

摘要

九十一年本場共執行科技研究計畫 68 項，示範推廣計畫 52 項，委託試驗 12 項，茲將各項成果摘錄如下：

稻作：本年度提出新品系台稈育 31086 號申請命名，並於 11 月 22 日獲得通過，命名為「花蓮 19 號」米質優良，並具高產量及抗病特性。花稈育 32 在全省性區域試驗表現優良，另外選拔花稈育 44、及花稈育 50 為 92 年組參試品系。搜集香米種原 39 種，並已檢定具濃香品種 13 種。以近紅外光分析儀，研發稻米直鏈性澱粉及粗蛋白質含量之預測模式，其準確度已可供篩選雜交後裔之用。輔導轄區內稻農生產有機米，花蓮縣 5 班 399 公頃，宜蘭縣 3 班 60 公頃。輔導良質米生產，分別為花蓮縣 3,900 公頃，宜蘭縣 2,050 公頃。

雜糧及特作：落花生品種改良第三年品系試驗，結果 HL85-12、HL86-07 及 HL85-11 等 3 品系表現較佳。花育 12 號為大莢大粒之瓦倫西亞型品系，在區域試驗表現優良。山藥品種選育試驗結果，以 Y90-5 及 Y89-5 兩品系產量最高。開發景觀綠肥作物選出青梢及黃波斯菊，分別適合春作及秋作種植。在保健作物試驗方面，利用菌根菌接種，並以細河沙為栽培介質，可提高綫草種子發芽率及植株鮮重；台灣天仙果及鐵包金最適播種期分別為 4 月及 11 月發芽率最高。

蔬菜：冬瓜育種完成自交第 6 代品系純化工作，選出 7 個優良純系，以 TAI-2-1-7-13-11-14-20 等 4 個純系作為父本，花蓮 1 號冬瓜為母本，可採收一代雜交種子。山苦瓜育種選出高雌花之自交第六代品系 14 個，果重最高達 338.8 g，果肉厚度 8.7 至 15.6 mm，可食率在 74% 以上。青蔥耐熱育種，夏作以 10484 和 10540 品系產量較高、蔥白較長，園藝性狀較佳。青蒜耐病毒病品系選拔試驗以 VFG180 品系表現最好，產量較對照品種高 24~40%，而以珠芽繁殖無病毒感染之宜蘭白蒜之二代種蒜所生產之青蒜，其園藝性狀甚佳；健康青蒜品系中以 VFG180 品系表現最好，產量較對照品種高 24~40%。小果番茄新品系區域試驗，新品系富含維他命 A、品質優良、抗病性佳，秋作產量以 CHT 1200 品系最高，CHT 1201 品系次之，風味品評則以 CHT 1201 較佳。在洋香瓜及哈密瓜架設支柱栽培者，其產量較高且果皮色澤、外觀及網紋較均勻。長形山藥花蓮 3 號禮盒包裝時，切口表面消毒 5 秒鐘，再迅速沾浸油酸鈉溶液 3 秒鐘，陰乾後裝盒，可有效降低切口發黴率。

花卉：百合品種改良，以原生台灣百合為母本，亞洲型和東方型百合為父本，進行遠緣雜交，在 7 個組合利用子房培養及胚珠培養技術，獲得雜交後裔 191 株，並已選出優良品系 FA2 及 FA3。選出台灣原生百合 FLTK908 自交系，其植物性狀表現最優良。蒐集具有特殊香味之香草植物種原有 12 科 242 品種，並建立各種香草植物最適當之繁殖體系，依其香味及植株特性可發展出不同用途的加工產品，以及應用在園藝觀賞盆栽之利用。搜集太魯閣耳挖草經試驗發現，其適應性廣適合發展為吊盆植物或景觀地被植物，本年度已建立其繁殖體系。選拔 30 個表現優良之銀柳品系，其有效分支數較多，植株較高且花苞數較多。由日本引進之寒梅新品種經試驗發現以雪御殿、白壽、芳壽之譽、虹等 4 個品種表現較為良好。寒梅在夏

季以帶葉綠枝條為插穗以珍珠石加蛭石(1：1)為介質，扦插基部處理 IBA 500ppm，扦插成活率達 70%。

果樹：柑桔品種多樣化，其中以明尼桔柚、Fremont、Ortanique、及茂谷柑等品種質優且豐產，表現較為優異。引進 5 個蓮霧品種芽體進行高接，其中綠鑽石及阿塗大粒種首次開花結果，其單果重均比本地栽培之南洋種為重。金柑無毒化種苗繁殖體系之建立，共繁殖無病毒品系 kq-1-1~20 共 695 株，嫁接成活率 85.1%。另選拔金柑優良單株 9 株，其中以 2-46 及 2-52 號具有較佳之園藝性狀。

農產品加工：開發紅麴酒養生飲品及紅糟醃漬品，不僅口感、風味佳，且較耐貯存。以山藥、綬草等保健作物為主原料，利用發酵技術開發複方保健產品，經衛生安全、營養成分分析及品評，發現產品具保健功能及商品化潛力。為解決本區文旦生產過剩問題，本場積極研發文旦加工技術，目前已在文旦醋方面，以米醋及冰糖之浸漬法的產品，風味特殊且可避免苦味。在文旦精油萃取方面，以壓榨法所獲得之柚皮精油含量多且製程簡便，文旦精油經分析，含檸檬精油等 11 種以上的化合物，是應用於美容用品的良好香料，目前已開發沐浴乳、洗髮精等產品。

生物技術：比較 6 個水稻品種，以台稉 17 號、台農 67 號癒傷組織產生率較高；培養基添加脯氨酸可提高水稻癒傷組織增生率。在癒傷組織再生試驗方面，培養基內添加 kinetin 2 mg/l 及 NAA0.02 mg/l，癒傷組織再生芽體數較多，利用已建立之再生系統進行基因轉殖，初步已獲有 G U S 基因表現之再生植株。以農桿菌進行花蓮亞蔬五號番茄基因轉殖，採用 PBI121 質體，轉殖後培植體再生芽體數為 1.8-3.4 個，檢測芽體葉片，部份有 GUS 基因表達現象，進一步培養獲得基因轉殖株。以農桿菌轉殖基因至百合癒傷組織 LG41 細胞系，經篩選後褐化率為 32.9-49.8%，存活細胞有 GUS 基因表達現象；以含 picloram 10 mg/l 之培養基，培養百合癒傷組織，可促進癒傷組織增生速度且不易造成褐化。組織培養試驗方面，普拉特草以 BA 5ppm、金石榴和布勒德藤以 BA 2.5ppm 培養，可獲得大量叢生芽體。探討培養基中添加有機物，對蝴蝶蘭幼苗發根展葉階段生長之影響，結果添加台農 66 號甘藷泥較台農 57 號為佳，且甘藷與香蕉泥混合比例以 40：60 或 50：50 (g/l) 效果最好。青蔥種源鑑定技術研究結果顯示，二十個青蔥品種／系之 DNA 經 PCR 產生多型性表現明顯的引子有 12 個，總共產生三十五個隨機增幅多型性核酸標誌。

植物保護：在山蘇、山藥病蟲害生態及防治技術研究，已確認山蘇輪紋病、葉芽線蟲、柚葉並盾介殼蟲等主要病蟲害，並篩選出馬拉松、苦楝油及畢芬寧對介殼蟲防治效果佳，蝸牛、蛭蟪則以聚乙醛餌劑防治效果較好；山藥主要病蟲害有黑盲椿、炭疽病、根瘤線蟲等，並篩選出益達胺、畢芬寧、亞滅培對黑盲椿防治效果佳，炭疽病則以免賴得、撲克拉及貝芬硫琨防治效果較好。水稻、小胡瓜有機栽培之病害防治技術試驗結果顯示小胡瓜葉部病害以氯化鐵防治效果佳，另以稻殼、雞糞為基礎分別添加有機資材可有效降低根部病害；水稻苗徒長病以亞磷酸預防效果較好，葉稻熱病以丁香油防治效果較佳，穗稻熱病以苦楝油防治效果較好。金柑疫病防治選出三元硫酸銅、達滅芬兩種藥劑；韭菜根蟻非農藥防治資材以印棟

素之效果最佳；溫泉薤菜青枯病噴施嘉賜銅或施用酸性土壤改良劑可顯著改善青枯病發生。應用枯草桿菌改良劑可明顯抑制洋香瓜白粉病。水稻育苗時，稻種以賽普護汰寧水分散性粒劑；育苗土以依得利乳劑處理，可有效減少徒長病及立枯病之發生。芋仔甘藷蔓割病防治，以採取健康種藷培育健康苗，並於種植前施用苦土石灰土壤改良劑，可有效提高產量 52%。

土壤肥料：在哈密瓜栽培時用本場研製之米糠堆肥，不但殘效長，且可降低生產成本，同時對品質並無影響。寒梅盆栽介質處理以壤土：真珠石：泥炭土=5：2.5：2.5 並覆蓋有機質之處理表現最好。在瓜果類之設施袋耕栽培中以稻殼堆肥替代進口介質，在產量及品質均無顯著，但成本可降低，顯示稻殼製成之栽培介質具有取代進口栽培介質之潛力。為建立花宜兩縣土壤性質之基本資料庫，自民國 81 年起開始進行之 250 公尺網格採樣調查工作，歷經 11 年終於在民國 91 年完成花宜兩縣約一萬餘點，總面積達七萬餘公頃之採樣調查，並已將資料上網供農民查詢。

農業機械：本場研製承載型蔬菜種子直播機已在 91 年取得國家新型專利。該機具有多項作業功能，操作簡便，適合各種類之蔬菜種子使用，且價格便宜。開發施肥作畦一貫作業，其特點具有油壓舉升裝置之作畦機構，讓機具備整地、施肥、作畦一貫作業之功能，惟亦可單獨分項操，不但肥料撒佈均勻且又與土壤充分混合。開發專用型滾軸式文旦分級機具，有四級分級功能，並配合包裝輸送裝置，一天之作業量可達 22 公噸。研發文旦加工機械方面針對文旦去皮裝置之研製，作業效率高，每天工作量達 3.8 公噸，利用 2Hp 之空壓機作為動力源，設定三種不同規格之筒刀，配合光電控制及相關零件，使達到自動去皮之目的，每天工作量達 3.8 公噸。

農業推廣：為加速農業人力與農民組織發展，辦理農民專業訓練共 9 場次，計訓練 305 人。整合農業產銷班，共計 598 班。農業經營管理顧問專家選定富里鄉農會富麗碾米廠及蘭陽盆花運銷合作社進行診斷輔導工作。輔導農地利用綜合規劃及輔導產銷組織相關計畫，改善轄區各農業產銷班基本生產環境及 27 個班場所之設施；推動區內農業策略聯盟，輔導文旦、休閒、花卉、山藥等農業策略聯盟，整合優勢資源，強化栽培經營管理能力，建立聯盟品牌，提升產業競爭力。輔導宜蘭縣三星地區農會取得「三星上將梨」品牌商標，並獲核定授予國產蔬果品質認證。深入基層舉辦各種農業技術諮詢及政策宣導座談會，建立政府與農民直接溝通的管道凝聚共識。輔導轄區農會辦理營養保健班及農村婦女開創副業等講習共 27 班。研發休閒鄉土野菜及紅糟料理食譜，並辦理成果發表品嚐會 2 場次，編印為精美推廣手冊 5,000 本；為推廣本場各項研究與輔導成果，提送本場試驗研究成果宣導主題 38 則，供行政院農業委員會（公關科）發佈新聞用，發佈地方農業新聞 91 則，拷貝農業教材錄影帶 148 支供各農會應用；發行「花蓮區農業專訊」季刊四期及「花蓮區農情月刊」12 期；為藉由網際網路之交流，推介本場試驗研究及示範推廣成果，設立本場全球資訊網，本年度上網瀏覽人次累計 4 萬餘人。另建立花蓮區農業產銷服務資訊系統，統合發展花蓮區農林漁牧各類專業資料庫，建立農業產銷資訊體系知識管理系統。

為民服務：為了提升服務品質，設置單一窗口提供各項農業諮詢及資料索取之服務，接

待各級農會農友、其他機關及國外來賓蒞場參觀計 46 次 2,421 人。執行作物病蟲害監測及防治處方服務，計診斷作物 70 種 491 件。91 年度輔導本區蔬菜用藥安全示範區面積 1200 公頃，並核發吉園圃標章使用。推動東方果實蠅共同防治可有效防止東方果實蠅之大量發生其防治率達 90%。本年度「土壤及植物營養診斷服務」共辦理 1,774 件診斷服務，其中植體分析 921 件，土壤分析 804 件，另外有機資材及堆肥之分析亦有 49 件。

Summary

In 2002, total 68 research projects and 57 demonstration plans were conducted, 12 commissioned projects from other organizations were also accepted. The results were summarized as follow:

On rice : A superior breeding line TKY 31086 was named as a new variety Hualien 19 at December 22nd. According to the second-crop results of 2002, two breeding lines HKY 44 and HKY 50 were submitted to attend the regional trials of 2003. There were 39 aromatic rice varieties been evaluated, and 13 of them showed strong fragrance in both leaves and grains. There were 36 rice varieties been chosen for evaluating the possibility for making 'SAKE' wine. The on panicle germination tests showed that the germination rate of Japonica rice in the second crop was higher than in the first crop. For Indica rice, however, it was rather low in both crops. On shattering tests, all Indica and Japonica type of rice were recorded as middle grade. The NIR prediction models were developed to predict the contents of amylose and crude protein in rice powder. These models are available for screening breeding materials. TN 71 and KH 143 appeared weaker and easier lodging under higher nitrogen fertilizer. To promote organic rice production, a total of 399 and 60 hectares were grown, respectively in Hualien and Ilan area. To enhance the quality of good quality rice, a total of 3,900 and 2,050 hectares were grown, respectively in Hualien and Ilan area.

On upland and special crops : The third-year trial for peanut was conducted, and 3 new breeding line performed higher yield potential than the control variety Hualien 1. On regional trials, the new breeding lines Hua-yu 12, Nan-kai-si 165 performed better than others in the first crop, and Hua-yu 13, Nan-kai-si 167 and Nung-yu 47 performed better than others in the second crop. On taro-like sweet potato selection trials, the yield of a breeding line TLSP-019 was the highest on autumn spring trial. On yam selection program, the breeding line Y90-5 (long-shape type), and Y89-5 (red-flesh type) got the highest yield. On the selection of green manure for landscaping and leisure agriculture, the feather cockscomb (*Coleosion argentea* L.) and *Cosmos sulfurous* Cav. were suitable for the spring season. and the common cosmos (*Cosmos bipinnatus* Cav.) was suitable for autumn season. To develop the native health improving plant resources, some experiments were conducted. Using the fine sand as culture media together with the infection of mycorrhiza, the results showed that the germination rate of *Spirunthes sinensis* was enhanced. The best sowing time for *Berchemia lineata* is November, and for *Ficus formosana* is April.

On vegetable : There were six breeding programs been conducted, including wax-gourd, bitter gourd, ornamental squash, green onion, garlic, and tomato. In wax-gourd, pure line selection was progressed to the sixth generation, and seven breeding lines were selected. To obtain hybrid varieties, the variety Hualien 1 was used as a maternal plant, and then crossed with 4 other pure lines to obtain hybrid seeds. In bitter gourd, pure line selection was progressed to the sixth

generation, and 14 breeding lines were selected. The percentage of female flowers ranged from 2% to 98%, the fruit weight ranged from 25.7 to 338.8 g, and the thickness of flesh ranged from 8.7 to 15.6 mm. Breeding of ornamental squash was conducted and nine breeding lines had been selected. In green onion, two breeding lines 10484 and 10540 have good performance under summer season, which higher yield, longer stem, and better quality. A selection program for virus tolerant garlic was conducted. The results indicated that the yield of a virus free strain VFG180 was 24 to 40% higher than control. A regional trial was conducted to selecting small-fruit tomatoes for high vitamin A content, better quality, and tolerant to bacteria wilt disease. The results of summer season had shown that breeding line CHT 1200 got the highest yield, followed by CHT1201. To study the effect of cultivation facility on melons, three simple facilities, including , A , type pillar, vertical pillar, and row tunnel, were compared. It has shown that cultivation facility resulted in higher yield and better outlook of the fruits. To reduce fungus infection, the cut ends of long-shape yams were treated with sodium oleate solution, and the storage quality was enhanced.

On flowers : Breeding of lily had been conducted by using *Lilium formosanum* as a maternal plant, and the asiatic or oriental hybrid lilies as paternal plants. To overcome inter-specific crossing barriers, the in vitro culture techniques including ovary-culture and ovule-culture were employed. A breeding program has also been conducted in order to select Taiwan native lily cultivars. One self-pollinated line FLTK908 was selected with good characters. To collect herbal plants with different fragrances and to investigate the usage of those plants, a total of 242 cultivars, belonging to 12 genres, were collected. To find suitable varieties for making processing products, there were seven basil varieties been investigated. It showed that different variety has different growth habits and specific fragrance. Besides, different types of processing products were developed according to the specific fragrance. The propagation system for *Scutellaria* sp., which is suitable for developing into hanging plants, or landscaping plants ,has been established. The selection of big-bud in cat-tail willow was conducted and 30 superior plants were selected. For the selected plants, the number of branch, the length of shoot, and the buds per shoot were higher than ordinary plants. New varieties of flowering quince were introduced for adaptation tests. The results indicated that variety Yukigoten, Hakuju, Hojunohomare, and Niji had better adaptability than others. The results of cutting trials for flowering quince indicated that the best protocol is: Using the softwood with leaves as a cutting, using the mixture of perlite and vermiculite (1:1) as a soil medium, and using 500 ppm IBA solution for pretreatment, the survival rate was raised to 70%. Different mulching materials were compared to study the effect on growth of *Lycoris aurea*. It showed that non-woven and grass-inhibiting mat have the best effects on weed control. The highest bolting ratio happened on rice-hull mulching, and the tallest scape happened on paper mat mulching. A shading trial for watercress was conducted in summer season. It showed that the yield of watercress grown under

50% and 80% shadings were decreased to 75% of that under full sunlight conditions. The number of shoot per hectare and the dry weight were also decreased.

On fruit trees : In order to diversify the Citrus industry, eight and twelve cultivars were introduced and cultivated, respectively in Hualien and Ilan area. After a four-year observation, the results indicated that cultivar 'Miniola' performed the best results with good quality in Hualien area, followed by sugar-orange and Ortanique. Cultivar Fremont, Ortanique, and Murcott performed the best results with good quality in Ilan area. There were nine kumquat trees, with superior performance, been selected and cultivated in Yuanshan. The fruit weight of number 2-46 and 2-52 trees was higher than local varieties. To improve the quality of wax apple, five cultivars were introduced and grafted onto domestic trees. Cultivars Green Diamond and A-Tu Large set fruits for the first time and the weights were higher than local cultivars. A regional trial of pineapple was conducted for 7 cultivars. Cultivars Tainon 16 and Tainon 17 performed the superior characteristics with good flavor, high sugar content, and earlier maturation. To establish a virus-free propagation system for kumquat, a total of 1656 seedlings of *C. sunki* were propagated and used as rootstocks. The scion buds, taken from virus-free plants from kq-1-1 to kq-1-20, were grafted. A total of 695 grafted plants were obtained, and the survival rate was 85.1%.

On processing technique: The result of studies on the application of brewing and pickled foods on *Monascus* indicated that the special local agricultural products could be used to develop the pickled food with low-sodium and nourishing *Monascus* drinks, The final products adding more sugar, soy sauce and treating heat can get better flavor, delicious taste, and longer storage. Development the tea bags for healthy purpose of the native plant in eastern area was conducted. The result showed that tea bag quality was better using 50 ~ 60 than 70 for plant dry. Four tea-bags products were developed according to combination of proportion rate which including mesona, sweetening chrysanthemum and cinnamon etc. The flavor of these tea bags was popular for persons. The processing products, including yam, *Spiranthes sinensis*, *Ficus formosana* etc., developed in this year, showed non or less toxic, SOD contents was 3329 unit/g, and the heavy metal content was not detected. Due to safety evaluation, the processing products were safe for persons. Development of large agricultural product processing technology in Taiwan showed that the optimal temperature of pre-fermentation and post-fermentation on wentan pumelo materials that produced in Hualien area was 22 , and avoiding other bacterial pollution was necessary. Fragrance of the wentan pumelo was kept in the product. The vinegar of Wentan pumelo was manufactured by brewing of Wentan pumelo, rice-vinegar, and crystal sugar. It can avoid the bitterness and maintain special flavor. The essential oil of Wentan pumelo was extracted by applying cold-pressure and high speed centrifugal. By the GC/MS analysis, the essential oil contains more than 11 compounds, including Limonen, α -Pinen, β -Pinen, and Phenol. The essential oil was processed into bath foam,

shampoo, moisture hand cream, and skin cream.

On biotechnology: There were six rice cultivars been compared, and TK17 and TN67 got the highest percentage of callus formation. The proliferation rate of callus was enhanced on the medium supplemented with proline. The number of shoot was increased on the medium supplemented with 2mg/l kinetin and 0.02mg/l NAA. Tomato Hualien AVRDC 5 was successfully transformed by *Agrobacterium tumefaciens* with a PBI121 plasmid. After a kanamycin selection, the transformation rates ranged from 33.1 to 74.3% and the number of regenerated shoots ranged from 1.8 to 3.4. The GUS gene expression was detected in some shoots. An *Agrobacterium* mediated transformation protocol was employed to transfer foreign genes into lily callus-line LG41. After a hygromycin selection, the browning rate of callus lies between 32.9 and 49.8%, and some calluses have shown GUS expression. The supplement of picloram (10mg/l) in the medium could enhance the proliferation rate and reduce the browning rate of lily callus. Using tissue culture together with irradiation techniques, 44 mutants of ornamental pineapple were obtained and grown in a greenhouse. In addition, the irradiation was investigated to find the best dosage. It showed that the exposure dose of 75 Gray caused the highest mutation rate (5.8%). On tissue culture research, the best result for the propagation of *Lobelia nummularia* was on the medium supplemented with 5 mg/l BA, and 2.5ppm BA for *Bredia oldhamii* and *B. hirsute* var. *scandens*. For *Phalaenopsis*, media supplemented with organic additives, such as sweet potato and banana paste, could enhance the growth rate. It showed that sweet potato paste taken from cultivar Tainong 66 was better than that from Tainong 57. The best proportion of sweet potato and banana mixture was 40:60 or 50:50 (g/l). The results of identification trials showed that there were 12 primers that could anneal with 20 green onion cultivars. A total of 35 Randomly Amplified Polymorphic (RAPD) DNA markers were obtained after Polymerase Chain Reaction.

On plant protection: The major pests and diseases of bird's nest fern have been identified. The more effective pesticides on scale insect are malathion, neem oil and bifenthrin. The most effective pesticide on snail and slug is metaldehyde. The major pests and diseases of Chinese yam are mirid, anthracnose, root-knot nematode and root-rot nematode. Imidacloprid, bifenthrin and acetamiprid can control mirid bug effectively. For the control of anthracnose, benomyl, prochloraz and carbendazim-dithianon are effective. Studies on disease management of organic farming of rice and cucumber shows that the most effectively material for the control of downy mildew and powdery mildew is ferric chloride. By using base fertilizer, which composed of rice husk, chicken excrement and organic material, the root disease of cucumber can be effectively lowered. *Bakanae* disease can be prevented by using phosphorous acid on rice seeding. Rice blast on leaf can be control by clove oil. Rice blast on tassel can be control by neem oil. Tribasic copper sulfate and dimethomorph are effective for control of gummosis on kumquat. Six breeds of anti-late blight of

tomato are selected. Experiments on non-pesticide control of bulb mites of leek shows that the best control material is azadirachtin. Spraying kasugamycin-copper oxychloride on spring water spinach or applying sour soil improvement material to field may decrease the incidence of bacterial wilt on spring water spinach. Application of the improved formula of *Bacillus amyloiquefaciens* B190 can inhibit the powdery mildew of cucumber.

The extension and services for the farmers were to incidence of bakanae disease and damping-off of rice seeding can be controlled by spraying fludioxonil cyprodinil. Sanitation of seeding of rice by using etridiazole can control damping-off of rice. The fusarium wilt of purple sweet potato can be control by using healthy seeding and applying dolomitic limestone in field before planting. It will increase yield by 52 percent. The monitoring on *Rattus exulans* and field mouse reveal that long-term poison trapping gives a control rate of 93.2 percent. The control rate of field mouse is 90.9%. The cooperative control of oriental fruit fly gives a control rate up to 90%. The service of diagnosis and control consultation identified 350 pests on 70 crops at Hualien and 141 pests at Ilan. The consultation on good agricultural product (GAP) and pesticide safety area in Hualien and Ilan covered 1200 ha.

Seven commissions of control effects of pesticide, fungicide and herbicide have been accomplished. They are downy mildew of cantaloupe, downy mildew of cucumber, sheath blight of rice, anthracnose of wax apple, beet army worm of cantaloupe and weed on pear field.

On soil and fertilizer : The highest yield of bird's-nest fern was found by applying with organic fertilizer 2 kg/plant/year and nutrition solution of nitrogen : phosphorus : potassium = 200 : 50 : 450 mg/l /week. The mixtures of chicken dung manure, rice bran, and rice hull as base fertilizer and four tons of rice bran were spread for dressing. Results showed that the sugar content of the muskmelon was similar with conventional fertilization method. The residue effect of this compost is more than half year, and it can save 60% fees of fertilizer. For the seedless guava, the results indicated that it got the highest yield of seedless guava for five-year old trees was pot by treating with organic fertilizer 20 kg/plant and chemical fertilizers nitrogen : phosphorus pentoxide : potassium oxide =120 : 120 : 180 g/plant/year to the soil under crown and foliage dressing six times with 1% potassium sulfate solution 2g/plant/week during young fruit stage. For the *Chaenomeles* saneness, the result indicated that loam, perlite and peat mixed at the ratio 5:2.5:2.5 had the best performance, and organic manure mulch significantly enhanced the effect. In bag culture medium study, the pseudo-composted rice hull have the same effect on vegetables yield and quality comparwd with imported medium. For establishing the soil database in this district, the grid survey with 250 meters has been conducted. In the past decade, more than 10,000 samples of grid survey have been sampled and data will be to establish the soil information system in the future. In 2002, there were 1,774 samples of soil and plant tissues were analyzed, including 921 samples of plant tissue, 804

samples of soil, and 49 samples of organic materials. Those data were used to assess the soil fertility and the plant nutrition for farmers.

On agricultural machine : A multiplicity of the vegetable seeding machine has been developed. It is more convenience for change different vegetable seeding disc. The vegetable seeding machine has been conferred the national patent in 2002. At fertilizer applicator and ridge making machine, a head of oil has been changed the fixity ridge making mechanisms. The work current is fertilizer applicator and churning with the land, then making ridge in the time. The roller Wentan pomelo sorting machine has been developed. Application four levels roller with different height, it can dispose 22 tons Wentan pomelo one day. For the Wentan pomelo process machine, it is the power source of 2Hp air compressor. Dependent on the Wentan pomelo size, there are set three size circle blades. It can dispose 3.8 tons Wentan pomelo one day.

On agricultural extension : To improve agricultural human resource and farmers' association development, the following training courses ; one class as -Specialized agricultural training for young farmers, one conference as Conference of agricultural village wine-brewing law and regulations, two sessions of Advanced knowledge of agricultural villages wine-brewing skill in Hualien district, and total five session courses as Educational training for agricultural product-cum-marketing groups in management system, also two product-cum-marketing groups in the district how to proficiently use the information in practical sense. There were about 305 people attending the educational training courses in this year. To improve the management efficiency, there were total 598 product-cum-marketing groups been guided and assisted . The agricultural management consultants had chosen Fuli Shiang farmers' association rice mill and Ilan flower association as the targets for diagnosis and developing projects. The implementation project of the integrated farmland utilization planning and relative development projects were conducted to improve the product-cum- marketing groups' basic production environments and 27 groups' facilities. To promote the area's agricultural strategic coalitions, developed promotions on Wentan pomelo, and leisure agricultural strategic coalitions. At the same time, also assisted to set up Ilan flower produce strategic coalitions and Hualien-Ilan nest-fern produce strategic coalitions. The purpose of these strategic coalition is to combine the advantage resources, strengthen the developing management abilities, establishing coalitions trademarked reputation, and increasing the competition ability. The station assisted Ilan Sanshing district Farmers' Association successfully to establish earned the SanShing General Pear trademark, also been given the National Produce qualification. To deepen into the basic agricultural society, the managements also offer agricultural technology information conference with total 139 farmers' involvement. To establish the direct communication between the government and farmers, the station conducted Hualien agricultural development conference, Listening to farmers' voices conference, also conduct agricultural policy

promotional conference in both Hualien and Ilan to gather the local general understandings. On rural Living and Agricultural culinary research, assisted the agricultural associations to conduct 6 classes for senior rural living, 11 classes for health and nutrition, 3 Agricultural managing classes for female farmers and 7 Home economics start-up courses also for female farmers; at the same time, developed organic recipes, monascus cooking DIY, research for cuisine development, and held exhibitions and taste conference twice, also published 5,000 stylish designed promotional brochures. In order to construct and develop the new and improved agricultural villages, the station also devoted its study in evaluation on development of the organic agricultural village in Hualien Area. In order to promote this station's extension and projects accomplishments, the station published the research accomplishments by way of COA and mass media, the magazine Hualien District Agriculture Monthly and another quarterly magazine Agricultural Extension Bulletin of Hualien District are issued by this station and distributed to the researchers, core farmers and key staff of production-cum-marketing groups. Furthermore, the home page of this station was developed to provide more agriculture information resources for agricultural workers and general public, and yet has almost 40,000 visitors to the site last year. It also combined the Hualien agricultural services information system and agricultural database to create the agricultural information management system. By setting up Service Center, offered to answer every aspect of agricultural question and provide the service of information, hospitality for the agricultural associations, farmers, and foreign visitors for about 2,421 people.