cutting. Cuttage media requirements are similar to Peperomia japonica Makino. 5" hanging basket is more suitable for horticultural application. It takes longer time completing a pot， about 6-8 months. Light fertilizer is also proper for fertilizing management. Blue waterhyssop（Bacopa carolineana）were cultivated monthly with apical and intermediate shoot cuttings to investigate the growth rate of year-round production. The results indicate that both cutting types which were cultivated during low temperature period between November and January regrew very slowly, but those cultivated after February regrew apparently faster. The cuttings cultivated during the period from May to September regrew much faster. The cutting from shoot apexes started to grow in 3-5 days and became salable in a week, and those from intermediate shoots grew in 6-8 days and became salable in 3weeks. To reduce the cultivation time and cost, it is suggested to grow blue waterhyssop in the period between May and September.

On fruit tree：The relationship between tree age and fruit quality on wentan pomelo had beem investigated. There was no difference on the total yield and the percentage of middle size fruit between 20-year-old and 40-year-old's wentan pomelo plant. However, the fruit quality was not significantly different. Utilizing 3,000 ppm IBA to treat stem cutting of abiu could promote the rooting.

花蓮區農業改良場年報 93:1-16

Twelve citrus cultivars/lines, including ‘Nankan No. 20’ and others were evaluated for their adaptation to I-Lan area. All tested plants bloomed between early to late March. The cultivar ‘Fremont’ had the highest number of fruit per tree with 162.5 fruits. ‘Shinjin No.3’ and ‘Nankan No. 20’ were the two cultivars that matured earlier. ‘Fremont’ and “P158-2’ had higher sugar contents of 11.6 degree Brix in average and ‘Murcott’ had 10.8 degree Brix. These cultivars/lines are regarded to have the potential for cultivation in this area. The optimal new variety of citrus in Hualien area was Minneola tangelo, Minneola tangelo was grafted on ‘Kwang-Tung lemon’ stock had the highest shoot number. The optimal period to harvest Minneola tangelo fruit was from middle Jan. to early Feb. in Hualien area.

Buds of four cultivars/lines of wax apple were collected and top-grafted onto 3-year old stocks. Among them, the ‘Feng-Shan No. 73-1’ had the largest fruit size of 148.5 grams. With respect to fruit sugar content, the ‘A-Tu Large’ had the highest of 11.6 and 13.9 degree Brix in the upper and lower half of its fruit and is highly recommended for cultivation. Five different bagging materials were evaluated on fruit-splitting of wax apple. Fruits bagged with meshed bags had the lowest fruit-splitting ratio of 26.7% and fruits bagged with paper bags plus no shelter had the highest fruit-splitting ratio of 53.3%. There were significant differences among treatments.

In order to establish the production and propagation of virus-free healthy kumquat seedlings, 1855 sunki seedlings were raised for stock use. The cost for each self propagated and grafted stock seedling was 14 NT dollars, and it was estimated a total of 43,000 dollars of seedling cost could be saved per hector. One hundred virus-free healthy kumquat trees for budwood were raised and 656 bud-grafted healthy seedlings were obtained. Six different stock species, including sunki and others were collected and grafted with virus-free healthy kumquat budwoods. Among them, the sunki, with stem width of 5.8 cm and plant height of 172.5 cm, was superior than others. Improvements of cultivation practice, including the establishment of the proper shape of kumquat tree, the correct method pruning and trimming and the establishment of grass ground cover, all showed positive preliminary results, and are worth of further experiments.

On biotechnology: When the lilies callus transferred by Agrobaterium- mediated method, the brown proportions of LA2 lily callus cocultured for 3 days (15.7% -16.0%) were better than LG41 callus (50.7% -52.5%). The brown proportions were lower when the LD3 preculture medium was used (45.8% -54.0%) than the PI-10 medium (74.0% -90.9%). The brown proportion of DFR1AGUS gene transformation was highest and CHIAGFP gene transformation were lower by particle bombardment method. The flower colors of flower-color antisense gene tobacco transformants had changed a little . The tomato cultivar ‘Hualien AVRDC # 5’ was transferred Bt genes with plasmids PBI121AC or PBI121IC. The regeneration proportions after selection were 8-27% and the regenerated shoots numbers per dish were 2.0-5.9. The regenerated shoots numbers

花蓮區農業改良場年報 93:1-16

after selection were higher when treated with AS 100μM coculture medium and PBI121AC plasmid. Ten areas of seedlings of papaya which were GMO-like plants and the papaya seedlings cultured in net-house were collected into our lab. The samples of 9 areas were detected the GUS gene expression by X-glcA solution and the PCR analysis. In contrast, the samples of net-house cultivation were not detected by X-glcA solution stained and PCR analysis. There were 15 mutated strains of ornamental pineapple selected this year. The shoots of 15 mutated strains have been sub-cultured several times, five of them sustained mutated characteristics with a 100% ratio, but three of them turned into normal green type. The other seven strains were still unstable, and further selection should be conducted continuously. To induce mutation on Pratia nummularia (Lam) A. Braum & Asch and Chaenomeles speciasa Nakai tissue culture plantlets, the Pratia nummularia (Lam) A. Braum & Asch tissue culture seedings survival ration were over 90% whenever planted in acclimated boxes or not. In the other experiment of Chaenomeles speciasa Nakai, the results showed that 0.5ppm IBA treatment could induce health root formation. The results of tissue culture seedlings survival ration were very low, especially without planted in acclimated boxes treatments were less than 10% .

On processing of agricultural products: There are 5 research and development projects for processing of agricultural products of Hualien District. In processing of agricultural specialty products of Hualien District：1. Millet : Millet porridge is a traditional food of primitive people. The processing procedure of healthy ready-to-eat millet porridge using local produced millet (Taitung S7) packaged in glass bottle and retortable pouch has been developed. Two formulas, sweet millet porridge and healthy millet porridge, were studied. The consumer preference test of the final products packaged in glass bottle and retort pouch revealed good acceptance. 2. Breadfruit : Breadfruit is a very popular plant in Halien with limited utilization. A new procedure to processing breadfruit flour was tested. The flour were used to produce high diet fiber and low calorie snack food and Mochi with golden color. 3. Wentan pomelo : Wentan pomelo is the most important fruit tree in Huallien. A new utilization of Wentan pomelo has been developed. The essential oil of Wentan pomelo flower was extracted with recycle of alcohol and vacuum-condense. The components of ssential oil of Wentan pomelo flower were analyzed. The essential oil could be utilized as food and cosmetic additive. In processing of traditional agricultural products : 4. Monascus : The procedures of solid and liquid koji fermentation for Monascus had been established. Five different strains of Monascus were screened. The results showed that one of five strains could produce the product with Monacolin K > 800ppm, and Citrinin < 10ppm. This strain could be used for further studies. In new utilization of Rice：5. Rice acrospires : The health food processing of rice acrospires and the extract method for the acrospires oil of rice had been

developed. Some chemical components of the acrospires oil of rice were analyzed by GC/MS. The product could be used as additive for healthy food products.

On plant protection: The organic cultivation in crops, non-chemicals controlling and biological pesticides preparation, agricultural extension and safety using of chemicals in crops were conducted in this year. Besides, we also set up the detection, the monitor and the warning of plant epidemic system to enhance pest control efficiency and product quality, and maintains health of the consumer, and ensures the production of agricultural and protects the environment of agricultural in Hualian. The controlling rate of bakanae disease of rice may reach 80% by using of anti-disease of soil, and the rice blast may reach 55% preventing by the phosphorous acid. The incidence of Chinese leek rust disease is low when the temperature more than 26 ℃, and the density of bulb mite is direct ratio with the rainfall. Application of humic acid may control bacterial wilt in water convolvulus, and combined with Bacillus B190 may effectively enhance the fresh weight. Application of Bacillus B190 and the improve agent may obviously decrease the incidence of powdery mildew on muskmelon, and observable antibiotics iturin A in Bacillus B190 by HPLC. The purification of antagonist may effectively promote the growth of tomato and sweet pepper. The citrus canker of pomelo was not found in field, and the incidence of black spot on pomelo was really low, and melanose and thrips occurs universally. The occurrence of silverleaf whitefly in the field was aggregation distribution, and also activated in the morning. The Beuveria fungus may effectively control the rice water weevil. The density of oriental fruit fly and damages ratio decreased by coordination of control compared with previous two years. The density of beet armyworm of green onion was reduced 50% compared with the control plot by coordination of control. The Burmese mouse and the wild mouse was monitored and controlled, and the controlling rate reach 94.3%. In order to control rice pest at suitable time and monitor plant epidemic system, the plant pest forecasts were issued 12 times, and the pest warning report and meteorological information were issued 18 and 30 times respectively. The survey points for quarantine harmful insect have been set, and demonstrated that there was no quarantine pest in Hualien area. More than 50 samples of ant were identified and more then 18 times of control guidance were conducted. The execution of crops plant pest monitor and controlling service, counts diagnosis was 193 times in 50 kinds of crops. There were 84 classes using of GAP mark in Hualian and the Yilan county were assisted.

On soil and fertilijer: For the pseudo-composted rice hull medium, a suitable system of solution-nutrition supply by multi-function timer, pump, and some switch was established. For the quality of tomato, the sweet and acidity of fruit can be enhancing by raise the concentration of potash fertilizer, but the reaction is not same for add potash fertilizer to plant to different tomato type. Effect of different water logging periods on the yield of rationing vegetable: The materials of experiment included water convolvulus, chayote, Chinese leek, sweet potato and gynura

花蓮區農業改良場年報 93:1-16

waterlogging 48 hrs, 24 hrs, 12 hrs, and 0 hr. (CK) at grow prolifically stage, respectively. The results indicated that water convolvulus had the highest tolerance to waterlogging stress. The yield was 27.1% higher than the check at the treatment of 48 hrs waterlogging. gynura got the lowest tolerance, and followed by sweet potato, Chinese leek and chayote shoot. Their yield was 59.2%, 38.7%, 26.0% and 25.5% less than blank, respectively. Another result indicated that it got the highest yield 5,662 kg/ha of sweet potato leaves with top dressing chemical fertilizers nitrogen : potassium oxide = 84:24 kg/ha and applied again a week later in 24 hrs waterlogging treatment. Band application of compost can only enhance the yield of cucumber 2.0% to 11.2% than broadcast application one. In 2004, there were 2,003 samples of soil and plant tissues were analyzed, it including 915 samples of plant tissue, 714 samples of soil, and 374 samples of organic materials. Those data were used to make recommendation of soil fertility and plant nutrition for farmers.

On agricultural machine: Agricultural machine development and improvement: There are two potions with agricultural machine development in Hualien. In the farmland machine, the vegetable seeding, fertilizer applying and ridge making all in one machine has been developed. This machine functions includes plane the land, fertilizer applicator, churning with the land, making ridge, and seeding. In the process machine, the Wentan Pomelo fruit processes machine entire arrangement has been finished. First, the sorting machine is used to space the Wentan Pomelo fruit with three levels. And the peeling machine winnow the Wentan Pomelo fruit peel according to the three levels. Otherwise in the industry and academia collaboration, the vegetable seeding machine improvement has been entered the mold development. The entire development mold include three molds the seeding case and shell, the seeding channel, the seed box and cover. To convenience notice seed condition the transparency PE was used for seed box material. In the vegetable acrospire’s automation culture guidance, the all acrospire’s amounts are 28.8 million. The neoteric agricultural machine furtherance, there were 40 the third multifunctional manure spreading machine has been used. In the technical devolution, the fertilizer applicator and ridge-making machine has been administered.