RESEARCH AND DEVELOPMENT

RICE RESEARCH

Genetic Analysis of Rice Grain Size with Molecular Markers

RFLP (Restriction fragment length polymorphism) markers are basically co-dominant, phenotype-neutral, free from epistasis and of greater variations. The disadvantages of RFLP include the laborious procedures involved and the relatively high cost. Yet, the RAPD (randomly amplified polymorphic DNA) technique provides a faster and easier approach for exploring genetic polymorphism while requires only very small amounts of DNA.

Many important heritable characters, e.g., spikelet length, spikelet width and yield, are consequences of the joint action of several genes. Yet, little is known about the chromosomal position and interaction effects of genes controlling their expression. Breeders have traditionally improved these traits by selection based on phenotypes at the cost of time and efforts. Now RFLP and RAPD maps can be used directly in selecting desirable genes via their linkage to easily detectable RFLP and RAPD markers.

From this viewpoint, an attempt was made in this paper to examine and analyze the genetics of grain size with molecular markers in the F_2 population from the cross ID-47 x 83N1168. The results show that QTLs were determined from differences between mean trait expression of marker locus genotypic classes, and described below.

Spikelet length: RG140 (chromosome 1), RG650 (chromosome 7), RG304 (chromosome 11), OPV6-920 (chromosome 9), OPV7-1240.

Spikelet width: RG140, RG147 (chromosome 1), RG13 (chromosome 5).

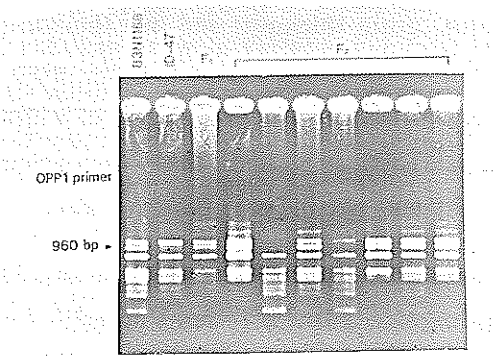

Fig. 1. Opp1-960 RAPD marker in F_2 population of the cross ID-47 x 83N1168.

The Relationship among Grain Size, Yield Components and Grain Chalkiness in Indica Rice

Twelve Indica rice varieties (line) were planted to study the grain size relation to yield components and quality in Indica rice. According to variance analysis of yield, it was not significant between varieties (lines). Those varieties with 29 - 30 gr of thousand grains weight were not necessarily higher in yield than

common grain varieties (lines). The main reason was due to its reducing in one or two yield components such as panicle number per hill, grain number per panicle and the percentage of filled grains. The effect of the percentage of filled grains to yield was significant by path analysis. On the other hand, the grain width was significantly correlated with brown rice rate(%) and total milled rice rate(%). One thousand grains weight of rice were significantly negatively correlated with head rice rate(%). Grain width, grain thickness and one thousand grains weight were significantly negatively correlatied with the degree of white belly. This suggested that the grain quality may decline with the grain size.

Tolerance Test of Bacterial Blight Pathogen Strains on Rice Varieties

The 45 released rice varieties were selected for testing. The rice plants at late stage of panicle initiation were sprayed with semi-automatic sprayer with high virulent XM-42 bacterial blight strains, the infection rate was investigated and recorded. The result indicated that Taichung sen waxy 1, Kaohsiung sen 7 were the most susceptible varieties, followed by Taichung 186, Taichung 190, Chianan 2, Chianan 8, Chianung 242, Hsinchu 64, Taichung waxy 70, Taikeng 8 and Taikeng 7. The varieties with medium bacterial blight infection rate but severely reduced in yield were Taichung 190, Kaohsiung 24, Taichung waxy 70, Tainan 6; while the yields of Taikeng 8 and Taikeng 7 were not severely reduced.

Cultural Test for the F_6 Generation of Indica-japonica Hybrid on Rice (*Oryza sativa* L.)

The test was conducted to study the effects of ideal type selection among 18 F_6 elite lines of indica-japonica rice hybrid and the yields under the different plant density. The trial employed 9 x 9 simple lattice design with four replications, two plant densities (20 x 20 vs 40 x 10 cm), Tcs-10 and Tcsw-1 using as the check varieties. The results showed that the grain yield in the plot with wide row and dense space between plants (40 x 10 cm) were generally higher than the treatment with 20 x 20 cm. The yield of the strain with the highest yield of 1100 g per 1 meter square was higher than the check varieties Tcs-10 and Tcsw-1 up for 20 % and 15 % respectively. These outcomes meet the performance of the coming ideal rice type proposed by IRRI. The average growth days among the trial strains were 7 days earlier than Tcs-10 and 10 days earlier than Tcsw-1, and 26 strains were selected based on the field responses, yields and rice quality etc. Test will be promoted to F_7 generation.

Application of the Bacterial Blight Resistant Near-isogenic Lines for Rice Breeding Program

I. The Agronomic and Physiologic Characteristics of Near-isogenic Lines and their Hybridizations

Bacterial blight caused by *Xanthomonas oryzae* pv. *oryzae* is one of the most serious diseases in rice culture in Taiwan. Serveral methods of chemical control have been tried against this disease, but none of them showed satisfactory result. It is commonly known that resistant cultivars may help control the disease. The near-isogenic lines which carry different resistance genes were developed by the researchers of the international cooperations. These near-isogenic lines include two current parents IR24 and Milyang 23 that were infected by Taiwanese strain XM42 of this bacterial pathogen. The more resistant lines to Taiwanese strain XM42 among them carried *xa-5*, *Xa-10*, or *Xa-12* resistant genes. The changes of peroxidase activities were also analyzed 4-days after inoculation. The correlationship between lesion length of the dieased leaves and the increasing percentage of peroxidase activity was significantly negative. It indicated that the more resistant to this disease the higher increasings of peroxidase activity. The hybridization had been held as TCS10/IRBB5 (*xa-5*) for introducing resistant gene into the popular cultivar TCS10 of Indica rice in Taiwan. The responsiveness of F_1 progenies to the strain XM42 pathogen was susceptible and that of the F_2 population will be investaged in the future.

WEED RESEARCH

A Study of the Population Differentiation of *Imperata cylindrica* in Taiwan

Cogongrass (*Imperata cylindrica*) belongs to the family of Gramineae. The grass can grow in variable habitats, and its ability to endue stress environment is strong. In this study, there were fifteen sites where samples of leaves were collected for assays. Various ecotypes were found, particularly the grass growing at Chuwei is very unique. The grasses grown at Chuwei are wax-like on the surface of plant and rib with a hollow structure without ground tissue. Among the 15 populations of cogongrass in Taiwan, RAPD and PCR-amplified RFLP were employed for studying the ecotypic variation of the grasses. Based on the findings of RAPD, two major groups were found among 15 populations. Of them, the Chuwei population was distinguishedly different from the remaining 14 populations. In studying PCR-amplified RFLP, amplified via the PCR from 45 samples of 15 populations, 2800bp was found in IGS region and 690bp in ITS

region of rDNA in nuclear genome. Thirteen and ten restriction enzymes were used to digest 2 DNA fragments for IGS and ITS studies, respectively. After the clustering analysis, the result of PCR-amplified RFLP in IGS region agreed with the findings of RAPD. However, there is no significant difference among 15 populations based on the analysis of ITS region. Furthermore, variation of rpoC1, C2 and atpI, H, F, A gene fragments where locate in chloroplast genome. However, there is no difference between each population detected PCR-amplified RFLP of two regions of chloroplast DNA. It is concluded that there are two different ecotypes based on the data of phenophic characters and molecular findings. In particular, the population at Chuwei is very unique and is remarkly different from those of other 14 populations.

Effect of Select 25% E.C. on Weed Control in the Peanut Field

This study consisted of six treatments: 1) Select 25% E.C. 0.8 L/ha. 2) Select 25% E.C. 1.0 L/ha. 3) Pendimethalin 34% E.C. 5.0 L/ha. 4) Fluazifop-butyl 17.5% E.C. 1.0 L/ha. 5) Weed control with man. 6) no weed control.

The results showed that Select 25% E.C. 1.0 L/ha had the best effect in controlling Gramineae weeds in both spring season and autumn season, but no effect on Cyperaceae and wide leaf weeds Select 25% E.C. 0.8 L/ha and Fluazifop-butyl also showed good resut.

In autumn season, it showed that weed control with man was the greatest in peanut production; Select 25% E.C. 1.0 L/ha the next, and Fluazifop-butyl the third.

In spring season, it showed that weed control with man was also the greatest in peanut production; Pendimethalim the next, and select 25% E.C. 1.0 L/ha the third.

The Diffusive Weed Control Effects of Sulfonyl-urea Herbicides in Paddy

The sulfonyl-urea was a kind of low dosage herbicides that was developped recently. For the control of paddy weed, it can be used at low dosage, wide application time and it can control perennial weeds. This experiment was conducted to compared the diffusive weed control effects of sulfonyl-urea herbicides in the paddy. The results showed that the diffusive weed control effects was connected with the solubility of chemicals. There was no a chemical damage when applied at the rate of 0.675 - 1.35 g of the chemicals in the same point of paddy. All of these chemicals are less effective for the control of barnyardgrass.

RICE QUALITY

Effect of Germinated Spike on Rice Quality

The experiment was conducted to study the effect of germinated spike caused by continuous rainfall during maturing stage on rice quality. The artificial springkling system was set up to simulate the rainfall. The results indicated that the embryo viability was decreased as the grain maturity and sprinkle duration were increased in two crops, but there was difference between varieties. The germination rate was about 60% and 25% in the 1st and 2nd crops, respectively. The milling quality was also decreased as grain maturity and sprinkling duration was increased. The head rice ratio was only 30 - 40% in the 1st crop. Among the physicochemical properties of rice, only gel consistency was harder by springkling. The eating quality was also worse, particular in the 1st crop. The germinated bud length varied with varieties and sprinkling duration as the milling quality was affected. One thousand brown rice weight was decreased as the sprinkling duration increased. The damaged degree of starch granules varied with varieties in those severely germinated grains, some small holes or loose packing were found on those starch granules.

Effects of Packing Method and Storage Temperature on the Qualities of Small Packing Milled Rice

The variety, Taichung 189, was processed into milled rice, and then packed with vacuum, CO_2 and air in PE bags and then was stored at different temperatures. The stored milled rice were sampled each month for one year to study the effect of storage time, storage temperature and packing method on the grain qualities.

The results showed that the pH value of milled rice decreased in parallel with the length of storage time. The smallest difference in pH value was found when the milled rice both under vacuum and with carbon dioxide flushing were stored at low temperature of 5°C to 10°C or 15°C to 20°C. The pH value decreased significantly when the rice was packed in a sealed polyethylene bag and stored at room temperature.

Texturometer (GTX-2-IN) was used to measure the physical properties of the cooked rice. The results indicated that hardness and cohesiveness increased, but viscousness, adhesiveness and balance decreased during storage when milled rice was sealed in polyethylene bags. Those stored at low temperature showed the better physical properties than stored at room temperature after the similar length of storage. There was almost no change in

the physical properties of cooked rice when milled rice both under vacuum and with carbon dioxide flushing were stored at any one of three different temperatures for one year. The summer's temperature in Taiwan is usually over 30°C, so packing milled rice under vacuum or with carbon dioxide flushing or storing it at low temperature may provide the best result in prolonging the fresh quality of milled rice.

Effects of Intermittent Drying on the Growth and Quality of Rice During Vegetative Growth Stage

A field experiment was conducted in 1993 and 1994 on Taichung District Agricultural Improvement Station to investigate the effects of early intermittent soil drying on the growth and quality of three rice cultivars, Tainung 67, Taichung 189 and Taichung sen 10. Soil drying to 0.06 millibar moisture tension were practiced at 30, 40 and 45 days in the spring, and 20, 25 and 35 days in the fall, respectively, after transplanting.

Experimental results showed that intermittent drying imposed on the spring crop at early growth stage significantly decreased rice tillering, and also the grain yield. Cultivar Taichung 189 responded to early soil drying more sensitively than that of Taichung sen 10. In the fall crop, early intermittent soil drying increased 1000 grain weight and seed settimg percentage, in spite of the decrease in tillering. The volume weight, translucence of rice were then promoted and percentage of white center and belly grain were decreased. And thus enhanced the quality of rice.

The results suggests that in the fall crop, intermittent soil drying in 20 to 25 days after transplanting that helped increase rice grain weight, is essential to a better quality of rice. Taichung sen 10 showed a better yield and quality than Taichung 189 while imposed to early soil drying.

Studies on the Identification of Wet Rice Quality

In order to develop a method for rapid grading of wet rice after harvest, an experiment by using microwave to dry wet rice was studied at Taichung DAIS in the first and second crop of 1994. The results indicated that it is not easy to inspect the grain quality of fresh wet rough rice, due to the difficulty in husking and increase in cracked kernel. But it can be solved when the grain moisture content is reduced to 18% or less by using microwave. At that grain moisture condition, the rough rice is easy to dehusk and the ratio of cracked kernel during process is also decreased. It takes about 4, 3, 2.5, 2 and 1.5 minutes with the microwave power of 260, 325, 520, 585, and 625w to reduce the moisture content of wet rough rice by normal harvest down to 18%. Therefore, this fast drying method by microwave can be practiced for detecting wet rice quality, when rice was sold in the form of fresh and wet type.

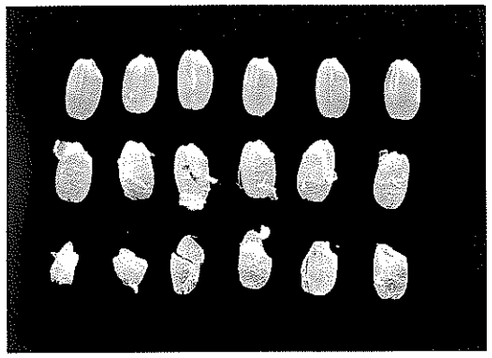

Fig. 2. The comparison of brown rice apperance between the rice before and after drying. Upper: husking after drying, Middle and lower: husking before drying.

UPLAND CROPS

The Studies on the Stability of New Lines of Job's-tears

This regional yield trial was conducted in the Spring crop Season both in 1992 and 1993 at four locations in Taichung district. Seven newly developed lines, including Chingyang, Chintes, Kuangchou, Taichung Shuen yu No. 3, 4, 5 and Taiwan Native line, Kangsan Native line as check variety were tested for their yield potential and adaptability. The preliminary results were Summarized as follows:

Among eight tested lines, Taichung Shuen yu No. 5 have better stability in all environments with higher yield potential. Its average grain yield was 3183 kg/ha, that were 26.2% higher than that of the check variety - Kangsan Native line. Its plant number per m^2, spikelet number per plant, ripening grain and 1000 grain weigh were better than those of the check variety. This new line will submitted for naming and registration in the late January, 1995.

Fig. 3. Plants of job's-tears "Taichung shuen yu No. 5".

VEGETABLE CROPS

Study on the Newly-risen Leafy Vegetable for Summer Season

In order to exploit new summer leafy vegetables, ten varieties of seven kinds of new vegetables were evaluated and results showed that Senpotsai, Shiau-Song-Tsai and leafy radish possessed the good characteristics such as rapid growth rate, heat and wet tolerance and could be harvested 20 - 25 days after sowing. They

are more suitable for planting in summer season than other leafy vegetables. Among them, the quality of Senpotsai is the best and it is recognized the most promising.

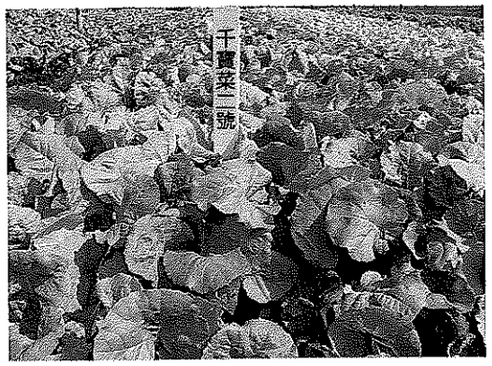

Fig. 4. Newly-introduced leafy vegetable "Senpotsai No. 2".

Cultural Practices of New Vegetable - Jew's Mallow

Jew's mallow is a vegetable originated from mediterranean area for frying or making soup. The first year of variety trial indicated that the best sowing time is from April to June, having high yield. Early or delay sowing will be affected by short day-length and low night temperature and resulted in bolting and flowering, slender and short leaves without any commercial value. The trial of young shoot harvesting indicated that the young shoot of 20cm in length have the best performance, but in term of speed of harvesting, the young shoot of 10 cm is mroe recommendable.

The Collection and Trial of Leek Varieties

This experiment is aimed at collecting the local varieties of leek (Allium tuberosum) for conducting their comparison experiment for the classification and preservation of leek germ plasm. The results are summarized as follows: (1) six year-round flowering varieties of flower leek are collected from the flower leek growing area, and graded in accordance with their bolting rate, flower stalk size and length. (2) 29 lines of the Tenwei dark green leaf lines of leafy varieties of leek are selected and classified into large leaf varieties and small leaf varieties based on the leaf size. They are also divided into dark leaf varieties and light leaf varieties based on the leaf color, and classified into hard-stem varieties and soft-stem varieties based on the plant type, and the length of stalk, the size of stem, quality, taste and its easiness in cultivation are also recorded as a reference for the growers. (3) 199 plants are selected from the leek growing area and multiplied vegetatively into 199 lines, Among them 11 unbolted lines seems to be suitable for being used as the leaf leek, From the bolting character, the leek may be divided into three types: year-round flowering, seasonal flowering, and non-flowering.

The Effect of Non-woven Material on the Growth of Leaf Vegetable

The higher temperature was obtained by inceasing the base weight of non-woven material for mulching especially it was helpful to improve the growth of crop in cool weather. Therefore, either in autumn or winter crop Chingken cabbage or cabbage under non-woven waterial mulcling grew, faster than those without mulching. The spreading of plant, the width of out side leaf, the average weight of plant, the head weight of cabbage were improved under non-woven material mulching. In spring crop. the base weight of 42 g or mulching obtained the lowest head weight, head size and head diameter. It seemed to be affected by the high temperature caused by the non-woven material during the late period of heading. Increasing in chlorophyl was found in Chingken cabbage or cabbage under non-woven material unlching, especially more increase in chlorophyl B. The tip-burning was serious on cabbage under non-woven material mulching due to the deficient of calcim in spring crop. The insect damage was serious in the plots without non-woven material mulching. However, it was improved in non-woven material mulching. No difference was found among the various methods of mulching.

Fig. 5. Using nonwoven material can control insect pests on vegetable cultivation.

Economic Analysis for Vegetable Production under Protected Structure in Taichung Area

This study was aimed to analyze the current situation, production cost, revenue and economic efficiency as well as to find the suitable structure type for the summer leafy vegetable production under simple protected structure in Taichung area. The data was obtained from 35 sample famers from 1991 to 1993. It was found that most of the summer leafy vegetable cultures under simple protected structure were located in Changhwa county and of them, the major structure was net-house, followed by the plastic-film greenhouse. The products were mainly sold to the country assemblers or the Taiwan Sugar corporation. The gross revenue, the net revenue, the return to family labor and the farm earnings were all the highest for summer leafy vegetable production under mixed structure type of net-house and plastic-film greenhouse

among all structure types. The next one was the culture under net-house. For the production cost, the summer leafy vegetable culture under mixed structure type and plastic-film greenhouse would be the highest and the culture under net-house would be the lowest. However, for annual economic efficiency per 10 ares, culture under the net-house was the highest with NT$146460, followed by culture under the mixed structure type with NT$134305. Generally speaking, the pay-back periods for facilities investment were about 0.3 year for the net-house and 1 year for the plastic-film greenhouse and 1.3 year for the mixed structure type. According to the above analysis, the net-house and the mixed type house would be most suitable for the summer leafy vegetable production under simple protected structure in Taichung area.

FLORAL CROPS

Study on New Techniques of Cut-flower Production in Rose

The production of high quality of cut-flower in rose could achieve under the following condition. The rose is growed under greenhouse facility using rockwool and nutrient culture method. By arching and tuisting techniques, the branches are separated into vegetative growing system and cut-flower growing system, resulted in greater sunlight at base area, reducing disease occurrence, convenient in management operation. The high quality cut-flower can produce from the dominant basal shoot. The nutrient solution was adjusted to maintain the balance of nutrition supply. The cut-flower growed rapidly and evenly, 80% of cut-flower belonged to lst grade, higher than the traditional soil culture of 48% by 67%. The automatic heating and shading control could avoid unfavorable weather conditions and produce cut-flower all year-round. The development of local facility material could reduce the high production cost of protected cultivation.

Studies on Enhancing the Sprouting Rate of Axillary Bud on Rose

Rose is one of the most important cut flower in the world. It is of importance in Taiwan as well. Approximately, 530 - 1600 thousand rose seedlings are needed every year in Taiwan. In several propagation ways of rose, cutting is the most popular one. However, cutting is relative more difficult for axillary bud sprouting. In order to improve the sprouting rate of axillary buds, several treatments including cooling, dark, acadian seaplant liquid concentrate, BA and GA plant growth regulator were adopted to treat rose 'Samantha' cuttings which contain 2 nodes and 2 leaves for each cutting. After 15, 25, and 35 days, the sprouting of axillary bud and the length of new shoot were investigated.

The results indicated that though BA could promote the sprouting rate of axillary bud, high BA concentration would lead the sprouted buds deficient in nutrition in 35-day's treatment. In general, cooling, dark treatment, and acadian seaplant liquid concentrate were available to enhance the sprouting rate of axillary buds. Plant growth regulator, GA could increase the length of shoot.

Studies on the Growth Efficiency of Chrysanthemum Cuttings after Different Storage Treatments before Rooting

The cuttings of Chrysanthemum (*Dendranthema grandiflorum* cv. 'Yellow Shiou-Farn') were collected from field, immersed in Benlate solution of 50% WP 1000 ppm, and then treated with NAA 1000 ppm talc powder reagent at the base of stem. These treated cuttings were then put into a growth chamber with 95% relative humidity under 12, 15, and 18℃ for 4, 7, and 10 days. This pre-rooting storage was conducted in a dark condition through out the experiment. After storage in particular time intervals, cuttings were planted on rooting bench. The cuttings collected from field at the same time were planted directly without storage and were used a control.

The results indicated that the cuttings after storage treatment had better growth. The root length was longer than that of without storage. Through anatomic observation by using paraffin method, root primordia were found differentiated and developed in the cuttings after pre-rooting storage. It was estimated that pre-rooting storage could save 2 - 3 days of bench time. This suggested that the pre-rooting storage method can be utilized to save bench time and promote the production efficiency of cuttings in a particular time and in a specific area.

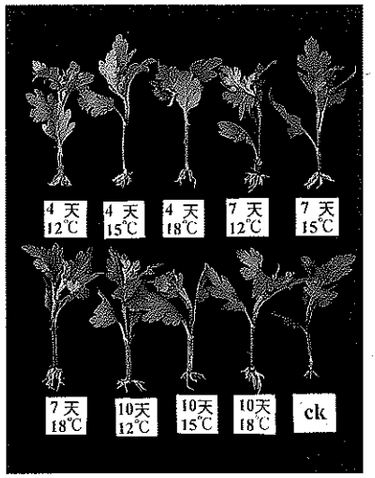

Fig. 6. Using pre-rooting storage method could promote the rooting of chrysanthemum.

Chrysanthemun Cut Flower Bud Viscoelasticity Property

The force relaxation and creeping behavior characteristics of chrysanthemum cut flower were predicted by a Generalized Maxwell model which consisted of three parallel Maxwell elements and four-element Burgers model. According to force relaxation equations of chrysanthemum cut flower bud, it was predicted that the relaxation force of chrysanthemum

cut flower buds would became "0" after 15 hours. Thus, the beginning deformation would become permanent after 12 days. Therefore, for the lowest layer packages of chrysanthemum cut flower, its allowable amount of deformation should be the added value of the beginning deformation and its deformation during the saving period caused by its creeping behavior. In the case of chrysanthemum cut flower with an average weight of 60 g, its deformation caused by its creeping behavior was 1.52mm after saving for 12 days. Since the allowable deformation for chrysanthemum buds was 5mm, the beginning deformation should be less than 3.84mm. So, for a package of 200 pieces of chrysanthemum cut flower, the best height of its package should be 26.8cm.

Study on Cultivation and Management of Ornamental Plants in Common Family

An automatic drip irrigation system was suggested to use for saving time and water resource to take care of the plants for common family. It included a timer, electrically controlled valve, pump, and a linkage pipe channel to transport water. It was automatically controlled by timer, and can supply different amount of water for different kinds and size of plants.

The result indicated that the potted foliage plants should be irrigated to one third or half of the volume of the potted growing media by automatic drip irrigation system once or twice every day, and respectively 200ppm of N and K_2O should be added to the irrigated water once per every two weeks.

There is no difference among the compound media, but the plants generally grew better when lighter and higher absorption material were used.

The Fertilization Technique of *Cymbidium sinense* in Soil Culture

A sandy loam soil mixed with 2% of fully fermented organic materials (such as tree bark manure, cattle manure and peat moss) was used as the cultural medium for *Cymbidium sinense.* The foliar spray of liquid fertilizers No. 1 and 2 was applied at two weeks interval. The results showed that the pH, P_2O_5, K_2O and CaO in the three organic treatments were increased, the soil total bulk density and hardness is decreased, and therefore it rendered significant effect on the root growth of orchid. Besides the flower stem length, flower number, flower width as well as the bolting percentage and flower stem number were also increased. Among them, tree bark manure was the best in performance.

The Effect of Growth Regulator on the Micropropagation of Lilium 'Casablanca' and *Cymbidium ensifolium* from Tissue Culture

For establishing a prolific micropropagation method for tissue culture, lilium and cymbidium were used to study their responses to the added growth regulators in the medium.

Bulb scales of lily were tested on MS basal medium supplemented with various concentrations of BA (2, 4, 8 mg/l), 2,4-D(0, 0.2 mg/l), and NAA (0.2, 0.5 mg/l) to confirm the proliferation capacity of shoots and bulblets. Bulblets were rapidly induced from scales cultured on MS medium containing 0.2 mg/l NAA and 4 mg/l BA. The growth rate of new shoots increased much faster in a medium containing 0.5 mg/l NAA and 8 mg/l BA.

Seed germination of *Cymbidium ensifolium* was promoted in Knudson C medium supplemented with 20 g/l sucrose and 4g/l activated charcoal. Adventitious roots were induced by 1/2 MS medium containing BA growth regulator. Shoots in a cluster were formed from rhizomes which were cultured in a liquid medium by shaking. After one month, the proliferation of shoots and roots seemed to perform better in a liquid medium. These rhizomes then could be transferred to a MS solid medium for regeneration. The growth of plantlet was enhanced through tissue culture with 2 mg/l NAA, 3 mg/l activated charcoal, and 30 g/l sucrose.

FURIT TREE CROPS

Prediction of the Optimum Timing of Top-grafting of Pear Tree

Top-grafting high chilling pears on Hengshan pear tree was a sussessful industry in lowland of Taiwan. Although the price of product was acceptable, growers were interested in making earlier top-graft due to the higher price of the earlier products. The results were always a failure. Therefore, how to identify the optimum timing of top-grafting by predicting the time of budbreaking of Hengshan trees was a key point in the improvement of cultural techniques. This prediction was difficult in field form the appearance of trees. Internal changes of trees may provide an available guide. Based on this idea, the trials were conducted to compare the changes of specific gravity, content of starch, and activity of dehydrogenase of Hengshan pear dormant branches before and after budbreaking. Staining branch section with KI was also conducted. The results showed that the rate of budbreaking was 6.8% on Feburary 15, 1993, then increased rapidly. Sixteen days before the above date (January 31), the activity of dehydrogenase reached the peak at O.D. 1.82, specific gravity was the lowest at 1.048, the content of starch was at the lowest of 299 μ g/g D.W., and the content of soluble protein was also at the lowest

level of 512 μ g/g D.W. In addition, KI staining obtained a positive response to the starch content inside the branch. It could be a good guide to predict the budbreaking.

The Application of Horticultural Practices in Inducing Off-season Flowering of Ponkan (*Citrus reticulata*)

This study was conducted to survey the off-season flowering of ponkan and the possibility to regulate production season artificially. The growth of the Summer-flush was inhibited by ringing and root-pruning since June, and the induction of Summer-Autumn flushes was followed by pruning, fertilizing and irrigation during September and October. The results showed that ringing and root-pruning at June had better effect on shoot-inhibition and off-season flower induction, the treatments in August and latter had no difference to that of the controls. The trunk healing were slower in those ringed after October and the leaves were weakened to drop in the winter, which caused the flowers formed earlier but the fruitsetting were poor. It seemed that the off-season flower rate of the Autumn-flush could be promoted by means of ringinng, root-pruning and fertilizing according to the results of this year, whereas the huge difference among the trees and low fruitsetting revealed that the economic production by off-season flower is still a long way to go.

The Feasibility to Produce Two Crops of Oriental Pear in a Year

Taichung DAIS have developed the "Twice Bud-forcing Cultural Practice" to replace the "Top-grafting Method" in high quality Oriental pear production at low eltitude area. In forcing stage of fall season, some buds have already formed the flower-bud and started to flower or fruit-set. In order to increase the production value, some study on the flowering and fruit-setting condition was canducted to make it possible to harvest two crops in a year.

Application of 0.6% hydrogen cyanamide on "Hosui" and "Shinko" pear trees was made on Aug. 23, Sept. 2 and Sept. 12. The buds emerged in 8 - 10 days after treatment, the bud bursting percentage was over 89%, then bloomed after 14 - 16 days. The blooming rate for "Hosui" and "Shinko" were 22.5%, 37.8%, 61.3% and 10.1%, 28.5%, 42.6%, respectively. The fruit-setting rate for "Hosui" and "Shinko" were 30.7%, 35.5%, 49.1% and 16.8%, 29.1%, 42.2%, respectively. After fruit-thinning, 20 leaves was maintained for each fruit. The fruit development in each treatment plots is very good, the fruit can be harvested in late January to perform the idea of harvesting two crops in a year.

The Effects of Trellis-training Systems on the Growth and Cultural Labor of Grape

This experiment was conducted to clarify the influence of some trellis-training systems on the growth and production labor of grapes. The trellis systems were: (1) 2-stories Duplex V-shaped two-armed umbrella system, (2) 2-stories Duplex two-armed fence system, (3) 6-wire vertical single-armed fence system, (4) 3-harvest V-shaped treellis and (5) horizontal trellis. The results indicated that the amount of fruiting cane of summer crop was lower than that of winter crop, whereas the budburst of summer crop was higher than winter crop. The vertical single-armed fence system had the least number of fruiting cane, and consequently, the number of budburst as well as flower cluster were lowered down. Meanwhile, all shoots in this trellis system grew vigorously resulted in the lowest rate of cease of shoot-tip growth during blooming period. The number of flower cluster in summer crop appear to be higher in (4) 3-harvest V-shaped, (1) Duplex umbrella and (5) horizontal trellis systems. The Duplex umbrella trellis also had highest amount of flower cluster in winter crop. The longest flower cluster were found on the vigourous shoots of summer crop on vertical single-armed fence. However, the fruitset was poor, the rate of shoot re-growth was high and the lignified shoot was short. The climate during the experimental period was unstable, some natural disasters such as drought and typhoon were harmful to the growth of shoot and fruit in winter crop. The largest fruit cluster were found in summer crop of Duplex umbrella system. On the contrary, the smallest was found in winter crop of vertical single-armed fence system. The sugar contents and acidity of summer fruits were not significantly different among all system. In winter crop, the sugar contents of fruits was the highest on vertical single-armed fence system. An estimation of labor demand indicated that the working hour in 3-harvest V-shaped and Duplex fence trellis were 17.4% and 18.5% higher than that of horizontal trellis system. Duplex umbrella system and vertical single-armed fence system saved 2.3% and 25.6% of labor, respectively, because of their low productivity.

SOIL AND FERTILIZER

An Experiment on the Possibility of Organic Farming in Central Taiwan

The results of the experiments suggested that organic farming is workable in central Taiwan, and upon the implementation of organic farming the yield and quality of many crops as well as the soil fertility may be greatly promoted. The main methods and results are

summarized as follows:

1. Combine rice hull charcoal with usefull microorganism in organic manures and apply immediately to the soil soon after the combination may greatly promote the effect of organic manures.
2. Sometimes it is necessary to apply proper rate of manganese to the organic plots to prevent serious manganese deficiency of some crops.
3. Under this series of experiment, sugar-vinegar or sugar-woodvinegar was used as the routine spray. Different kinds of natural expellants such as garlic, hot pepper, tobacco, neem, wormwood, citronella, peppermint, wine, kerosene, castor bean oil, camphor oil, and useful microorganism etc. were added to the spray depending on the difference in crops and pest to promote its effect of pest control. As for the night moths, Bacillus thuringiensis usually performs a very nice job of control.
4. The rotational cropping system with three crops a year, i.e., grow heat-tolerant crops in the summer, cold tolerant crops in the fall-winter, and rice or other suitable crops in the spring seems to be a good system helpful to promote the economic efficiency of organic farming.

One of the Sery Studies of Substainable Agriculture Techniques

II. The Effect of Magnetic Force on the Crop Cultivation

In order to develop some techniques for the substainable agriculture, a series of experiment has been conducted at Taichung DAIS to Study the effect of magnetic force on the seed germination potential, root elongation and product enchancement since 1994. The perliminary results showed that the germination potential, root elongation and nutrient absorption of corn, and the berry quality, sugar content, acidity, balance of sugar to acid and rind color of grape, could be enchanced by the magnetic force. It is assumed that application of magnetic force to crop cultivation have a good future in view of enviroment protection and soil conservation.

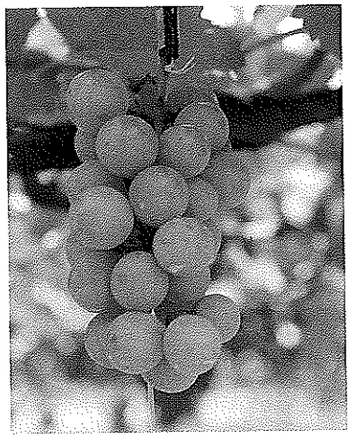

Fig. 7. Attaching magnet to the grape cluster would increase its fruit sugar content.

Fig. 8. Maize root treated with magnet (in the left) is much more denser, than that treated with no magnet (in the right).

Effects of Different Organic Wastes and Aeration Rates on the Nutrients Contents in Composts

In order to control the nutrients contents in composts derived from organic wastes, it is necessary to understand the changes of C, N, P and K during composting. Experiments with two ingredients (A: chichen-sawdust-rice straw, B: dairy-sawdust-rice) and three aeration rates (6.6±0.5 l/min, 13,8±0.9 l/min, and 25.4±1.9 l/min) were conducted to study the effects of organic wastes on the changes of C, N, P and K after composted. The results showed that the concentration of C decreased and the concentrations of N, P and K increased during composting. The loss rates of the total amounts of N, C and dry weight in compost were 31.4%, 58.7% and 48.8%, respestively, in B ingredient, and 37.1%, 64.9%, 52.1%, respestively, in A ingredient. Results derived from aeration treatments showed that the loss rates of the total amounts of N and C were 22.0% and 61.6%. There were not significantly losses on the total amounts of P and K during composting.

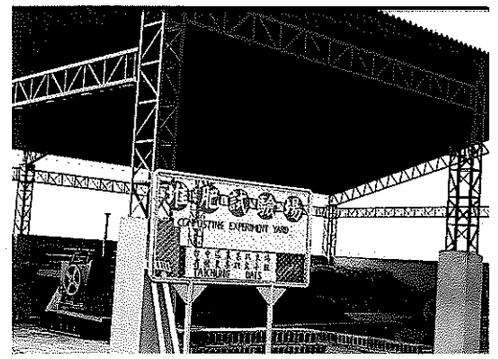

Fig. 9. Composting experiment yard in Taichung DAIS.

Fig. 10. Organic wastes in composting.

Effect of Manure on Vegetable Yield and Soil Fertility under Protected Culture

The experiment is conducted at slate

alluvial calcaeous soils under protected PE film pipehouse at Yungchin, Changhua county to study the effect of different manure on the yield of vegetable crops and the soil fertility under protected facility. The result indicated that the yield in organic rice straw plot is increased by 4.3 and 0.5% for Pai-tsai and amaranth, respectively, under same total ritrogen condition. The effect of organic fertilizer on soil fertility is that it could increase soil pH value by 0.03 - 0.37 and increase soil organic matter by 0.2 - 0.3%, available phosphorus by 11 - 149 ppm, exchangeable potassium by 11 - 230 ppm. After two crops of fertilizer management, soil electric conductivity is increased by 0.64 - 0.83 dSm than pre-experiment and it will not affect crop germination and growth.

Fig. 11. Plots for the experiment of manure effect on protected vegetable.

The Application Status of Organic Fertilizer for Citrus Orchard in Central Taiwan

Citrus is an important fruit tree in central Taiwan, the cultivation acreage is 10360 ha. The major citrus species is Pon-kan, naval orange, tangerin and Wen-tan, covering 25% of the total cultivated land. The citrus in central Taiwan is mostly grown in the slope hill region with very low organic matter. The government subsidy program for organic fertilizer have been carried out recently, in order to improve soil fertility and increase productivity. The result of questionnaire made for citrus growers in central Taiwan to study the application status of organic fertilizer in citrus orchard are as follows:

The commercial organic materials mostly popularly used by citrus grower in central Taiwan are mushroom compost, tree bark, saw dust, poultry manure, soybean extracts, feather, rice hull, sugar cane extract, tobacco stem and fermented fungi. The application time is after fruit harvest as basal fertilizer. Manual application method is the most common, due to slopeland situation. The application rate is different with tree ages, yield and fertilizer component, but the average is about 8000 kg/ha.

There is 64.1% of citrus growers, receiving the service of soil fertility test for their orchard, and 52.3% of them receiving the service of leaf nutrition diagnosis from experiment agencly. 94.9% of them said the organic fertilizer

organic fertilizer, 57.2% of them said it is acceptable, 42.8% said the price is too high and hope to get subisdy from government. After Taiwan join GATT, 83% of growers said it will have strong impact on citrus industry, 14% of growers said the affection will be mild, 3% of growers said no effect. The counteract policy is not to increase the citrus cultivation acreage, but to improve management efficiency, reduce production and marketing cost and increase fruit quality.

Studies on the Utilization and Planning for the Composting of Household Garbage of Rural Communities in Taichung Area

According to the concepts of rural development planning and community development, the rural communities is used as an operative unit that may consider the specific aspects of the respective surroundings including ecological, social, institutional and economic settings. A total of four communities were selected to execute the composting project of household garbage in central Taiwan during July, 1993 to June, 1994. The present paper describes the integrated planning, practice procedures and composting technology for the composting utilization of household garbage, based on the results of this prelimiary research. In addition, the feasibility and ensuing extension of this model to the inhabitants of rural communities is also reported.

Fig. 12. The maturation of organic wastes.

Fig. 13. One of the locations for composting household refuse in Taichung County.

PLANT PROTECTION

Ocurrence and Effect of Grey mold on Loquat

Grey mold is the major disease of loquat. The optimum temperature for spore germination is 20 - 28 ℃, for mycelium growth is 24 - 28 ℃. As the production area of loquat is located at slopeland district, during Jan. - April and Oct. - Nov., the average temperature is

around 20℃, that is not suitable for the germination of spore and the growth of mycelium while during May - Sept., the mean temperature is 25 - 29℃, that is very suitable for disease occurrence, and the infection rate could reach 50%. Within 10% disease infection rate, the leaf number during fruit enlargement stage maintained 15 leaves, blooming rate was 80%, fruit weight and sugar content was normal. When disease infection rate was higher then 20%, the leaf droped immaturely or yellowed, the leaf number was only 5, the blooming rate was less than 60%, the fruit weight per cluster was 80g, low sugar content, and therefore, the yield and quality of loquat was significantly reduced.

Fig. 14. The grey mold of loquat.

Chemicals Screening Test for Control of Rice Stem Blight

The stem blight is used to infected 2nd rice crop, but in recent years, the 1st crop is also infected seriously. There have been recorded that no rice varieties is resistant to stem blight, so the control of stem blight is mainly depending on chemicals. There are 27 chemicals being released for commercial application since 1958. However their chemical effects were singificantly different after long term of use. The chemical screening test for control of rice stem blight in 1st crop, 1994 at Minchieng village showed that two applications of 25% Pencycuron W.P. 2000x, 23.2% Pencycuron F. 2000x, and three applications of 10% Hexaconazole E.C. 1500x, 20% Flutolanil F. 2000x, 24.9% Difenoconazole E.C. 2000x showed better control of stem blight than other chemicals or control plot in term of stem infected rate or spot rate. The chemical screening test in lab conducted by TARI showed that the chemicals with control and prevention effect were 75% Carbendazim + Mepronil W.P. 750x, 10% Hexaconazole E.C. 1500x, 20% Flutolanil F. 2000x; the chemicals with good prevention effect were 25% Pencycuron W.P. 2000x, 23.2% Pencycuron F. 2000x, 40% Mepronil W.P. 1200x, 50% B-enomyl W.P. 1500x, 55% Carbendazim + Iprodione W.P. 1000x. The chemical with good control was 6.5% MAFA S. 2000x.

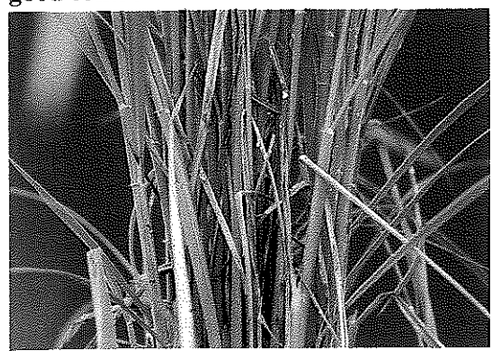

Fig. 15. The soaking symptom of rice stem blight.

Water-melon silver mottle virus transmitted by *Thrips polmi*

During the growing season of 1988, a virus-like disease which causing significant losses in watermelon occurred in Ellin and Tacheng area of Changhua county. Later it was identified as a tospo-like virus and demonstrated it is serolgically related to watermelon silver mottle virus (WSMV) in Okinawa. When allowing the larvae of Thrips palmi to feed on the WSMV-infected leaves of Datura stramonium, either the larvae and adults could transmit the virus. But if exposed the adults on the diseased leaves, none of them transmitted the virus. The threshold period for acquisition feeding was determined as 30 min and it required a latent period about 2 - 3 days before transmission. Efficient transmission was obtained by exposuring the 1st and 2nd instar larvae of T. palmi on diseased D. stramonium for 24 hr and each plants received 5 adult thrips, reaching rate of 30 and 20%, respectively. When the seedling of D. stramonium received 1, 5 and 10 adult thrips inoculation which had exposured to feed on the diseased plant for 24 hr during larvae stage, 8, 30 and 40% of the inoculated plants developed typical symptom of WSMV. The infected efficiency seem to be increased with the increase of inoculated thrip number. The viruliferous adult thrips initiated to infect plants at the 2nd days after emergency. In order to determine the viruliferous thrips after acquisition feeding, the thrips using for experiment were allowed to feed on diseased leaves for 1, 6, 12 and 24 hr and detected by ELISA immediately. The results showed 10, 24, 20 and 19% of the test individual gave positive reaction, respectively. On the other hand, the percentage of viruliferous thrips had no increase when allowed the larvae to feed on diseased plants for 1 hr and detected by ELISA at adult stage. When using 5 adult thrips which had feed on diseased at larvae stage as mechanical inoculation virus source to inoculate the seedling of D. stramonium, it exhibited typical ring symptom on Benincasa hispida and the tospovirus about 70 - 90 nm could be observed by electron microscope. Extra thin section of the viruliferous T. palmi revealed spherical particle about 70 - 90 nm distributed in the abdomen region.

Effect of Soil Amendment and Disease Infection of Bulbs on the Occurrence of Bulb Mites

Gladiolus and lily plants were grown in potted peat or soils amended with tree bark, cow excretion, seabird excretion, fish powder or organic fertilizer. The occurence, with or without inoculation, of mites on the bulbs was determined after one month. Under natural conditions, only 0.2 - 8.5 mites/bulb was observed on bulbs grown in peat or soil amended with bark, which was considerably lower than 29 mites/bulb on bulbs grown in unamended soil. Addition of organic fertilzer to the soil increased the occurence of bulb mites to 56.6 mites/bulb. With inoculation of the same number of mites, significantly fewer mites were found on bulbs grown in peat or soil treated with bark. The numbers of mites on the bulbs were increased by 1.5 to 3.1-fold when the plants were grown in soils with fish power, organic fertilizer or cow excrete. In addition, 7.9 to 10.1-fold more mites occurred on diseased bulbs or bulbs inoculated with Pseudomonas spp. pathogens as compared with healthy bulbs. Under inoculation of mite source, slightly more mites were found on unhelathy bulbs than on healthy ones.

Fig. 16. Bulbs infested by root mites.

Field Observation on the Use of Sex Pheromone to Control Spodoptera litura on Soybean in Indonesia

The Agricultural Technical Mission-Republic of China to Republic of Indonesia (Surabaya) introduced a total of 35,000 lures of sex-pheromone from the Taiwan Agricultural Chemical and Toxic Substances Research Institute to test and demonstrate the use of sex-pheromone for controlling Spodoptera litura in soybean field in East Java, Indonesia. The field observation and demonstration activities were carried out in 1989 - 1992. The comparison test of pheromone + chlorpyrifos and chlorpyrifos alone was employed in 1989 at Jombang. Both treatments had very good results on the controlling S. litura, but the application of chlorpyrifos was decreased from 7 times to 4 times when pheromone was used together with chlorpyrifos. The leaf damage by insect was about 15 - 16% for both treatments. Large scale field observation test was conducted at Gresik and Lamongan in 1991, and Ngawi and Jombang in 1992 with a total acreage of about 270 ha. Three sex-pheromone traps were installed one week after seeding and renewed about 35 days later. An average of 417 - 615 insect/ha were attracted and killed by these sex-pheromone traps. About 65 - 75% of insects were captured in the first 5weeks after sex-pheromone trap installment. The test on the effects of number of traps was employed in 1992 at Jombang. It was found that the insects killed increased from 289 insect/ha in the treatment of 2 trap/ha to 1044 insect/ha in the treatment of 10 trap/ha. The economic analysis also indicated that the use of sex-pheromone could significantly reduce the input of pesticides on soybean production. The cost of pesticide was decreased from NT$ 869/ha of check farmers to NT$ 599/ha of demonstration farmers. The net income on the sex-pheromone demonstration farmers was about 15.7% higher than that of the check farmers.

Population Fluctuation of Major Insect Pests in Asparagus Bean and Optimal Chemical Control Time

Investigation of the population fluctuation of major insect pests that occur during growth period of asparugus bean is as follow. The insect pests that occurred at early growth stage were Melanagromyza phayeaji, M. sojae, Edwardsia flarescens and Aphis cyaccivora that were high in population density during fall crop that were usually sowed during August - September. Therefore it may influce the further plant development. The recommeded chemicals after screening test is 2.8% Deltamethrin E.C. 1000x, one to two application. The insect pests that occurred at flowering stage (about 50 days after sowing) were Liriomyza bryoniae, Tetranychus urticae, Frankliniella intonsa, Ostrima furnacalis, Maruca testulalis, E. flarescens, A. cyaccivora, The most common in spring crop were O. furnacalis, M. testulalis, L. bryoniae, while the most common in fall crop were L. bryoniae, T. urticae, F. intonsa, E. flarescens. Recommended chemicals for control the insect pest at flowering stage is 3% Bacillus thuringiensis W.P. 1500x, 20% Ethofenprox W.P. 1500x, 75% Cyromazine W.P. 5000x, 2.8% Bifenthrin E.C. 2000x, 2.8% E.C. 2000x, Cyhalothrin, 2.8% Deltamethrin 1000x, for 2 to 3 times continuous application. At bean harvesting stage, that is 90 - 110 days after sowing, the major insect pests that occurred were T. urticae, L. bryoniae, M. testulalis, F. intosa, E. flarescens and A. cyaccivora. The selection of chemicals for application should be based on the field actual situation.

Fig. 17. Asparagus bean damaged by corn borer.

Investigation of Insect Pest of Rice in Central Region

The result of insect trapping at high air in three years showed that the immigration amount of brown hopper and white-back hopper was very low. The year capture by insect lamp show ed that the peak stage of brown hopper was in Oct. - Nov., for white-back hopper was in June and September, spot hopper was in June. The peak stage of adult Chilo suppressails was in June - July. The trapping by sex pheromone was better than insect lamp. At monitor field, the rice plants infected by Chilo suppressails only 0.73% showed dead heart, 1.40% showed white spikelet. The density of brown hopper in the 2nd crop of 1991 was higher which was 10.2 per tiller, and was lower 1992 - 1994 in that was less than 2 per tiller, and white-back hopper was less than 1 per tiller, that was still below the control threshold. The spot hopper and white-back hopper captured by insect net was 2.6 per net. The 3-year field survey indicated that the density of hopper was decreasing gradually and the infection was very mild. Only Hsiu-sui, Tatusen and Huatan of Changhua conuty showed severe infection by Chilo suppressails, the other areas in Taiwan was only slightly infected.

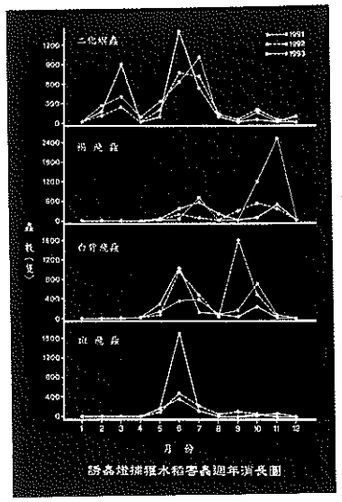

Fig. 18. Annual fluctuation of rice insect pests captured by insect lamp.

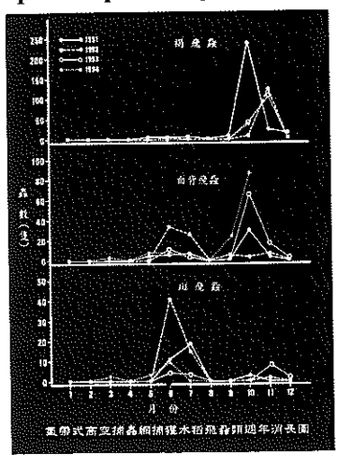

Fig. 19. Annual fluctuation of rice insect pests captured by high-air net.

Insect Species Investigation and Control for Eggplant

The insect species of eggplant is slightly different with plant parts. The insects that feed on leaf are *Tetranychus kaneawai* Kishida, *T. urticae* Koch, *Amrasca biguttula* (Is-hida), *Thrips palmi* Karny, *Aphis gossypii* Glower, *Spodoptera litura* Fabricius, *Porthesia taiwana* Shiraki, *Henosepilachna uigintio ctopunctata* Fabricius, *Bemisia tabaci* (Gennadius) , *Trichoplusia ni* Hubner, and *Leucinodes orbonalis* Guene. The former 5 insects caused severe damage to eggplant. The three insects: Amrasca bigu ttula (Ishide), Thrips palmi Kanny and Aphis gossypii Glower not only invade leaves, but also damage flower buds and fruits, the percentage of those insects damage on fruit, flower bud, matured leaf and axillary bud, from Amrasca biguttula (Ishida) is 0.87, 2.39, 66.77 and 29.97%, respectively; from Thrips palmi Karny is 25.62, 53.72, 12.69 and 7.97%; from Aphis gossypii Glower is 2.61, 2.42, 88.65 and 6.32%. The results Using the chemicals that registered in "Plant Protection Manual" to control Tetranychus spp., Aphis gossypii Glower, Amrasca biguttula (Ishida), H. uigintioctopunctata Fabricus and Thrips palmi Karny. In Chihu and Tatsuen, Changhua county showed that 40% Pyridaphenthion E.C. 800 X plus 2.8% Cyhalothrin E.C. 1000 X had good effect to control Aphis gossypii Glower, Amrasca biguttula (Ishida) and Tetranychus spp., 48.34% Carbosulfan E.C. 700 X plus 40% Pyridaphenthion E.C. 800 X or 2.8% Cyhalothrin E.C. 1000 X could control H. uigintioctopunctata Fabricius, 3% Bacillus thuringiensis W.P. 1000 X plus 85% Sulphur W.P. 500 X and using two yellow sticky card (15m^2) could control Tptranychus spp. All tested chemicals showed no effect on Thrips palmi but it is the most important insect pests in eggplant, that have great effect on the growth, yield and guality of eggplant. The effective control chemical or method should be further studied.

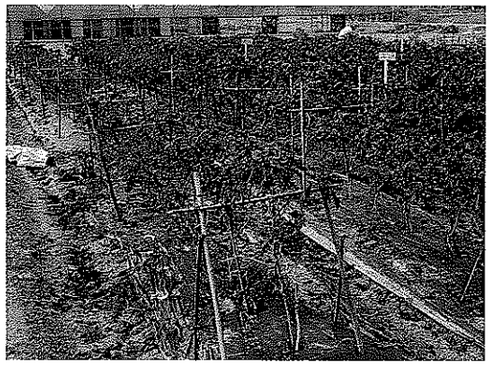

Fig. 20. Wilted eggplant infected by two-spotted small green leaf hopper.

Effect of Different Insecticide Spray Intervals on the Spider Mites on Roses

The toxicity of three insecticides against the two-spotted spider mite (Tetranychus urticae Koch) and kanzawa spider mite (Tetranychus kanzawai

Kishida) on rose plants was evaluated using two different application intervals. For the kanzawa spider mite, the control effect of 68.1% propargite EC (2000-fold dilution) with a spraying interval of 3 days was better than that with an interval of 1 week. However, two sprays of 38% dienochlor F (1500-fold) with 1 week interval gave better control of the same spider mite, with the exception of the larvae. Two sprays in 3 days with 68.1% propargite EC (2000-fold), 2.8% bifenthrin EC (1000-fold) and 38% dienochlor F (1500-fold) resulted in better control than two sprays in 1 week of the adults, larvae and nymphs of the two spotted spider mite. Only 2% abamectin EC (2000-fold) gave better control of this mite when the two sprays were made in 1 week.

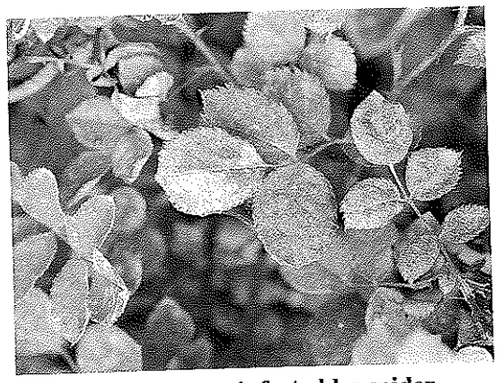

Fig. 21. Rose leaves infested by spider mites.

AGRICULTURAL MACHINERY

The Development and Improvement of The Ring-Furrow Digger with Manure Applicator for Orchard

Long term fruit trees like orange, lichee, mongo and wax apple in Taiwan need to apply manure once or twice a year for improvement of fruit quality. Since manure spreading in orchard is unsuitable, farmers use ring or radiant type furrows around each tree for applying manure into soil to save fertilizer and increase the efficiency of fertilizer. This method needs a lot of labor and is very troublesome, therefore it is urgent to develop a machine to do the job. A self-propelled ring-furrow digger with manure applicator is developed in this project under this circumstance. The machine uses a small four-wheel-driven and four-wheel-turning chasis for the convience of doing work under fruit trees. It uses 16 Hp diesel engine and a chainsaw type digger mounted on right side. Capacity of manure tank is 1.02 m^3 with a scraping system at the bottom. Also a hydraulic soil scarper at rear side can be up and down for pushing soil back into furrow. Testing results showed that the machine has 1.7 m turning radius and can dig a minimum of 135cm diameter of 33cm depth, 20cm width ring furrow, then force manure into the ring-furrow. Each ring furrow can be worked out in about 2min, working efficiency is over 4 - 6 times than labor. The machine is still in testing and need to improve the mechanism of soil scraper.

Fig. 22. Field operation of the ring-furrow digger with manure applicator.

Development and Improvement of the Chainsaw-type Digger and Ridger for Soft Ginger

Soft ginger is an important crop planted in the Ba-Gwa mountain for about 500 hectare. A lot of 10 m long by 40 cm deep and 15 cm width of furrow are needed for the growing of ginger, but these furrows are usually digged fully by labor before planting. This digging work is very hard and in low efficency, usually taking over 30% of the total production cost. For mechanizing the work to increase the efficiency of this farming operation, a small model machine has been developed in this project. The machine uses chainsaw type digger with ridger on a 8.5 Hp cultivator, also uses a new developed double speed coaxial planet gear set to slow down the field speed to 0.29 km/hr. Another over-load protection gear box is added in power line for prevention from damage. Two sets of independent-suspension wheel are mounted on both left and right side of the chain-saw to support the machine. When moving on road, the machine can drive faster to 4.91 km/hr speed by shifting the planet gear set to normal speed. Testing results showed that the machine can dig up to 44cm depth by 15cm width, and a 10m long furrow can be made in about 2.27 min. Premilinary estimation showed the efficiency of the machine is about 6 - 8 times better than labor, but the machine still needs further testing and further improvement of the ridger's shape.

Fig. 23. Digging experiment of the chainsaw-type digger and ridger for soft ginger.

Automatic Control Driving Device of Multiple Protected House for Agricultural Production

Use good facilities can carry out job on time, improve product quality, save cost, and get better chance in the competition of market. The study of automatic control driving device of

multiple protected house is an extended research of auto-spraying equipment for improving its driving function. The single force source could drive φ 3mm cable wire by several winches and a shaft, and the cable wire give working devices a linear movement, then the working devices could work in any shape such as spraying, ventilation, lighting, feeding, cleaning, shading and environment control. The driving power is controlled by several mechanical/electric clutches at the driving shafe, and the multiple working devices would work in sequencely by activating each clutch. The experimental driving device is in the facility field, 55m length, 8.5m width. It is tested by 7-grade water sensitive paper under 28.7 m/min driving speed. The pump pressure is 25kg/cm^2, liquid flow from pump to nozzles by 100m φ 10mm hoses. There are 20 nozzles fixed on 5 vertical stainless steel pipes. Nozzles can be moved between 18.7 m/min and 36.8 m/min, the spraying volume also can be changed from 60.6 liters to 30.8 liters, and the flow rate of nozzle is 20.6 l/min. So the spraying volumes are changed between 129.6 l/10a and 65.9 l/10a.

Fig. 24. The automatic control driving device of multiple protected house.

AGRICULTURAL MANAGEMENT

A Comparison Study on the Differences of Sino-Japanese Agricultural Extension System

Our Agricultural Extension Act was passed in the first talk process under the agreement of the joint committee of economy and education in the Legislature, ROC on 21, October, 1991. Basically, this Act is set up to shift the agricultural extension works back to public sectors, especially to the district Agricultural Improvement Station. After world war II, the modern agricultural extension of Taiwan, ROC was followed by the organizational flow which was set up in the Japanese occupied era, ; then improved by the JCRR in which the concepts of 4-H club, home economic education and farm education were introduced from USA. Eventually, our agricultural extension works were conducted cooperatively both by public sectors and private sectors. In Japan, the "Law Concerning Improvement and Promotion of Agriculture" was legislated in 1948, and modified 5 times since then. Therefore, government is obligated to conduct the agricultural extension service for farmers. It is owing to the similarity of the agricultural background, situation, and developing process between two countries, therefore, this study is focused to campare the differences between the two agricultural extension law for being used as the reference to improve our Agricultural Extension Act.

Crop Diseases and Insect Pests Diagnosis Service

The "Crop Diseases and Insect Pests Diagnosis Service Station" was established on Nov. 1990 under plant protection and technique information data bank project. The farmers received the service mainly came from central region, some of them are from the out side parts of the central region. There were 881 cases in two years within the 10 service items. Among them, 297 cases (about 33.7%) were related to information or booklet distribution; 243 cases (27.6%) belonged to diseases and insect pests diagnosis. In term of district, 109 cases (46%) from Changhua county, followed by 83 cases (35.1%) from Taichung county. In term of service method, the cases by telephone and mail were 76 (32.2%) and 73 (31.0%), respectively. In term of crop category, the cases of vegetable and rice were 64 (33.7%) and 58 (30.5%), respectively. The diagnosis cases, 89 cases (46.8%) were related to diseases, 39 (20.5%) cases belonged to insect pest.

Fig. 25. Indentification of complex symptoms of rice sheath blight and small black sclerotial.

Studies on the Operation of Farmers' Association in Taichung Areas

A survey on the organization, services and management performance was conducted basing on 3 mountainous area types, 44 rural types and 14 city types Farmers' Associations. The results indicated that in city type full members was slightly higher than associate members, but in mountainous area type, more than 93% of them were full members. As to the distribution of employees, farm credit department had the highest number of staff than others department, followed by supply and marketing department, administrative department or agricultural extension

department. In city type over 50% of employees were graduated from college or university, and in others types most of them were graduate from high school and vocational school.

As to services income, both rural type and city type depended on the farm credit services as the main income source, but in mountainous area type, economic services was as important as farm credit services. In profit and loss of economic services, the mountainous area type had some profit, others didn't, but in management performances, the city type had highest capital-profit ratio. In the management of farm credit department, the mountainous area type had higher deposit loan ratio, this result also indicated that there were more potential in service management. Because the rural type had more services on supply, marketing, entrust and others service, so they have the highest cross margin ratio. The city type had better management on livestock insurance service, so that they had the highest insurance ratio and lowest payment ratio .

AGRICULTURAL INFORMATION RESEARCH

A Study on the Treatment of Agricuetural News in Six Major Newspaper in 1993

This study was carried out from Junuary to December, 1993 to understand the behavior of Central Daily, United Daily, China Time Daily, Taiwan Hsing-Sen Daily, Taiwan Daily and Economy Daily on the treatment of agrcultural news. The content analysis method was employed in the study. It was found that about 1.33 times or 800 - 1200 letters of news were published on each daily every day. The percentage of agricaltural news published by newspaper was quite low compared to other news. The analysis on the news content indicated that crop production and crop improvement (17.9%) , agricultural extention (15.6%), agricultural problems and farmers opinions (20.5%) , and farmers welfare and rural living (19.9%), were the major items to be published by newspapers. It was also found that most agricultural news was published on local news edition (50.2%), and next was social news edition (17.4%) , or general news edition (15.3%) . The distribution of agricultural news on each month was between 4.4 - 12.6% of total agricultural news.

Analysis of Rural Youth in Joining the Agricultural Professional Training Program

The resrarch is to study the motive of the young farmers in joining the "Agricultural Professional Training Program". A total of 119 sampled trainees were selected for questionnaire, the analysis of the result of their answers

was described as follows. The trainees are mostly at the age from 31 to 35, and then followed by the group from the age of 36 to 40. The 82.6% of the trainees are high school or professional high school graduates and above. The satisfactory degree in term of overall training related items, the trainees in "Protected Vegetable Class" have the highest percentage of trainees showing satisfaction, which is 54.5%; then followed by "Flower Production Class", which is 39.3%. For the individual training item, the training environment received the highest percentage of satifactory degree, which is 52.5%, followed by training subject arrangement, which is 45%, then followed by training facility and instructor level, which is 40.5% and 36.9%, respectively. The training materials received the lowest satisfatory degree in term of percentage of trainees, which is 29.7%.

Fig. 26. Study trip to observe the composting of agricultural waste.

Fig. 27. Field trip to rice organic farm of young farmers training class.

Investigation on Health Problem of Old People in Central Taiwan

The study was sampled from the 1189 trainees of "Class Improvement of Living for High Age People" under the project of rural living improvement in 1994 from 43 towns or villages, of which 16 from Taichung county, 20 from Changhua county, 7 from Nantou county. The data collected from the trainee physical exam result and questionnaire before class. The sample included 918 male and 771 female. The trainees are mostly at the age from 65 to 69, comprised of 43.3%, the age of over 75 also comprised of 13.4%. About 44.0% of trainees are illiterate. The trainees live with spouse and their offspring have the highest portion, which is 40.6%, those only live with spouse only 26.9%. The 44.5% of old people feel themselves is healthy, 43.4% feel all right, 12.2% of them feel unhealthy. There is 47.7% of

trainees didn't have any painful and trouble emotion, but 52.3% of them say yes. The emotion most bother 57.0% of old people is illness, followed by 14.0% of no money, 12.5% of no children around, 11.3% of them feel lonely and lonesome. Blood test result indicated that 453 trainees, comprised of 39.4%, have higher than normal value of uric acid; 244 trainees (20.5%) have high cholesterol value; 294 trainees (24.9%) high triglyceride value; 160 trainees (13.5%) have high fasting blood sugar value; and more than half of tester (52.9%) have abnormal blood pressure. There are only 18.5% of trainees showed normal physical test result, and 81.5% of old people at least have one item is abnormal. The above result indicated that rural old people have high percentage of chronic illness. The recommendation for improvement of health is: (1) educate the old people to realize the importance of healthy life, (2) through insurance policy, having regular physical exam, (3) establish community clinic and service network.

Fig. 28. Closing ceremony of "Improvement of Living for High Age People Workshop".

ACTIVITIES OF AGRICULTURAL EXTENSION IN 1994

Training and Education

A total of four subject matter training courses were held for young farmers in 1994, with 116 trainees attended. A total of four on-the-job training classes were held for agricultural extension workers, with 30 persons attended. A total of three foreign training classes were held for the agricultural technicians of friendly nations, with 36 participants attended. And a total of 82 persons attended related training programs at this station (Table 1).

Improvement of Rural Living

To improve the rural living environment and quality, a series of improvement programs for the rural inhabitants were executed by some basic-level Farmers' Associations and guided by this station in 1994. A total of 43 training classes were organized for the aged people in farming villages. A total of 19 training classes were held to strengthen the sanitation and health services, and 9 training classes were conducted to teach the knowledge of family environment protection. A total of 14 villages were selected for conducting the environment improvement activities (Table 2).

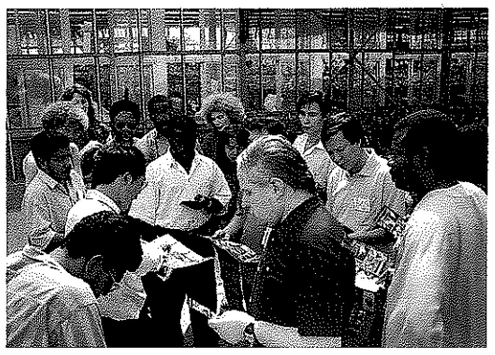

Fig. 29. Foreign trainees from "Workshop of Small-Scale Farming Technique and Transfer".

Table 1. Training activities of agricultural training center in 1994

Training activities	Class	Trainee
Special subjects training	4	116
On the subjects training	1	30
Foreign training	3	36
Other training	3	82
Total	11	264

Table 2. Improvement of rural living environment and quality in 1994

County & City	Guidance of aging life (class)	Sanitation & health (class)	Family education (class)	Improvement of living environment (village)
Taichung city	—	—	1	—
Taichung county	16	7	5	5
Nantou county	7	4	1	2
Changhua county	20	8	2	7
Total	43	19	9	14

Development of Rural Culture

Under the development program of rural culture, an integrated activities of rural culture were held at the two demonstration villages at Ta-chia and Wu-chi. A total of five township's activities of rural culture were held to promote the traditional rural culture. And a total of 25 villages were selected to set up farmer's culture classroom (Table 3).

Farmer's Services

The farmers' service work rendered by the staff of this station was very productive and fruitful in 1994. A total of 8,960 local visitors and 838 foreign guests visited this station. A total of 1, 461 farmer's letters or consulting problems have been answered. And local Farmers' Associations and agricultural cooperatives as well as agricultural production and marketing groups were guided to conduct 211 training classes of which the trainers were invited from the staff experts of this station (Table 4).

Table 3. Activities of rural culture in Taichung areas in 1994

County & city	Demonstration village	Township's activities	Farmer's classroom (village)
Taichung county	2	4	8
Nantou county	—	—	7
Changhua county	—	—	9
Taichung city	—	1	1
Total	2	5	25

Table 4. Activities of farmer's services of this station in 1994

Services item	Frequency	Person
Local visitors	131	8,960
Foreign guests	82	838
Consulting services	574	1,461
Trainers support	211	—

Guiding the Investigation of Production Cost for Farm Products

Guiding the farmers' associations to investigate the production cost of farm products. The informations obtained were then used for publishing the Report of Production Cost of Farm Products in Taiwan by the Department of Agriculture and Forestry. A total of 51 farmers' associations were guided and 134 crops were investigated in 1994 (Table 5).

Project for Guiding the Rural Youth to Establish Business Career

The purpose of this project is to assist young farmers establishing new mordernized farms. A total of 214 rural youths were qualified to receive the low-interest loans from the government to start their new farms in 1994. The loan was used for establishing the farm of ornamental plants, tea tree, fruit tree, vegetables and layer etc.. (Table 6).

Fig. 30. Investigation of production cost for farm products.

Table 5. Status of investigation of production cost for farm products

County	No. of crop	No. of village	No. of farmer
Taichung	35	16	240
Changhua	45	22	300
Nantou	54	13	315
Total	134	51	885

Table 6. Kinds of farm enterprise managed by young farmers

County/City	Flower	Vege-table	Fruit	Tea	Mush-room	Fishery	Other agric.	Layer	Broiler		Dairy cattle	Milk goat	Pig	Total
Taichung City	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Taichung County	30	2	5	0	9	0	1	0	0	1	0	1	0	48
Changhua County	46	5	2	1	4	2	0	2	4	0	1	1	2	70
Nantou County	46	7	4	30	4	1	0	0	0	0	0	0	0	92
	126	14	11	31	16	3	1	2	4	1	1	2	2	214

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一、研究成果摘要

稻作研究

利用分子標誌探討水稻穀粒大小之遺傳

洪梅珠

穀粒大小是影響產量及稻米市場品質的因素之一。有關穀粒大小的遺傳研究很多，其有些是受單一主效基因 (Major gene) 所控制，但大多數則是受微效基因 (Polygene) 所控制，其遺傳行為較複雜。本文利用 RFLP (Restriction fragment length polymorphism) 及 RAPD (Random amplified polymorphic DNA)分子標誌探討水稻穀粒大小的遺傳，期能找出與控制穀粒大小有關之遺傳標誌，以作為育種上改良穀粒大小之參考。

首先利用121種RFLP探針(Probe)並使用60種random primer進行聚合酶連鎖反應 (Polymerase chain reaction) 偵測親本間之多型性，進而探討其在ID-47×83N1168 F_2 集團中的分離情形。由試驗結果發現與粒長、粒寬有關之分子遺傳標誌為：

粒長：RG140（染色體1）、RG650（染色體7）、RG304（染色體11）、OPV6-920（染色體9）、OPV7-1240。

粒寬：RG140（染色體1）、RG147（染色體1）、RG13（染色體5）。

秈稻穀粒大小與產量構成要素及米質之相關

林再發

本研究選取不同穀粒大小之12個秈稻品種（系）為試驗材料，以探討穀粒大小與產量構成因素及米質特性之關係，經產量變方分析結果，產量不顯著，即穀粒千粒重在29公克到30公克未能比一般秈稻品種（系）增加產量。此係由於大粒種品系之穗數或一穗粒數或稔實率等之產量構成因素減少所致，由產量與產量構成要素之路徑分析結果僅以稔實率對產量影響達到顯著水準。各性狀之相關係數中以穀粒粒寬與糙米率及白米率呈顯著相關，但千粒重與完整米率呈顯著負相關，粒寬、粒厚及千粒重與腹白等級呈極顯著負相關，表示秈稻之米質隨穀粒大小而降低。

水稻品種對白葉枯病菌系耐病性試驗

林金樹

選用本省過去及目前推廣水稻品種計45個，供試水稻於孕穗末期，即劍葉展開時以半自動人力噴霧器噴射致病力強的XM-42菌株，觀察其致病情形。試驗結果不同品種對白葉枯病感病性最高者，分別為台中秈糯1號及高雄秈7號，次為台中186號、台中190號、嘉南2號、嘉南8號、嘉農242號、新竹64號、台中糯70號、台粳8號、台粳7號。對產量之影響，白葉枯病罹病面積率中等，對產量減少幅度大者，有台中190號、高雄24號、台中糯70號、台南6號；罹病率中等而對產量影響較不顯著者則有台粳8號、台粳7號。

抗白葉枯病之水稻近同源系在育種上之應用

I 農藝及生理特性與雜交

張素貞、朱桂芬、林俊義

水稻白葉枯病為稻作重要病害之一，其防治之道目前雖有藥劑可予預防，但效果不彰；欲降低此病的危害程度，仍端賴抗病品種之利用。藉由水稻抗白葉枯病近同源品系之抗病行為及農藝特性的瞭解，將有助於對不同抗病基因的瞭解及其將來可能在抗病育種計畫中的利用價值。本研究利用兩組不同輪迴親(IR24, Milyang 23)的抗白葉枯病近同源水稻品系為材料，進行不同抗病基因在生長箱及田間的表現。初步結果顯示各組近同源品系中帶有抗病基因 *Xa-5*，*Xa-10*，或 *Xa-12*之品系對本省菌系反應較具抵抗性，其葉片在生長箱接種菌系 XM42 後之病葉內的過氧化酶活性亦有增加的趨勢。至於在田間農藝特性抽穗期，成熟期，株高，以及稻米品質在各組同源品系內相似，但在不同組近同源品系間則有明顯差異。其中以Milyang 23為輪迴親之近同源品系組生育日數較短，以IR24為輪迴親之近同源品系組生育日數較長。將xa-5基因(IRBB5)與台中秈10號雜交，F_1後裔對白葉枯病反應為感級，與台中秈10號相似。

秈粳稻雜種後裔F_6世代栽培法試驗

楊嘉凌、胡兆華

本試驗旨在探究秈粳稻亞種間雜交後裔理想株型之選拔效果及不同栽培密度下對其產量的影響，並依此結果進行F_6世代的選拔。試驗採9×9簡方設計，四重複，分為20×20公分，四行區；及40×10公分，兩行區兩種栽培密度，單本植，並以台中秈10號及台中秈糯1號為對照品種。試驗結果小區產量以寬行密植（40×10公分）的表現較佳，普遍高於栽培密度20×20公分者，參試18個品系中最高小區產量表現每平方公尺達1100公克較對照品種台中秈10號及台中秈糯1號各別高出20及15%，此結果符合IRRI所提出的未來水稻理想株型表現。參試品系之平均生育日數較台中秈10號及台中秈糯1號各別早7天及10天左右；依田間生育表現、產量及米質等各項資料進行選拔共選出26個品系晉升F_7世代。

雜草研究

台灣地區白茅族群分化之研究

蔡奇助、周昌弘

白茅為禾本科、白茅屬植物，能生長於多樣化的環境，對惡劣環境的忍受力亦很強。本研究選定15個採集點，將白茅的根莖移植於溫室中，在相同生長環境下，發現不同地區白茅的葉長、葉寬及株高等外部特徵已有顯著差異。另外，可觀察到竹圍白茅的植株覆有白色長條狀似蠟質結晶，且葉片之中助粗大且中空。在遺傳物質的分析上，採RAPD (Random amplified polymorphic DNA)及PCR-amplified RFLP二技術，以RAPD的分析結果，可明顯區分成竹圍白茅一群，其它14個樣點之白茅一群。另外，在PCR-amplified RFLP分析上，乃利用 PCR (Polymerase chain reaction)將rDNA的IGS (Intergenic spacer)及ITS (Internal transcribed spacer)區域分別複製，再各別用13種及9種限制酵素來

偵測序列的變異，結果發現IGS的分析結果與RAPD相符；但ITS的結果不能將各族群明顯區分。此外，更進一步探討葉綠體DNA有否分化，選定rpoC1, C2及atpI, H, F, A 2段葉綠體基因分析，結果發現各樣點皆無變異。總之，依不同層次族群分化觀點，台灣地區之白茅可視為一族群，但此族群又可分成2個次族群。

不同殺草劑對落花生田除草效應之比較

沈勳、陳彩蓮、邱萍菁

為探討殺草劑Select 25% E.C.在落花生田禾本科雜草殺草效果，本研究利用三種殺草劑配合人工除草與不除草來實施。處理方法為(1)Select 25% E.C. 0.8公升/公頃(2)Select 25% E.C. 1.0公升/公頃(3)施得圃34% E.C. 5.0公升/公頃(4)伏寄普17.5% E.C. 1.0公升/公頃(5)人工除草(6)不除草。試驗結果顯示Select 25% E.C. 1.0公升/公頃無論在落花生田秋作或春作對禾本科雜草之殺草效果皆最好，但對莎草科雜草及闊葉性雜草並無效果。而Select 25% E.C. 0.8公升/公頃及伏寄普17.5% E.C. 1.0公升/公頃，效果亦不錯。在落花生產量上，在秋作以人工除草區最高，其次Select 25% E.C. 1.0公升/公頃，第三為伏寄普17.5% E.C. 1.0公升/公頃；在春作仍以人工除草區最高，其次施得圃34% E.C. 1.0公升/公頃，第三為Select 25% E.C. 1.0公升/公頃。

水田硫醯基尿素類殺草劑在水田的擴散性藥效

許志聖、宋　勳

硫醯基尿素(Sulfonyl-urea)類殺草劑為近年來開發的低施用劑量殺草劑，在水田雜草防治上，具有施用劑量低、施用時期的時距較寬及對多年生雜草具有防治效果等特點。本試驗旨在比較本省現行三種硫醯基尿素類(10% Londax、10% Sirius及10% Imazosulfuron)殺草劑在推薦劑量下的擴散性藥效。結果顯示：該類藥劑在0.675g～1.35g的藥量施於田間同一點下，水稻仍無藥害之發生；各藥劑的擴散性藥效與該藥劑的水中溶解度有關；但各藥劑均對稗草之防治效果較差。本試驗由於採推薦劑量，而非同一劑量，在藥劑的比較上，不免失之以偏，將再進一步進行相同劑量的試驗以驗証。

稻米品質研究

穗上發芽對稻米品質影響之研究

許愛娜、宋　勳、蕭浚二

為明瞭稻穀近成熟期遭遇連續下雨所導致之穗上發芽對米質之影響，利用人工噴水方式進行模擬連續下雨試驗。發現就整體品質言，在兩個期作之胚活性皆有隨稻穀成熟度與噴水天數之增加而下降之現象，但不同品種間亦有差異，其發芽勢在第一期作最低降至六成，第二期作僅約二成五。碾米品質方面，除品種原有之差異外，亦有隨稻穀成熟度與噴水天數增加而劣化之現象，尤以第一期件之完整米率為甚，最低降至三成四。對於整體之白米外觀則影響不大。至於米質理化性之影響僅凝膠展延性較為明顯，而有隨稻穀成熟度與噴水天數增加而略轉硬之現象。稻穀成熟度與噴水天數之增加亦會造成入口品質之劣化，但以第一期作表現的最為明顯，皆為負值。由於不同品種穗間與穗內發芽粒間之品質不一，若依芽長分為五個等級，碾米品質隨噴水天數增加，不同等級間會有明顯變化。此外，糙米千粒重降低以及凝膠展延性亦有明顯轉硬現象。至於微細構造之變化，在發芽程度較嚴重之穀粒，其澱粉粒上有小洞或變疏鬆，但其受害程度亦因品種或部位不同而有差異。

包裝形式及貯存溫度對小包裝白米品質之影響

洪梅珠、宋勳

利用台中189號碾製成之白米，以不同之包裝形式，貯存於不同溫度處理，探討白米在貯存期間品質之變異，以供改善白米包裝及貯存條件之參考。結果發現白米之pH值隨貯存期延長而降低，降低程度以一般小包裝室溫貯存者最大，以眞空包裝及充二氧化碳包裝之低溫貯存者最小。一般小包裝米飯的硬度及凝集性，隨貯存期之延長而增加，但粘性、附著性及均衡性則隨貯存時間之延長而降低，尤以室溫貯存者降低的速度較快，而低溫貯存者較慢。然眞空包裝及充二氧化碳包裝之白米飯物理性，在本試驗的貯存溫度範圍(5～10℃、15～20℃、室溫)，一年內未有顯著之變化。台灣夏季氣溫常有出現30℃以上之高溫現象，故可適度推廣眞空包裝、充二氧化碳包裝及低溫貯存，以延長小包裝白米保鮮之期限。

斷水處理對水稻生育及稻米品質之影響

李健摔、宋　勳

提高稻米品質是目前本省水稻試驗研究最重要工作。本研究目的為利用水稻在營養生長期提早斷水處理，以抑制其過盛之分蘖及減少植株間互相遮蔭，使植株能充份進行光合作用及光合產物之累積，以利稻穀千粒重之增加，進而提昇稻米品質。試驗結果顯示，一期作提早斷水之處理因水稻分蘖數顯著減少，使產量明顯降低，參試品種當中以台中189號降低的幅度最大，台中秈10號降低的幅度最小；又因稻穀千粒重無增加效果，因此對於稻米品質之提昇亦無助益。二期作提早斷水之處理，雖然分蘖數亦降低，但因千粒重及捻實率明顯增加，因此產量並無降低，粒重增加的原因主要為粒寬及粒厚增加所致，因稻穀千粒重明顯增加，使得稻穀容重量、透明度增加，心腹白減少，極顯著提高稻米品質。綜合兩期作試驗結果顯示，二期作提早在水稻插秧後20天或25天斷水，可以顯著達到提昇稻米品質之效果，同時對於產量亦無影響，一期作則不適宜提早斷水，參試品種當中以台中秈10號在兩期作提早斷水情況下，均能保持其高產量及高品質的特性，表現最為優異。

水稻濕谷品質檢驗技術之研究

宋　勳、洪梅珠

稻穀分類生產，收穫後經糙米品質檢定、分級收購、分倉保管、拉大良質米與普通米間的價差，提高生產者栽培良質稻的意願，保障消費者以較高的價格確實可以買到高品質米，這是目前政府輔導良質米產銷重要的目標之一。過去農會以乾谷形式收購時，稻谷極易脫殼，很容易就可檢定糙米外觀品質，但目前農民在收穫後，有直接繳交濕谷，由農會代為乾燥之趨

勢。但在濕谷狀態時，若直接脫殼，多數無法完全除去谷殼，且破損粒多，不易判定眞正稻米品質之優劣，造成濕谷收購上之困擾。因此在收購濕谷時如何檢驗稻谷的品質是一重要問題。

為解決以濕谷形式收購稻谷時，能快速檢定稻谷品質之問題，依本場初步研究之結果，發現濕谷可用微波爐快速乾燥到水分含量為18%時，再以小型脫殼機去殼，此時大部分穀粒已可完全除去谷殼，且可進行糙米外觀品質檢定。

雜糧研究

薏苡新品系地方適應性之探討

曾勝雄、楊錦蓮

為探討薏苡新育成品系之地方適應性，於81年及82年春作在二林、草屯、仁愛及信義進行產量穩定性試驗，供試品系計有青陽、金提、光州、台中選育3、4、5號及本島在來，以岡山在來為對照品種，結果獲得如下結論：

兩年期之春作試驗結果，以台中選育5號之表現最佳，其每公頃籽實產量為3183公斤，比岡山在來（2522公斤）顯著增產26.2%，且穩定性佳。其每平方公尺株數（65.9支），每株小穗數（155個）、稔實率(81.8%)及千粒重（92.1公克）均比岡山在來為佳，擬於明年元月下旬申請登記命名及推廣。

田菁之誘變育種（初報）

張隆仁、胡兆華、宋　勳

田菁為本省常用於夏季水田之綠肥作物。本試驗應用放射線誘變，期選拔具矮性、葡伏型、早熟、莖稈木質化較晚及適合冬播型之品種。乃以一國外栽培種經以4種不同 X- 射線劑量處理，即 Kr-20 、Kr-25、Kr-30及Kr-35等。其M1世代植株於苗期即可看出其生長勢有顯著之差異，四種處理間顯示出有劑量效應存在。收穫之種子量亦以 Kr-35 處理最少。本年度繼續將四種處理收穫之種子及其未處理之對照品種 (CK_1) 與本省目前推廣種植品種 (CK_2)等6個品種(系)，經以RCBD，4重複設計種植。初步結果顯示，播種後第45天，品種(系)間株高有極顯著之差異存在，以本省推廣品種最高為51公分，Kr35處理最低為34公分。莖稈內N.P.K含量各品種（系）間無顯著差異存在。纖維素含量則有極顯著之差異，以推廣品種最高，誘變處理之 Kr-20 ， Kr-25 ， Kr-30 間無差異，Kr-35 處理者較高與其未經處理之對照種 (CK_1)相近。

蔬菜研究

新興夏季葉菜品種之研究

郭俊毅

為開發新興葉菜種類或品種，期能增加夏季葉菜之多樣化，並充裕夏季菜源。本試驗先後引進葉用蘿蔔等 7 種新的葉菜，共計10個品種。經試驗結果，認為千寶菜 2 號，小松菜安藤早生及葉用蘿蔔美綠等三個新品種，具有耐熱、耐濕、生育快速，播種後20～25天即可採收之優良特性，極適合夏季推廣栽培。其中又以千寶菜葉質柔嫩富甘味，深受大眾喜愛，極具發展潛力。

埃及錦葵新興蔬菜栽培試驗

洪滋堂

埃及錦葵 (jew's mallow) 為地中海地區原產的蔬菜，可供青炒與煮清湯之用，引進試作，觀察其適應性，據第一年試作結果：播種期以4～6月播種產量最佳，太早或太遲播種易受日照短、夜溫低影響抽苔開花，葉片變狹窄而細小，產量低且缺乏商品價值。嫩梢採收長度試驗，以長度20公分的處理表現較佳，唯就採收難易區分，似以採摘10～15公分處理嫩梢莖部纖維少較為方便。

韭菜品種蒐集與觀察

古錦文

本試驗旨在蒐集台灣韭菜 (*Allium tuberosum*)地方品種（系）藉以比較觀察，以供分類及種原保存。其結果如下：(一)自花韭栽培區蒐集年花6個品種，各以不同季節抽苔量多寡及花莖粗細、長短為栽培之取捨依據。(二)自葉韭生產區獲得田尾黑葉等29個地方品系，依葉片面積以區分大葉種，小葉種；依葉片頻色以區分黑葉種、赤葉種；依植株型態區分硬骨種、軟骨種。以韭白長短，直徑大小，品質，口感，栽培管理難易，為栽培者取捨依據。(三)自韭菜園區採集199株，無性繁殖為199品系，其中11品系，經二年之觀察，未曾抽苔開花，可知依抽苔開花性狀，可區分年花、時花、不花三型。(四)依供食部位可區分根用、葉用、苔用三型。

不織布覆蓋對葉菜生育之影響

郭孚燿、戴振洋、潘心怡

不織布覆蓋可提高溫度，隨其基重增加保溫性愈高，平均可較氣溫增加2～3℃，在低溫期中有促進作物生育之效果。因此秋冬作，無論青梗白菜或甘藍，應用不織布覆蓋處理，均較未覆蓋之對照組生育快速。冬作甘藍其植株開張度、外葉大小長寬、平均單株重及葉球平均重、大小，均以不織布覆蓋處理表現最好；青梗白菜無論秋作或冬作，其株高、葉數、單株平均重量，亦有同樣之結果，與未覆蓋處理間均呈顯著差異。但春作甘藍其結果則恰好相反，其無論何種植株性狀，均以未覆蓋不織布處理表現最佳。不織布覆蓋處理中以基重42公克者最差，其葉球大小、縱橫徑、平均重量，較其他處理顯著減少。此乃受結球末期，不織布覆蓋下蓄積過高溫度之影響。不織布覆蓋處理葉色，較未覆蓋者呈翠綠色，甘藍在外觀上以肉眼判斷，覆蓋不織布者較對照處理，葉表面上較少臘粉質。經分析葉綠素含量，無論青梗白菜或甘藍，不織布覆蓋者其含量顯著增加，且以葉綠素B增加比率較高。病虫害發生情形，甘藍覆蓋不織布者，缺鈣所引起之頂燒病發生最嚴重，尤其是在春作中。未覆蓋不織布者，其虫害發生情形，無論小菜蛾、粉白蝶、黃條葉蚤，均相當嚴重，不織布覆蓋則顯現較為輕危。不同覆蓋方式處理間，在本試驗結果中，其差異性並無明顯之一致性，有待進一步探討。

台中地區夏季葉菜簡易設施栽培之經濟分析

林月金

本研究以台中地區35戶樣本農家利用2年的資料，分析台中地區夏季葉菜簡易設施栽培之現況、生產成本、收益與經濟效益，並擬找出適合本區夏季葉菜簡易設施栽培之類型。結果顯示：台中地區夏季葉菜簡易設施栽培，大多集中在彰化縣境內，以網室栽培最多，塑膠布網室次之；產品以透過台糖銷售或售予販運商最多；不論粗收益、淨益、家族勞動報酬以及農家賸款均以混合式設施栽培最高，其次為網室栽培，生產成本以混合式及塑膠布網室最高，網室最低；年經濟效益以網室栽培平均每10公畝146460元為最高，混合式栽培134305元次之；一般而言，設施投資的回收年限，網室約0.3年，混合式栽培約1年，塑膠布網室約1年餘；根據以上分析可見，網室與混合式栽培為台中地區夏季葉菜簡易設施栽培之最適類型。

花卉研究

玫瑰切花生產新技術研究（初報）

林天枝

玫瑰在溫室設施內用岩綿及養液滴灌方式栽培，配合扭曲捻枝技術(Arching)，將玫瑰枝條分為營養生長系統與切花生長系統兩部份管理，如此可使株基日照充足，減少病蟲發生，且操作管理方便，並利用基部芽生長優勢，可培養高品質切花。且由於人為調配養液配方可保持營養分平衡供給，故切花枝生長快速而整齊，其切花產品有80%以上列一級品，比傳統土耕法只佔48%要強約67%，又因配合自動加溫及自動遮陰控制，可避開寒冬與酷熱的不良環境，便利周年生產，達到產業升級目的。唯設施成本較高，今後宜加強設施本土化研究，以降低生產成本。

促進玫瑰插穗側芽萌發之研究

陳彥睿

玫瑰為世界三大切花之一，亦為本省重要切花。玫瑰每年約需切花苗53～160萬苗，其主要的繁殖方法係用扦插法。因有部分玫瑰插穗側芽不萌發，而影響未來之發育，為改善上述現象，進行促進玫瑰插穗側芽萌發之研究，試驗以沙蔓莎未萌發側芽之2節2葉插穗，用冷藏、暗處理、生長素BA、GA、楓葉蜜果等方式處理，處理後第15天、25天、35天進行調查，調查項目包括萌芽率及萌芽長度，結果顯示BA雖可促進芽體之萌發，但濃度過高使芽體萌發後可能因後期營養不足容易發生夭折，冷藏方式可促進芽體之萌發，暗處理可促使萌芽長度增高，略可提高萌芽率，GA祇有促進芽體之抽高。促進側芽萌芽之效果以楓葉蜜果最好，其他依序為冷藏2天、BA 50 ppm、暗處理、BA 500 ppm。

扦插前貯藏處理對菊花插穗發根之影響

張致盛、黃勝忠、許謙信

自田間採取黃秀芳品種菊花插穗，浸泡Benlate 50%粉劑消毒處理，基部沾施NAA 1000 ppm滑石粉劑後，在95%相對濕度全日暗期生長箱中，以12℃、15℃及18℃三種不同溫度貯藏4天、7天及10天後再行扦插，另以採穗後未經貯藏處理立即扦插者作對照。插穗經低溫貯藏後，以石臘切片觀察，發現經處理之插穗，在貯藏期根源體即已開始分化及發育，扦插後可較採穗後立即扦插提早發根。在菊花大量繁殖時，插穗經適當之貯藏處理後再扦插，可節省扦插床使用時間，提高單位面積及時間之育苗效率。

菊花花苞黏彈特性研究

何榮祥、陳俊明

菊花花苞之黏彈特性其中負荷鬆弛特性可用三個馬克斯威爾元件並聯所組成的一般化馬克斯威爾模式來預測，潛變特性可用Burgers四元件模式來預測。

根據所得之負荷鬆弛特性方程式預測，菊花花苞在10mm變形量之下，經過15小時以後，其內部應力將降為"零"，較菊花運至日本市場銷售所需8～12天之儲運時間，為時甚短，因此裝箱時因減積操作所導致之初始變形量，在菊花上市時，都將成為永久變形，因此最下層菊花花苞可容許之最大變形量，應為裝箱時之初始壓縮變形量與下層菊花於儲存期間，因潛變因素所增加之變形量兩者之總和。以單枝平均重量60g之菊花為例，冷藏儲存12天後，菊花花苞因潛變因素所導致之變形量為1.52mm，而菊花花苞容許之最大變形量為5mm，因此在裝箱時菊花花苞之最大可容許壓縮變形量應為3.84mm，故每箱200支菊花之包裝方式，其紙箱之最佳高度應為26.8cm。

家庭觀賞植物的栽培與管理之研究

易美秀、宋　勳

為節省水源及時間，提供家庭簡易之植株管理方法，建議採行管路滴灌系統，利用自動計時控制器、電磁閥、幫浦及塑膠管路可定時定量依植株需要供水。

經研究結果建議盆栽之自動滴灌灌水，以盆栽介質容積之三分之一至二分之一容量於每日灌水一次或每日分上、下午各一次灌溉，並採用每兩週施肥一次，以每日之灌水量各加入200 ppm濃度之氮肥及鉀肥。

栽培時混合介質皆能生長良好，但以混合輕質及保肥力較強之混合介質為佳。

利用土耕法栽培報歲蘭之肥培技術研究

莊杉行

在砂質壤土表土中用完全腐熟的有機質資材（包括樹皮堆肥、牛糞堆肥及泥炭土）以2%量充分拌合後做為報歲蘭土耕栽培床，併配合營養生長期及生殖生長期每兩週行葉面噴施速效肥1號或2號液肥一次，觀察其效果，試驗結果為：施用三種有機資材對土壤養分變化而言，pH、P_2O_5、K_2O、CaO呈增加趨勢，對土壤總體密度及硬度呈下降，或顯著下降趨勢，對報歲蘭根部發育有顯著幫助，同時對花梗長、花朵數、花朵徑寬有顯著促進效果，對抽苔率及花梗數亦有增加趨勢，唯以樹皮堆肥效果表現較佳。

生長素對國蘭無菌種子繁殖與百合鱗片繁殖的影響

黃勝忠、吳素卿、吳文鳳

利用切刈後之百合鱗片組織培養，可誘導出小鱗莖，再將此小鱗莖誘導出不定芽。配合含不同生長素的培養基，探討最適當的生長素配方，以進行百合種球之大量繁殖。百合鱗片培養於0.2 ppm NAA及4 ppm BA培養基所誘導形成之原球體，顏色深綠。培養於0.5 ppm NAA及8 ppm BA的植株生長較好。此後的移植與養球之部份目前仍在試驗中。

報歲蘭及素心蘭種子之無菌繁殖，培養基以低濃度鹽類(KC-medium)，外加20 g/l蔗糖，4g/l活性碳之medium較好。以1/2MS至MS medium利用根莖為培植體，外加BA可促進長根。利用液體振盪培養，以BA (3～5 ppm/l)可誘導芽體數量多，且呈叢生狀，然後以MS固體培養基＋微量元素2 mg/l NAA＋3 mg/l活性碳＋30 g/l蔗糖可使植體與根由根莖直接長出。

果樹研究

高接梨嫁接適期之預測

林信山、林嘉興、賴美玲、賴餘玉

中低海拔地區所栽培之高接梨目前仍是本省重要產業之一，獲利不錯，但因愈早上市之高接梨售價愈高，所以果農試著不斷提早高接的作業時間，結果是失敗的多，如何鑑定做為高接砧的橫山梨樹之生理狀態是否處於適合高接的適期乃成為改進栽培技術的重要課題，而其關鍵則為預測橫山梨之萌芽期。在田間，這種判斷無法由梨樹之外表得之，於是嚐試從內在變化求取判斷的根據。試驗中比較橫山梨萌芽前後枝條之比重、澱粉含量、脫氫酵素之活性等之時序變化，以與枝條碘化鉀染色後之呈色及萌芽率比對，期能定出萌芽指標。試驗結果顯示二月十五日之萌芽率為6.8%，之後萌芽率之增加相對的較為快速。在此之前16日（1月31日），脫氫酵素之活性出現高峰值(O.D. 1.82)，枝條之比重相反的出現低峰值(1.048)，澱粉之含量呈現低峰值(299 μg/g D.W.)，可溶性蛋白質之含量亦是在最低值(512 μg/g D.W.)。此外，枝條經染色結果，與澱粉含量有正相關，似可為預測萌芽期之依據。

應用園藝技術方法誘導椪柑形成不時花

林嘉興、張林仁

柑桔類之花芽分化習性與荔枝、龍眼等亞熱帶果樹類似，在秋冬季必須經過適當的低溫、乾燥、短日等環境條件才能形成花芽。本省柑桔遇到長期乾旱之後，若在夏秋季進行適當的肥培管理及灌水，萌發之秋梢會形成少數不時花。因此，擬利用柑桔樹在逆境條件下自然形成不時花之特性，自1990年開始以人為方法處理，觀察應用在調節椪柑產期之可行性。自6月開始在樹幹進行環刻與中耕斷根處理，並控制夏梢生長，在9月及10月間進行修剪、施肥及灌水等處理，調查夏秋梢萌芽後之帶花率。初步試驗結果，6月間環刻處理區之新梢抑制率及花芽率分別為43.4～53.3%及8.3～13.3%，中耕區為68.3～74.6%及0.2～14.5%；8月及10月處理者與對照區比較無差異。10月以後環刻樹幹者傷口癒合緩慢，到11月天氣轉為冷涼後葉片快速黃化，以致在冬季嚴重落葉，翌年之花蕾形成期較對照區早，但直花比例高，著果率低。由試驗結果得知，在6月以環刻及中耕配合修剪及施肥等方法處理，雖具有提高秋梢帶花數的效果，但植株間之差異大，著果率低，無法達到經濟栽培之目標。

東方梨在低海拔地區一年二收可行性研究

廖萬正

本場已研究完成以“二次催芽栽培法”取代“高接法”能在本省低海拔地區生產高品質東方梨，而大幅降低生產成本。在秋季催芽時，會有部分芽體因已形成花芽而開花、結果，為提高產值，故擬研究此時期開花結果之情形，以達一年二收之目標。

於8月23日，9月2日及9月12日分別以0.6% hydrogen cyanamide噴施豐水及新興品種梨。在處理後8～10日開始萌芽，萌芽率皆達89%以上，14～16日則盛花，開花率豐水品種分別為22.5%、37.8%及61.3%，新興則分別為10.1%、28.5%及42.6%；著果率則豐水為30.7%、35.5%、49.1%，新興為16.8%、29.1%及42.2%，經疏果後，約20片葉留一果，各處理區之果實發育皆良好，於元月下旬收穫，而達一年雙收之目標。

不同棚架對葡萄生長及作業勞力之影響[1]

張林仁、林嘉興

本試驗以“巨峰”種葡萄為材料，於1989年4月定植於台中區農業改良場果樹園內，並搭設高垣籬雙幹式、低垣籬雙幹式、垣籬單幹式、豆籬式及水平棚架等5種棚架。1991年以後植株進入正常狀態，開始調查各種棚架間之植株生育與生產，同時測定各種棚架之田間作業勞力。綜合3年調查結果顯示，結果母枝數以夏果低於冬果，萌芽數則以夏果高於冬果。以垣籬單幹式之結果母枝數最少，其萌芽數及花穗數相對降低，但是枝梢生長勢稍強，結果枝之開花期停心率最低。夏果之花穗數以豆籬式、高垣籬雙幹式及水平式棚架為最多，冬果之花穗數以高垣籬雙幹式最多。花穗長度以直立生長之垣籬幹單式之夏果花穗最長，因其較具徒長性，著果率較低，且枝條再生長率最高，木質化程度最低。本試驗期間各年度之氣候條件不同，結果枝生長量差異很大，1992年6月以前之乾旱氣候使夏果生育量低於往年，且數次颱風後果園積水使冬果之新梢生育量不足，影響果實生長。夏果之果穗以高垣籬雙幹式為最大，低垣籬雙幹式與垣籬單幹式之果穗較小；垣籬單幹式之冬果因落果率高，果穗最小。夏果之糖度及酸度無顯著差異。冬果以產量少之垣籬單幹式之糖度17.8° Brix略高外，其他各種棚架之糖度、酸度異差不顯著。初步估算田間作業時數，以豆籬式及低垣籬雙幹式高於水平棚架17.4%及18.5%，高垣籬式減少2.3%，垣籬單幹式減少25.6%；但垣籬單幹式之產量低於水平棚架，使工作時數相對減少。

永續農業之研究

有機農業可行性觀察試驗（大村試區）

謝慶芳、徐國男

本試驗發現，在中部地區推行有機農法是可行的，而且許多作物的產量和品質都會因採行有機農法而大量提高，地力也可同時獲得改善。主要方法為：

1. 薰炭添加綜合性微生物再與有機肥混合後即刻使用，可以大幅提高有機肥的效果。
2. 適量地施用錳肥以防止有機區嚴重缺錳現象，有時候是必要的。
3. 本試驗期間平時主要噴施糖醋液和糖木醋液，並視作物種類和病虫害之不同，酌量添加蒜頭、辣椒、菸葉、苦楝、苦艾、香茅、薄荷、酒精、煤油、蓖麻油、樟腦油、微生物等一起使用以提高其效果、夜蛾類則噴施蘇力菌非常有效。
4. 一年三作，即初夏種植耐熱性作物，秋冬種植耐寒性作物，春季種植水稻或其他適當作物，似乎是一個可以提升有機農法經濟效益之輪作制度。

永續農法相關技術之研究 II 磁力對作物栽培之效應

王錦堂

本研究為在永續農業栽培需求下，探究應用磁鐵之磁力對作物種子發芽勢，植株根群伸長及果實品質改進等之效應，於1994年起在台中場進行有關試驗，結果顯示磁力對蘿蔔、菜豆、玉米等之發芽勢，玉米植株之營養吸收及根群伸長，葡萄果實之品質提昇，即糖度、酸度、糖酸比、果皮著色度等均有促進之良好表現。磁力之開發應用確具有其潛能，可使永續農業更為充實活性化，為期維護環保並促使自然生態的平衡，以培育健康的土壤生產清潔的作物提供人類需要，將繼續進行研究。

不同有機資材及通氣量對堆肥中營養要素成分之影響

禁宜峰、黃祥慶

為探究碳、氮、磷、鉀等營養要成分在有機物堆肥化過程中之變化，以期能依不同有機物之特性，使製成堆肥的養分供應潛能適合不同作物之養分需求。本研究利用多種不同有機廢棄物為堆肥資材，實施二種不同堆肥配方處理（A：雞糞－木屑－稻桿，B：牛糞－木屑－稻桿）及通氣量處理三級(a: 6.6±0.5 L/min, b: 13.8±0.9 L/min, c: 25.4±1.9 L/min)等試驗。試驗結果顯示，堆肥化過程中碳成分濃度下降，氮、磷及鉀成分濃度呈上昇。以木屑及稻草為碳源，在以牛糞為氮源時，堆肥化中氮的損失率約31.4%，碳的損失率約58.7%，乾物損失率為48.8%。如以雞糞為氮源時，堆肥化中氮的損失率約37.1%，碳的損失率約64.9%，乾物損失率為52.1%。同樣以雞糞為氮源下，在堆肥化中持續實施通氣處理，則氮的平均損失率約為22%，碳的平均損失率為61.6%。堆肥化中磷和鉀的損失率在誤差變異內，可視為在堆肥化過程中無損失。

有機肥料對設施蔬菜產量及土壤肥力之影響

陳鴻堂、王錦堂

本試驗在彰化縣永靖鄉石灰性粘板岩沖積土之塑膠布防雨栽培設施蔬菜園，進行不同有機肥料對設施栽培蔬菜產量及土壤肥力影響試驗，結果顯示施總氮素量相同的條件下，有機材料稻草區分別可以增產青梗白菜及莧菜4.3及0.5%。對土壤肥力之影響，有機肥料分別可以提高土壤pH 0.03～0.37個單位，及增加土壤有機質0.2～0.3%。有效性磷11～149 ppm、交換性鉀11～230 ppm，經兩作肥培管理後，土壤電導度(EC)雖達0.64～0.83dSm較試驗前增加，但尚不致影響作物發芽及生長。

台中地區柑桔施用有機質肥料現況調查

陳清文、陳武揚

柑桔為台中地區重要果樹，栽培面積10360公頃，主要種植種類以椪柑、柳橙、桶柑、文旦等四種，占全省栽培面積四分之一。本區柑桔大部份種植在土壤較為脊貧的山坡地，土壤有機質缺乏，近年來政府補助獎勵農民施用有機質肥料，以改善土壤肥力，藉以提高耕地之生產力。為瞭解本區柑農施用現況，在轄區內主要產區，進行問卷調查，期供與本產業相關人士關注或再予深入研究之參考。

調查結果顯示，本區施用有機質肥料係以商品化市售有機肥料，其主要材質為廢棄太空包、樹皮、木屑、禽畜糞、豆粕渣類、羽毛、谷穀、蔗渣、米糠、菸骨、發酵菌等製作而成。就其施用時期於果品採收後全量當基肥施用，由於柑園多位於山坡地，且屬老園區，不利於機械作業，均以人工散施方式。施用量因樹齡、產量、有機質材質不同而有所差異。如以雜項有機質類平均公頃之施用量約為8000公斤。

調查柑農中對於柑園曾經採土做過肥力測定者，高占64.1%，曾有試驗機關協助做葉片營養診斷者占52.3%。至於施用有機質肥料效果認為有效或很有效果者占94.9%；對於市售有機肥料之價格，認為可以接受者占57.2%，售價偏高者占42.8%，並盼政府能提高有機質肥料補助金額。對於台灣即將加入國際關貿總協定，認為柑桔產業受到衝擊嚴重者占83%，14%認為影響不大，3%認為不受影響。因應之對策果農也有共識，則以不再擴大栽培面積，提高經營效率、降低產銷成本與提昇果品品質，方能自保。

台中地區農村社區家庭垃圾堆肥化利用與規劃之研究

鄭健雄、禁宜峰、張惠貞

本研究參考鄉村發展規劃及社區發展的理念，以農村社區為實施單位，在自助人助的原則下，並兼顧農村社區社會、經濟、生態、制度等不同層面的發展規劃，在台中區四縣市各選定一配合意願高之農村社區，共同從事家庭垃圾分類及有機質垃圾堆肥化利用之處理工作，經細部規劃及初步研究結果顯示，此種模式可有效將家庭垃圾中之有機質垃圾製作有機堆肥使用，達到資源回收利用及家庭垃圾減量的功能，值得進一步推廣農村社區使用，依據大多數台中區基層農會家政推廣人員表

示，今後可分別透過轄區產銷班、家政班或村里社區擴大辦理。

作物病害研究

十字花科根瘤病之抗病品種篩選

林俊義、黃秀華、吳榮銘

十字花科根瘤病是由 Plasmodiophora brassicae Woronin 所引起，為本省十字花科作物重要的病害之一，主要發生於本省高冷蔬菜生產區。目前防治本病的方法可利用土壤添加物加以防治，但此方法常受限於土壤因子的影響而使防治效果不佳。本文主要目的探討由國外引進抗病品種，篩選抗本省根瘤病之品種，提供園藝育種專家，改良目前常用之初秋甘藍品種之參考。利用根毛感染率及田間試驗篩選，經試驗結果有キやベツ93-128ケCR多恵甘藍93-130キやベCR頂點兩品系之甘藍對根瘤病極抗，另有結球白菜：CR 祝勝はくさい、野崎90うげし90、野崎70うげし70、石井交配CRあつぱれ、ハクサイ89-175うて_げ、ハクサイ93-199隆德；蘿蔔：大根93-177總太ソ宮恵、大根93-161早太ソ大藏；青花菜：協和交配はなもり、協和交配あつもり、協和交配しげもり。

數種物質對瓜類白粉病的影響

劉興隆、林俊義

供試的22種物質，在溫室試驗結果得知，以CS-7展著劑250倍、膠體肥料250倍及 Tween80 250 倍效果比農藥芬瑞莫佳，而草酸200倍、磷酸二鉀200倍、魚精2 500倍、乳酸200倍、氯化鐵200倍、糖水200倍、尿素200倍、海草精250倍及磷酸一鈣500 倍效果比對照不噴藥佳。進一步比較不同濃度之CS-7、膠體肥料及Tween80對白粉病之發生影響，在CS-7方面，以500倍效果較好，且無藥害，在膠體肥料以250倍較佳，在Tween80以200倍最適。於本場田間設施試驗時，其結果以甲硫氨酸與核黃素混合物 700 倍最好，其次依序為CS-7 500倍、膠體肥料250倍、芬瑞莫4000倍、Tween80 200倍及對照不噴藥。比較不同展著劑對瓜類白粉病的影響，發現測試的 4 種展著劑在推薦的濃度內都能降低白粉病的發生，不過以CS-7 250倍、500倍及力道威250倍、500倍較佳。

枇杷灰斑病發生與損失評估

劉添丁

灰斑病 (Pestalotiopsis) 為枇杷主要病害之一，胞子最適發芽溫度為20～28℃，菌絲生長為24～28℃，綜觀本省枇杷栽培區多分佈在山坡中海拔地帶，氣溫稍低，在1～4月及10～12月平均氣溫在20℃以下，胞子發芽及菌絲生長受到抑制，5～9月平均氣溫在25～29℃間極適合該病的生長，罹病率可達50%以上。罹病率在10%以內，果實肥大期的葉片數可保持15片，開花率達80%，果實重及糖度均正常，罹病度20%以上葉片會提早黃化落葉，開花率也會減低。罹病度40%以上則不但葉片提早黃化，葉片只剩5葉左右，開花率也顯著的降低，不及6成，且果實細小每穗果重平均80公克，糖度又低，顯著的影響枇杷單位面積產量與品質。

水稻紋枯病藥劑防治篩選試驗

陳啓吉

以往本省水稻紋枯病主要為害第二期稻作，但近幾十年來，第一期作紋枯病發生之嚴重性，亦不亞於第二期作，儼然已成為本省稻作之重要風土病，根據前人報告，無任何水稻品種可以抵抗稻紋枯病病原菌之侵入，因此稻紋枯病之防治，目前仍以藥劑防治為主，自1958年有機砷劑開始推廣使用以後，新藥劑陸續推出，迄八十一年在市面上推廣防治藥劑多達27種，經長期使用之後，藥劑間之藥效有明顯差異，於八十三年第一期作在名間鄉辦理紋枯病藥劑防治田間篩選試驗結果，25% 賓克隆W.P. 2000倍、23.2%賓克隆F 2000倍防治二次，10% 菲克利E.C. 1500倍、20%福多寧F 2000倍、24.9%待克利E.C. 2000倍防治三次，不論罹病莖率或病斑高率與其他供試藥劑處理區或對照不施藥區都呈顯著差異。另由台灣省農業試驗所進行室內藥效比較試驗結果，預防兼治療具優者有75% 貝芬普寧 W.P. 750倍、10% 菲利克E.C. 1500倍、20%福多寧F 2000倍，以預防性效果較具突出者有 25% 賓克隆 W.P. 2000倍、23.2%賓克隆F 2000倍、40%滅普寧W.P. 1200倍、50%免賴得W.P. 1500倍、55%貝芬同W.P. 1000倍等而治療性效較優者則有6.5%鐵甲砷酸銨S 2000倍。

作物蟲害研究

南黃薊馬傳播西瓜銀斑病毒

陳慶忠、柯文華

1987年彰化縣大城、二林等鄉鎮栽培之西瓜嚴重發生經由南黃薊馬(Thrips palmi)傳播之類似番茄斑點萎凋病毒 (Tomatospotted wilt virus) 引起之病害。晚近葉錫東教授等再確認此種病毒為一種Tospo virus並命名為西瓜銀斑病毒 (Watermelon silver mottle virus, WSMV)。南黃薊馬幼蟲吸食罹染WSMV之蔓陀蘿葉片，幼蟲及成蟲均可傳播病毒，但成蟲吸食病葉則不能獲毒傳病。試驗測得幼蟲最短獲毒時間為30分鐘，幼蟲吸毒後需經2～3日潛伏期始能傳播病毒。以1、2齡南黃薊馬幼蟲吸食病葉，於成蟲期以 5 隻為一組進行傳播試驗，結果分別有30% (3/10)及20% (2/10)之植株發病。當幼蟲期吸食病葉於成蟲期以 1, 5及10隻分組接種蔓陀蘿幼苗結果，傳病效率分別為8% (2/25), 30% (3/10)及40% (4/10)，傳播效率有隨每株植物釋放接種蟲數增加而增高之趨勢。一般幼蟲期獲毒之蟲體，於羽化為成蟲後之第 2 日起始能傳病。利用邱人璋教授製備之WSMV多元抗體，將吸食病株1、6、12及24小時之單隻南黃薊馬幼蟲立即進行 ELISA 分析結果分別有10、24、20及19%之供試蟲體在紫外光譜儀A405之吸收值大於對照組5倍以上，相對的以幼蟲吸食病株 1 小時後於成蟲期供ELISA分析，其A405之吸收值並無明顯增高現象。利用於幼蟲期吸食病株後羽化之薊馬成蟲，以 5 隻為一組，經磷酸緩衝液研磨之汁液接種蔓陀蘿葉片可以產生環輪狀病徵，病葉組織經超薄切片可於葉肉細胞內觀察到直徑 70 ～ 90nm 之近似球形病毒粒子沿細胞壁附近之細胞質而分佈。包埋帶毒南黃薊馬成蟲腹部，超薄切片並於電顯下可於腹腔部位觀察到直徑 70 ～ 90nm之近球形病毒粒子。

土壤添加物及種球罹病對根蠕之影響

劉達修、曾阿貴

以樹皮、牛糞、海鳥糞、魚粉、有機肥等添加於盆栽土壤中，泥炭土則以全量分別栽植唐菖蒲及百合，以自然發生和接種等量根蠕，經一個月後調查球莖之蠕數。結果在自然發生情況下，使用泥炭土及土壤中添加樹皮處理組根蠕之發生數每株僅0.2～8.5隻，均比一般土壤組之29隻減少；而土壤中添加有機肥，根蠕每株達56.6隻能助長其發生。接種等量蠕源時，添加樹皮及泥炭土全量之蠕數亦顯著減少；而添加魚粉、有機肥和牛糞之根蠕發生數約增加1.5～3.1倍。另比較健康種球、罹病種球或將種球刈傷或接種Pseudomonas spp.病源，在自然發生情況下，種球罹病或接種病源者根蠕之發生數比健康種球增加7.9～10.1倍；接種等量蠕源時，非健康種球根蠕之發生數均比健康種球略有增加。

在印尼利用性費洛蒙防治大豆田斜紋夜盜蛾之觀察試驗

邱建中、許明禮、許兩順

中華民國駐印尼泗水農業技術團由台灣省農業藥物毒物試驗所引進斜紋夜盜蛾性費洛蒙35000支，於1989～1992年在印尼東爪哇地區進行田間觀察試驗與示範推廣，希望能引進並推薦此一生物防治技術給印尼之大豆農民，也盼能帶動台灣農藥企業進軍印尼市場。1989年旱季第二期作先於Jombang進行性費洛蒙與Dursban混用及僅施用 Dursban 二種處理方式之比較，發現大豆葉片之受害率都可控制在 15～16%之間，但是性費洛蒙與Dursban混用處理較單用 Dursban 處理，可節省三次Dursban之施藥處理，有降低農藥成本之效果。1991年及1992年分別在Gresik, Lamongan. Ngawi與Jombang等四處進行田間觀察試驗，除Gresik為旱季第一期作（4～7月份）外，其餘均為旱季第二期作（6～9月份），由於Gresik是第一次施用，很可惜未調查誘殺蟲數，其餘三處均詳細記錄誘殺蟲數，全部觀測調查面積270 ha，每公頃用性費洛蒙三支，35天後更新一次，平均誘殺蟲數為417～615隻/ha，防治效果令人滿意，大豆平均產量在1544～1970 kg/ha之間。1992年於Jombang縣五個村進行每公頃設置2、4、6、8、10個誘蟲盒之比較試驗，每一處理2 ha，經計試驗面積50ha，試驗結果發現，誘蟲盒愈多，誘殺蟲數也愈多，誘殺蟲數從每公頃二盒之289隻直線上升至每公頃十盒之1044隻，效果極為明顯，而前五週之誘殺蟲數約佔總誘殺蟲數之77%以上，不受設置誘蟲盒數量多寡之影響。經濟效益分析指出，利用性費洛蒙確實可節省農藥費用，經調查54 ha 94個農户之平均指出，平均農藥費用為 Rp 44976/ha，較對照區之 Rp 65204/ha 為低，示範區之平均農家淨收益可增加15.7%。

台中區水稻重要害蟲發生調查

黃金助

據三年來調查結果，由氣帶式高空捕蟲網數據顯示，褐飛蝨及白背飛蝨遷入量極少。由全年誘蟲燈所獲數據顯示褐飛蝨高峰期在10月～11月間，白背飛蝨高峰期在6月及9月間，斑飛蝨高峰期在6月間。二化螟蟲成蟲高峰期在6～7月間，利用性費洛蒙誘引雄成蟲，捕蟲效果均比誘蟲燈為佳。害蟲偵測田調查二化螟蟲田間稻株被害枯心率僅0.73%，白穗率1.40%；瘤野螟被害捲葉率第一期作為1.7%，第二期作2.0%；褐飛蝨在1991年第二期作乳熟期密度最高達平均每叢10.2隻，1992年～1994年密度甚低每叢未達2隻，白背飛蝨每叢未達1隻，均未達防治標準。而斑飛蝨及白背飛蝨網捕調查每網最高僅2.6隻。田間巡迴調查，近三年來無論第一、二期作，飛蝨類之蟲口密度已逐漸降低，其為害均輕；瘤野螟第一期作及第二期作均零星發生。二化螟蟲除了在彰化縣秀水、大村、花壇附近發生較嚴重外，其他各地區發生均輕微。

豇豆主要害蟲之族群消長及藥劑防治適期

張德前

豇豆栽培期間發生各種害蟲情形：依據豇豆主要害蟲族群發生消長調查結果，豇豆于萌芽後生育初期主要發生害蟲根潛蠅、莖潛蠅、小綠浮塵子、豆蚜等，尤其秋作8～9月播種者發生密度較高，危害較為嚴重，由於既時期適值豇豆生育初期，植株被害後，對生育影響較大，因此一旦發生前述害蟲時需之即採取防治措施，依藥劑篩選結果，選用2.8%第滅寧E.C. 1000倍，連續施用1～2次，以防被害後對生育影響。豇豆萌芽後50天亦即開花期上，此時期發生害蟲種類主要斑潛蠅、葉蟎、薊馬、玉米螟、豆莢螟、小綠浮塵子及豆蚜等害蟲，春作以玉米螟、豆莢螟、斑潛蠅較高，秋作以斑潛蠅、葉蟎、薊馬、小綠浮塵子較高，此時期已屬開花結莢初期，發生前述害蟲時宜針對害蟲種類選用低毒性殺蟲劑防治，如3%蘇力菌W.P. 1500倍、20%依芬寧W.P. 1500倍、75%賽滅寧W.P. 5000倍、2.8%畢芬寧E.C. 2000倍、2.8%賽洛寧E.C. 2000倍、2.8%第滅寧1000倍等藥劑任選1～2種，連續施藥2～3次，豇豆種植後90～110天，亦即採收盛期，此時期可能發生害蟲主要葉蟎、斑潛蠅、豆莢螟、薊馬、小綠浮塵子、豆蚜等害蟲，依田間實際情形再選用上述藥劑防治之。

茄子害蟲種類調查及防治試驗

方敏男

茄子之害蟲種類依茄株不同部位略有差異，危害葉片的有神澤葉蟎、二點葉蟎、小綠葉蟬、南黃薊馬、棉蚜、斜紋夜蛾、毒蛾、28星瓢蟲、煙草粉蝨、擬尺蠖、茄螟等，而以前五種之發生危害最為嚴重，尤其小綠葉蟬、南黃薊馬及棉蚜等三種害蟲除危害葉片外，亦可危害花蕾及果實。其危害果實、花蕾、中老葉片及側芽之比例，小綠葉蟬分別為0.87、2.39、66.77及29.97%，南黃薊馬分別為25.62、53.72、12.69及7.97%，棉蚜分別為2.61、2.42、88.65及6.32%。於彰化縣溪湖鎮及大村鄉以植保手冊登記推薦農民使用之藥劑進行葉蟎、棉蚜、小綠葉蟬、28星瓢蟲及南黃薊馬防治試驗結果，40%必芬松E.C. 800倍加2.8%賽洛寧E.C. 1000倍對於棉蚜、小綠葉蟬及葉蟎具有防治效果，48.34%丁基加保扶E.C. 700倍加40%必芬松E.C. 800倍或加2.8%賽洛寧E.C. 1000倍，對於28星瓢蟲具有防治效果，3%蘇力菌W.P. 1000倍加85%硫黃W.P. 500倍加黃色黏板二片(15m²)

對於葉蟎亦具有防治效果，但所有試驗藥劑對於南黃薊馬之防治效果均欠佳，而該蟲為茄子之最重要害蟲，對於茄子之生育、產量及品質影響至鉅，其有效防治藥劑或方法有待進一步探討。

不同施藥時間間隔對玫瑰葉蟎之影響

王文哲、劉達修

以兩種不同施藥間隔分別對玫瑰二點葉蟎及玫瑰神澤葉蟎進行毒效試驗。結果對玫瑰神澤葉蟎以 68.1% Propargite E.C. 2000 倍防治時，3 天內施藥兩次之防治效果，比施藥後隔週再施藥一次者為佳，而 38% Dienochlor F. 1500倍除對幼蟎外，以隔週再施藥一次之試驗組之防治效果較佳。在對玫瑰二點葉蟎成若蟎和幼蟎而言，以三天施藥兩次之防治效果較佳的藥劑有 68.1% Propargite E.C. 2000 倍、2.8% Bifenthrin E.C. 1000 倍和 38% Dienochlor F. 1500倍三種藥劑，而在隔週再施藥一次之防治效果較佳的藥劑，只有 2% Abamectin E.C. 2000倍一種。

農機研究

果樹用挖環溝施堆肥機之研製與改良

龍國維、田雲生

本省長期性果樹如柑桔、荔枝、芒果、蓮霧等，均有年施一至二次堆肥之習慣，有助於果實品質提升。因果園不適於全面施撒堆肥並耕犁，一般均採挖洞或挖溝施肥方式，較節省並有效施肥，用法則於果樹冠下以圓形環溝或輻射狀開溝後以人工施肥並覆土。此方法極費人力，亟需機械化以提高效率並節省人工。本計畫即針對此需求開發研製完成一挖環溝施堆肥機雛型。機體底盤採用低矮之小型四輪傳動、四輪轉向機台以利於靈活工作於果樹園及樹冠下，動力為16Hp柴油引擎，於右側加裝鏈式挖掘刀組，以油壓升降，並於車台處裝置容積約為 1.02m^3 堆肥斗，肥料配出以連續旋轉之刮板強制送肥至右側。右後方則另以油壓升降一刮板式覆土裝置以完成一貫化作業。經測試車體轉彎半徑約為1.7m，掘環形溝時可掘深約33cm、寬約20cm深溝，環溝直徑最小時為135cm，溝形完整，每環溝作業時間約為2min，堆肥大致均可導入溝中後覆土，初估作業效率每環溝施肥可較人工快4～6倍以上。目前有待進一步測試並改良覆土機構，以達更確實之性能。

嫩薑深溝築畦器之研製與改良

田雲生、龍國維

嫩薑為本省中部八卦山脈極重要蔥菜類作物之一，生產面積約有 500ha，其栽培方式需先掘許多深約40cm、寬15cm、長10m之深溝作為栽植溝，此俗稱踏薑壟之工作目前全靠人力，不但佔生產成本達30%以上，且專業人力年趨老化、僱請不易。本計畫即擬針對此作物之掘溝需要而開發小型機械以取代人力，期達成機械化作業以提高效率並降低生產成本。所研製改良完成之小型掘深溝築畦器以 8.5Hp 中耕機改裝鏈式挖掘機構，並以新開發之同心軸式雙速游星齒輪減速機降低田間作業速度至0.29 km/hr，同時並設計研製一組過負荷安全保護傳動齒輪箱，加裝於傳動系中以確保傳動軸組不致損壞。支持輪則以左右各一組單獨懸吊之固定輪支撐，全機於路面移動時切換行星齒輪組後，可以配合操作人步伐之 4.91 km/hr 快速度移動。經測試最大挖掘深度可達 44cm 深、寬 15cm 之溝形。長 10m 之溝作業時間約為 2.27min，初估可較人工快達6～8倍。目前仍進一步測試並改良畦型固定抹板；同時為考慮代耕需求，已進行設計大型曳引機掛載式，可一次掘五溝之機型。

農產品生產設施連棟控制自走裝置的研發

陳令錫

栽培蔬果林木的溫室，飼養禽畜的房舍等均可納入農產品生產設施，生產的農產品品質和成本關係著產業的絕續，採用省工管理器具可協助適時作業和提昇產品品質，節省管理成本，提昇產品競爭力。研發完成的設施內連棟控制自走裝置乃延伸設施簡易自動噴灑裝置的傳動理念，在單一動力源驅動下透過傳動軸將動力傳輸到驅動絞盤上帶動 φ3mm鋼索牽引作業器具，作業器具可能是噴灑裝置、電扇、電照器具、餵飼台車、清掃括板、遮陰網、環境感測元件等，傳動軸上可裝設機械式或電氣式離合器負責動力傳達切換，在多棟設施作業的場合，發揮逐棟順序操作的特性，減輕動力負擔。本裝置的關鍵元件在離合器，經過組裝測試和調校後可達預定功用，現正裝設於后里試驗農田長期牽引自走噴灑設備，田長55m、寬8.5m，葉面噴灑效果在 28.7m/min 速度時可達水試紙七級以上,泵壓力25kg/cm^{2}傳輸管長100m，噴霧架上裝設5支垂直噴桿，每桿4粒中空圓錐霧型噴頭，速度於 18.7 m/min 至 36.8 m/min 間可調，單位時間噴量測得 20.6 l/min，試驗田噴量由60.6公升減少至30.8公升，單位面積噴量介於129.6 l/10a及65.9 l/10a之間。

農業推教之研究

中日農業推廣體制之比較分析

高德錚

吾國之農業推廣條例草案已在民國八十年廿一日經立法院經濟、教育兩委員會聯合審查一讀通過，基本上此條例乃為建立以政府（農業改良場）為主體之農業推廣制度與體制而制定。二次大戰以後，台灣之農業推廣工作除延用戰前日本人設制之農業組合外，亦由美國引入四健、家政及農事推廣工作之觀念，而形成一種政府與農會合辦之多元化體制。而戰後日本于1948年通過之〝農業改良助長法〞即將該國之農業廣工作改由政府來主導之一元化推廣體制。又，至今日本之農業改良助長法已歷經五次修正，以更進一步確定由政府主導來服務農友的目的。基於中日兩國之農業背景及發展路徑幾相近似，因之本研究著重於比較兩國近代之農業推廣體制之異同，藉以探討如何修補審議中之〝農業推廣體制〞。

作物病蟲害診斷與農民服務

林正賢

本場自七十九年十一月起，在建立植物保護技術資訊庫及診斷服務計畫下，成立「作物病蟲害診斷服務站」其服務對象主要為轄區內農民，偶亦有其他地區農民來函諮詢，在服務之十個項目中，二年內計有881件，就中(1)寄送或當面致送農業

技術淺說小冊、單張贈閱資料者達297件（佔33.7%），次為作物病蟲害診斷243件（佔27.6%）。(2)接受農民諮詢案件之地區別以彰化縣109件最多(46%)，次為台中縣83件(35.1%)，(3)以作物病蟲害診斷服務的方式別為電話聯繫及自行送件最多（分別76件(32.2%)、73件(31.0%)）。(4)作物病蟲害診斷的作物類別以蔬菜最多（64件33.7%），水稻次之（58件30.5%）。(5)作物病蟲害診斷結果類別以病害居最多，計89件（佔46.8%）蟲害次之，39件（佔20.5%）。

台中地區農會運作之研究

戴登燦、邱建中、李嘉元、陳炎星

本研究以3個偏遠型農會、44個鄉村型農會及14個都市型農會進行會務、事業及經營績效等項目之分析，其結果顯示在會務方面，都市型之農會其正會員之比率略高於贊助會員，但偏遠型農會之會員則以正會員佔大多數（約93%）。聘僱人員之配置，以信用部人員最多，其次為供銷部、會務股或推廣股，此現象在不同類型農會之間皆相似。就聘僱人員之教育程度而言，以都市型農會最高，專科以上學歷者佔50%以上，其餘三類型農會以高中職程度佔最多數，在農會事業收入方面，鄉村型與都市型農會皆以金融事業為主要收入來源，偏遠型則以金融及經濟事業並重。損益方面僅有偏遠型農會之經濟事業有盈餘，其餘兩型農會皆虧損。在經營效能方面，都市型農會之自有資本收益率最高，鄉村型及偏遠型依序次之。以信用部門營運而言，偏遠型之農會存放款比例高於其他兩型農會，業務經營較具潛力。而供銷部門的績效則因鄉村型農會經營供給、運銷、政府委託及其他事業等較多業務，而獲較高毛利率。家畜保險方面，承保率以都市型農會較高且理賠率較低，其績效較兩型農會佳。

農業資訊研究

國內六大報紙對農業新聞報導之分析研究

邱建中、李嘉元、鄭健雄、黃穎捷

本研究係利用內容分析法，探討中央日報、聯合報、中國時報、台灣新生報、台灣日報、經濟日報等國內六大報，在民國82年對農業新聞報導的層面與範圍、就新聞內容、版面安排、新聞性質、報導方式、篇幅大小及圖片配合等主題進行分析。發現每報每天報導農業新聞1.33則，約為800～1200字，在新聞報導之比重上，實屬偏低，而報導內容方面，以農業生產與科技創新(17.9%)、農業推廣(15.6%)、農業問題與農民意見反應(20.5%)及農民福利與農村生活(19.9%)等方面的內容為主，在版面安排方面，大都是安排在地方新聞版(50.2%)為主，綜合新聞版(15.3%)及生活與社會版(17.4%)次之，各月份新聞之分配約在4.4%～12.6%之間，差異不大。

83 年度農村青年農業專業訓練之分析研究

鍾維榮、鄭健雄、邱金滿

本研究係針對本場83年度所辦理四個農村青年農業專業訓練班，以參加之119名學員為研究對象，問卷調查經分析結果。參訓學員年齡以31～35歲佔最多，佔36.9%；36～40歲次之，佔32.9%。學員之教育程度，大多數為高中高職以上，佔82.6%。調查參訓學員分佈於各改良場區域情形，發現學員大多數來自台中場區域有49人，佔41.3%；桃園場區域次之，計有30人，佔25.2%。參訓學員對所接受的農業專業訓練之滿意程度之學員比率，比較四個班別，以設施蔬菜班最高，達54.5%；其次為花卉班，佔39.3%。在訓練項目方面，四個班別平均，以訓練環境之滿意程度最高，佔參訓學員之52.2%；其次為課程安排,佔45.0%；再其次為訓練設備及師資安排，分別為40.5及36.9%；而以訓練教材之滿意程度學員百分比最低，僅為29.7%。

台中地區鄉村老人健康問題之調查研究

張嘉眞、邱阿勤

本研究以台中地區辦理八十三年度農村生活改善計畫『高齡者生活改善班』之班員為對象，包括台中縣16鄉鎮、彰化縣20鄉鎮及南投縣7鄉鎮，共43鄉鎮1189名班員，其資料蒐集方式為在研習前進行成員之體檢及問卷調查，樣本中包括男性418人，女性771人，年齡分佈以65～69歲最多佔43.3%，75歲以上老人亦有13.4%，教育程育有44.0%均不識字，居住型態以與配偶、兒媳同住者佔40.6%最多，其次僅與配偶同住的也佔了26.9%。這些老人有44.5%覺得自己身體健康，覺得普通的有43.4%，12.2%覺得自己不夠健康，有47.7%目前沒有最感痛苦和困擾煩惱的事，52.3%回答有，其中以病痛為多佔57.0%，依次為沒錢14.0%子女，不在身邊12.5%及無聊、寂寞、孤單11.3%。根據抽血檢查結果，尿酸超過正常值的有453人，佔受檢人數之39.4%，膽固醇超過正常值有244人，佔20.5%，三酸甘油脂超過正常值的有294人，佔24.9%，空腹血糖有160人佔13.5%超過正常值，血壓一半以上之受檢者52.9%超過正常值。五項均正常的只有18.5%，有81.5%的老人至少有一項以上是屬於不正常的，由此可看出鄉村老人患有慢性疾病的比率頗高，有待加強改善與照顧。因此建議：(一)教育老人懂得珍惜身體健康的重要性。(二)透過農保及將實施的全民保險，對老人定期健康檢查。(三)社區老人健康醫療及服務網的建立。

二、農業推廣教育成果

農業推廣工作

教育訓練工作

本場為增進青年農民之農業新知技術，八十三年度辦理花卉、設施蔬菜、有機農業及農業經營等 4 班農村青年專業訓練班，結訓學員 116 人。為提升農業推廣人員的工作技能，本場辦理幻燈片教材製作班1班，受訓學員30人。同時接受海外會及海合會委託代訓 3 班別之友邦農技人員專業訓練班，共計36人；本場亦另代訓30班之訓練班，受訓學員共計82人（表一）。

農村生活改善

本場為提高農民生活素質，積極推動農村生活環境改善工作，重點工作包括輔導43村里辦理高齡者生活改善班、19村里組班辦理預防保健工作、 9 村里組班辦理環境保護教育、14村里辦理農村社區實質環境改善工作（表二）。

表一、農業推廣中心之訓練業務

訓練班別	班數(班)	人數(人)
農村青年專業訓練班	4	116
推廣人員在職訓練班	1	30
友邦農技人員訓練班	3	36
其他代訓班	3	82
合計	11	264

表二、台中區農漁村生活環境改善情形

縣市別	高齡者生活改善	預防保健工作	強化家庭功能	社區實質環境改善
台中市	—	—	1	—
台中縣	16	7	5	5
南投縣	7	4	1	2
彰化縣	20	8	2	7
合計	43	19	9	14

鄉村文化發展

本場為塑造具有鄉土性之社區文化，建立具有文化氣息之現代化鄉村社會，八十三年度共輔導台中縣大甲鎮及梧棲鎮等農會設置農漁村文化示範村里， 5 鄉鎮辦理鄉村文化系列活動，25村里設置農民教室（表三）。

農民服務工作

本場為推展各項農民服務工作，八十三年度接待來訪貴賓及農民8960人、外賓838人，提供諮詢服務及推廣教材 1461 人，派員擔任基層農會講習會講師211人次。

農產品生產成本調查輔導

輔導區內農會辦理農產品生產成本調查，資料提供農林廳編印台灣農產品生產成本調查報告。本年度計51個鄉鎮農會辦理，計調查134種作物（表五）。

輔導農漁村青年創業計畫

本計畫旨在協助青年農民創設現代化農場，本年度計 214 位青年農民獲得低利貸款從事花卉、茶、果樹、蔬菜及蛋雞等農場經營（表六）。

表三、八十三年度台中區辦理鄉村文化活動情形

縣市別	農村文化示範(鄉鎮)	鄉村文化活動(鄉鎮)	農民文化教室(鄉鎮)
台中縣	2	4	8
南投縣	—	—	7
彰化縣	—	—	9
台中市	—	1	1
合計	2	5	25

表四、八十三年度農民服務情形

服務項目	次數	人數
引導國內團體參觀	131	8,960
引導外賓參觀	82	838
農民諮詢服務及教材	574	1,461
安排講師	211	—

表五、農產品生產成本調查概況

縣市別	調查作物數	調查鄉鎮數	調查户數
台中縣	35	16	240
彰化縣	45	22	300
南投縣	54	13	315
台中地區	134	51	855

表六、青創農場之經營種類

縣市別	花卉	蔬菜	果樹	茶	菇類	水產養殖	養蜂	農產	蛋雞	肉雞	乳牛	乳羊	養豬	合計
台中市	4	0	0	0	0	0	0	0	0	0	0	0	0	4
台中縣	30	2	5	0	9	0	1	0	0	1	0	1	0	48
彰化縣	46	5	2	1	4	2	0	2	4	0	1	1	2	70
南投縣	46	7	4	60	4	1	0	0	0	0	0	0	0	92
合計	126	14	11	31	16	3	1	2	4	1	1	2	2	214

三、出版刊物

A・發表文章(臺中場研究彙報第42～45期)

1.謝慶芳、徐國男　有機質肥料對甜椒生長與產量之影響　42：1～9。

2.王錦堂、陳鴻堂、賴惠珍　中部多作蔬菜栽培區土壤重金屬含量調查　42：11～20。

3.劉達修　中改式昆蟲性費洛蒙誘蟲盒的構造及其捕蟲效果　42：21～28。

4.李健摓、陳世雄　營養生長期土壤水分境況對水稻生育之影響—對產量及產量構成要素之影響—　42：29～40。

5.龍國維、田雲生　堆肥撒佈搬運車研製與試驗　42：41～52。

6.林嘉興、張林仁　不同棚架對葡萄生長及作業勞力之影響　42：53～61。

7.陳啓吉、劉達修　水稻莖稈特性與其對螟蟲之感受性關係研究　43：1～6。

8.洪梅珠、宋勳　包裝形式及貯存溫度對小包裝白米品質之影響　43：7～15。

9.劉興隆　種子藥劑處理與土壤施藥處理對菠菜立枯病防治效果比較　43：17～24。

10.蔡宜峰、黃祥慶　不同有機資材及通氣量對堆肥中營養要素之影響　43：25～33。

11.林天枝　遮蔭及覆蓋對薑荷(*Zingiber mioga* Rose)生長之影響試驗　43：35～40。

12.張林仁、林嘉興　不同海拔及結果枝形質對枇杷生育與品質之影響　43：41～47。

13.王文哲、劉達修　數種殺蟎劑和殺菌劑triforine混合對玫瑰二點葉蟎毒效之影響　44：1～11。

14.蔡宜峰　菇類太空包廢料堆肥化製作之研究　44：13～21。

15.田雲生、龍國維　小型多功能畦間搬運車研製　44：23～34。

16.張致盛、楊耀祥　GA_3及Fulmet對黑后葡萄花穗發育之影響　44：35～44。

17.郭俊毅　豌豆無筋絲新品系特性之探討(Ⅰ)冬天氣溫對豆莢無筋絲表現之影響　44：45～52。

18.張惠眞、黃淑惠　中部地區農村婦女家政教育需求之調查研究　44：53～62。

19.許志聖、陳有富、柯學儒、白鐵　栽培水稻秈、粳型雜交後代族群基因頻度的變化　45：1～9。

20.林景和　蜜餞食品工廠排放水流域附近蕃石榴枯萎原因研究　45：11～18。

21.陳鴻堂、林景和、紀秋來、王銀波　本省中部地區設施內土壤鹽分累積調查研究　45：19～26。

22.方敏男　豌豆害蟲種類調查及防治試驗　45：27～43。

23.鄭健雄、張惠眞、邱阿勤　東勢鎮高齡者生活輔導班運作成功因素之個案研究　45：45～54。

24.謝慶芳　有機農業可行性觀察試驗（台中試區）　45：55～68。

B．台中區農推專訊(月刊)

135期　台中秈十號
136期　農村社區家庭垃圾堆肥化的規劃與處理技術
137期　綜觀台灣國蘭產業之發展
138期　國蘭病害之簡介
139期　從植物營養學觀點談國蘭肥培管理
140期　生長調節劑應用在國蘭栽培上之初步探討
141期　有機米栽培

C．台中區農業專訊(季刊)

第五期　(83. 4)
第六期
第七期　(83. 6)
第八期　(83. 9)
第九期　(83.12)

D．台中區農業改良場特刊

第33號 枇杷生產技術研習會專集 林嘉興、張林仁 主編(83.6)
第34號 台灣經濟果樹栽培技術及應用研究討會專集 林信山、張林仁 主編(83.6)
第35號 Toward Enhanced and Sustainable Agricural Productivity in the 2000's:
Breeding Research and Biotechnology　Volume Ⅰ、Ⅱ、Ⅲ
/Edited by Sheng-Chung Huang, Chief Dah-Jiang Liu Ching-Huei Kao
Te-Tzu Chang(1994)

E．其他刊物

台中縣鄉村休閒之旅
台中市鄉村休閒之旅
彰化縣鄉村休閒之旅
南投縣鄉村休閒之旅

四、八十三年度國內外來賓訪問及參觀本場統計表

Local Visitors
國內部份

83.01.04　信義鄉農會共45人來場參觀果樹、蔬菜栽培。
83.01.05　水土保持局第一工程所共45人來場參觀有機農業。
83.01.08　中華花卉園藝文教基金會共150人來場參觀花卉。
83.01.21　華塑投資股份有限公司共5人來場參觀。
83.01.22　中華文教基金會共50人來場參觀花卉。
83.02.02　彰化糧管處共90人來場參觀。
83.02.16　彰化糧管處共90人來場參觀。
83.02.17　員林高級中學共140人來場研習GATT講解。
83.03.04　桃園改良場共45人來場參觀有機農業。
83.03.04　東勢鎮農會共45人來場參觀梨樹栽培。
83.03.08　和平鄉農會共45人來場研習探討GATT。
83.03.09　西螺鎮農會共190人來場參觀良質米與秈稻。
83.03.14　仁武鄉農會共90人來場參觀水耕及花卉。
83.03.14　東勢鎮農會共45人來場參觀梨第二次催芽栽培。
83.03.15　大村國小共182人來場參觀。
83.03.17　和平鄉農會共45人來場參觀番茄栽培管理技術。
83.03.22　南投縣政府共40人來場參觀有機農業。
83.03.22　水里鄉農會梅產銷班班員共90人來場參觀土壤管理。
83.03.22　中興大學農業經營系共25人來場參觀水耕。
83.03.24　私立實踐設計管理學院共45人來場參觀水耕、花卉、園藝。
83.03.25　台中市農會共50人來場研習GATT、花卉病害。
83.03.30　草屯鎮農會共50人來場參觀梨栽培。
83.03.30　苗栗三灣鄉農會共90人來場參觀梨新品種。
83.03.31　新莊市農會共50人來場參觀蔬菜栽培、病蟲害防治及產銷班組織。
83.04.04　彰化婦女會共100人來場參觀。
83.03.08　員林國小共31人來場參觀。
83.04.09　彰化高中共30人來場參觀水耕、花卉。
83.04.12　墩南合作農場共8人來場參觀花卉(玫瑰)栽培。
83.04.13　花蓮高農共46人來場參觀永續農業。

83.04.14　亞太糧肥技術中心共32人來場參觀。
83.04.15　竹崎鄉公所共47人來場參觀有機農業。
83.04.18　永靖鄉竹子蔬菜產銷班共47人來場參觀水耕。
83.04.18　芬園鄉農會共40人來場參觀。
83.04.19　台北瑞芳區漁會共58人來場參觀家政。
83.04.19　省訓團(糧管處)共50人來場研習米穀檢驗講習。
83.04.20　中埔鄉農會共45人來場參觀土壤及有機農業。
83.04.23　中華花卉園藝基金會共100人來場參觀花卉、水耕
83.04.27　泰山鄉農會共169人來場參觀。
83.05.04　竹崎鄉公所、農會、茶葉、柑桔研究班共48人來場參觀有機農業。
83.05.05　草屯鎮農會共40人來場參觀良質米栽培管理。
83.05.06　霧峰高農共83人來場參觀水耕。
83.05.10　屏東縣泰武鄉公所共45人來場有機農業。
83.05.10　台東地區農會共45人來場參觀梨病害。
83.05.10　王公小學共30人來場參觀。
83.05.12　苗栗農工共80人來場參觀水耕、花卉。
83.05.15　嘉義農專共45人來場參觀水耕。
83.05.16　梓官鄉農會共90人來場參觀台中秈10號。
83.05.16　埔鹽鄉農會共90人來場參觀家政。
83.05.16　九如鄉農會共90人來場參觀家政。
83.05.17　糧食局辦理公糧委託人員講習會共40人來場參觀稻穀品種特性介紹。
83.05.17　竹崎鄉農會共90人來場參觀有機農業。
83.05.17　溪口鄉農會共120人來場參觀台梗九號及設施栽培。
83.05.17　東勢鎮農會共45人來場參觀梨第二次催芽栽培技術。
83.05.18　大湖地區農會共90人來場參觀組織培養。
83.05.18　通霄鎮農會共90人來場參觀果樹栽培。
83.05.20　新豐鄉公所共90人來場參觀水耕栽培。
83.05.25　番路鄉農會共45人來場參觀土壤管理。
83.05.25　后里鄉農會共45人來場參觀家政。
83.05.28　糧食局共50人來場參觀米穀檢驗講習。
83.05.30　新屋鄉農會共45人來場參觀水耕。
83.05.31　雲林二崙國中共35人來場參觀花卉。
83.06.01　龍潭農工共43人來場參觀水耕。
83.06.03　東勢鄉公所共30人來場參觀。

83.06.07　后里鄉農會共40人來場參觀花卉。
83.06.07　西螺鎮農會共180人來場參觀台中秈10號栽培管理。
93.06.09　農委會共40人來場參觀場務簡介及蔬菜農户。
83.06.14　國姓鄉農會共160人來場參觀枇杷、土壤栽培。
83.06.14　台東地區農會共45人來場參觀梨栽培。
83.06.16　苗栗市農會共45人來場參觀水稻栽培。
83.06.17　西螺鎮農會共180人來場參觀台粳8號。
83.06.20　埔里鎮農會家政班共90人來場參觀。
83.06.22　新竹農場共8人來場參觀水耕。
83.06.22　台中縣農會四健會幹部共70人來場參觀。
83.06.25　台中縣后綜中學共5人來場參觀水耕及簡介。
83.07.06　省府會見民眾案件處理小組會議共50人來場參觀。
83.07.19　彰化糧管處(米香之旅)共190人來場參觀水稻栽培。
83.07.26　彰化糧管處(米香之旅)共90人來場參觀水栽培。
83.07.29　路竹鄉農會共45人來場研習蔬菜新品種試作。
83.08.02　彰化糧管處(米香之旅)共90人來場參觀水稻栽培。
83.08.09　泰山鄉農會共45人來場參觀水耕及花卉。
83.08.15　魚池鄉農會共50人來場參觀產銷班組合及蔬菜栽培。
83.08.16　泰山鄉農會共50人來場參觀水耕及花卉。
83.08.22　泰山鄉農會共90人來場參觀水耕及花卉。
83.08.24　員林崇實高工老師共30人來場參觀水耕。
83.08.25　魚池鄉農會共50人來場研習產銷班組合及國蘭病蟲。
83.08.26　大村鄉農會共30人來場研習葡萄栽培。
83.08.29　台中縣農會共29人來場參觀家政。
83.09.08　草屯鎮農會共50人來場參觀水稻。
83.09.13　台灣省中等學校教師研習會共53人來場參觀水耕。
83.09.15　省農會各縣市農事技術交流觀摩共90人來場參觀水耕。
83.09.22　省農會各縣市農事技術交流觀摩共90人來場參觀水耕。
83.09.23　花蓮吉安鄉農會共45人來場參觀水耕及花卉。
83.09.29　埤頭鄉農會共45人來場參觀葡萄栽培管理。
83.08.29　草屯鎮農會共50人來場參觀水稻栽培。
83.09.30　埔里鎮農會共45人來場水稻新品種。
83.10.03　東勢鎮農會共45人來場參觀梨第二次催芽。
83.10.04　台北松山區農會共90人來場參觀有機及蔬菜栽培。

83.10.04 竹東鎮公所共45人來場參觀有機農業。
83.10.14 東勢鎮農會共45人來場參觀梨第二次催芽。
83.10.17 南投縣水稻育苗協進會共45人來場參觀水稻栽培。
83.10.17 省新聞處大專院校教授共70人來場參觀。
83.10.18 林口鄉農會共100人來場參觀水稻栽培。
83.10.18 雲林土庫國中共40人來場參觀水耕及花卉。
83.10.26 東劫鎮公所共45人來場參觀葡萄栽培。
83.11.15 台中市農會共45人來場參觀良質米、有機農業。
83.11.17 花蓮玉溪地區農會共70人來場參觀水耕及花卉。
83.11.18 板橋老人會共45人來場參觀。
83.11.22 魚池鄉農會共45人來場研習GATT及青創貸款講解。
83.11.29 仁愛鄉公所及仁愛國中校長、鄉長共90來場參觀。
83.11.30 台北市南港市農會共45人來場參觀蔬菜栽培。
83.12.08 新社鄉農會共45人來場參觀有機農業。
83.12.11 台中市農會共40人來場參觀花卉栽培。
83.12.13 信義鄉農會共20人來場參觀蔬菜栽培。
83.12.13 草屯鎮農會共40人來場參觀水稻新品種。
83.12.19 社頭鄉農會共45人來場參觀如何利用家庭垃圾製作。
83.12.19 大埤鄉農會共15人來場參觀水耕。
83.12.21 國姓鄉農會共90人來場參觀茄子栽培及病蟲害。
83.12.21 花壇鄉三春國小教師共25人來場參觀花卉栽培。
83.12.22 台中縣后綜國中共46人來場參觀水耕及簡報。
83.12.28 二林鎮農會共200人來場參觀水耕栽培。
83.12.30 竹崎鄉農會共120人來場參觀自然農法栽培。

Foreign Visitors
國外部份

83.01.02 日本長野縣松本農學共12人來場參觀。
83.01.13 財團法人海峽交流基金會大陸記者共13人來場參觀。
83.01.19 農委會(大陸傑出學人何康夫婦)共3人來場參觀。
83.01.26 農委會(日本植病生物防治專家木島利男轉博士)共1人來場參觀。
83.02.17 亞蔬中心(菲律賓稻米研究所病理系主任)共1人來場參觀。
83.02.22 行政院新聞局(德國慕尼黑大學植物專家)共2人來場參觀花卉。
83.02.26 亞蔬中心(尼泊爾農業訪問團)共13人來場參觀。

83.03.01 台中高農(菲律賓國際農村青年)共5人來場參觀。
83.03.02 香蕉研究所(美國佛羅里達大學土壤博士)共3人來場參觀。
83.03.10 行政院新聞局(日本朝日新聞記者)共1人來場參觀。
83.03.22 土地改革所十七國學員六三期農地正規班中外學員共30人來場參觀。
83.03.24 東加王國國王共22人來場參觀。
83.04.18 中興工程顧問共17人來場參觀。
83.04.26 海外會(南非共和國等十八國官員)共18人來場參觀。
83.04.29 農委會(歐體官員)共2人來場參觀。
83.05.03 土地改革所(中南美洲高級官員)共25人來場參觀。
83.05.03 日本醫生勞動研究協會共6人來場參觀。
83.05.13 中國青年反共救國團(日本農漁村青年幹部)共30人來場參觀。
83.05.14 吐瓦魯財政暨經濟部長達拉及夫人共3人來場參觀。
83.05.24 海外會(多明尼加等八國)共11人來場參觀。
83.05.26 外交部亞太司共8人來場參觀。
83.05.30 韓國南道振興公司共42人來場參觀。
83.05.31 韓國南道振興公司共42人來場參觀。
83.06.06 中南美洲經記記者會共8人來場參觀。
83.06.09 農委會共40人來場參觀場務簡介及蔬菜農戶。
83.06.23 外交部聖克里斯多福外交部次長共3人來場參觀。
83.06.29 東海大學農學院長及澳洲外賓共10人來場參觀。
83.07.08 亞洲農業服務中心(大陸農業專家)共9人來場參觀。
83.07.16 南非非洲民族議會訪華團共6人來場參觀。
83.07.21 中國農村發展規劃學會(大陸水稻專家馬岳先生)共2人來場參觀。
83.07.21 日本福岡市丸支出荷組合代表共25人來場參觀。
83.07.23 外交部(南非非洲民族議會議員)共8人來場參觀。
83.08.05 行政院新聞局(泰國每日新聞主編)共2人來場參觀。
83.08.08 日本大學米田和夫教授共1人來場參觀花卉。
83.08.12 農委會(日本教授陳仁端)共2人來場參觀。
83.08.13 中興大學(日本教授二名及興大學生)共15人來場參觀。
83.08.20 韓國農村公務部共9人來場參觀。
82.08.25 日本靜岡縣組合共30人來場參觀。
83.08.30 嘉義農專職校(大陸傑出農業學者)共10人來場參觀。
83.09.03 行政院新聞局(印尼觀察家報總編輯行)共3人來場參觀。
83.09.03 行政院新聞局(加拿大太陽日報總編輯)共2人來場參觀。

83.09.08 亞東關係協會(日本態本縣益城町農業協同組合)共5人來場參觀。
83.09.30 亞東關係協會共10人來場參觀。
83.10.01 南非農業部副部長及國會議員共8人來場參觀。
83.10.19 泰國技術學院共40人來場參觀農藝及園藝作物栽培。
83.10.24 日本鹿兒島共11人來場參觀。
83.10.27 外交部(索羅門群島)共3人來場參觀。
83.11.18 馬達加斯加共和國(印度洋月刊政濟雜誌總編輯)共2人來場參觀。
83.11.21 國際農業開發院共16人來場參觀。
83.11.22 中國合作事業社(韓國模範農民)共10人來場參觀。
83.11.26 韓國四健會聯盟共18人來場參觀。
82.11.30 JA和寒町青年部共36人來場參觀。
82.12.02 新聞局(加拿大曼尼托巴合作報記者)共2人來場參觀。
83.12.02 日本宮城縣農業協同組合共10人來場參觀。
82.12.07 菲律賓農企考察團共16人來場參觀。
83.12.13 農委會周若男(大陸學者)共3人來場參觀。
83.12.15 台中農學工程學系(大陸農業水利團教授及專家)來場參觀。
83.12.20 外交部(吏瓦濟蘭駐聯合國大使夫妻)共5人來場參觀。
83.12.23 美國夏威夷州農業廳長共5人來場參觀。

五、八十三年度出國人員統計表

姓　名	前往國家	出國日期	目的及任務
鄭健雄	埃及開羅	1.13～3.17	應亞非農村復興組織函邀研習農業輔導
戴登燦	日　本	2.26～3.12	研習農漁村社區更新推行策略及體制
王錦堂	日　本	3.09～3.18	參加自然農法推廣研習會擔任講師並作田間參觀
洪梅珠	日　本	3.22～3.26	赴日本北海道大學參加畢業典禮並收集良質米抗冷稻種及永續性農業試驗資料
龍國維	日　本	4.17～4.23	研習蔬菜移植機械與技術
宋　勳	新加坡 馬來西亞	4.29～5.12	協助勘查規劃稻作發展
林嘉興	日　本	6.21～7.14	研習日本園產品採取後處理技術
林景和	美　國	7.16～8.08	參加農業生態體系轉變為永續經營之生態、能源與經濟之分析學術研討會
林俊義	日　本	8.05～8.12	赴日本自然農法國際研究開發中心及MOA產銷支部觀摩考察
張惠眞	日　本	9.26～10.08	參加農村婦女耕作及改善生活品質研習班
高德錚	日　本	10.01～10.23	研習農業推廣體制(一九九四年度中日技術合作計畫)
廖萬正	日　本	11.21～11.27	督導梨採穗作業
高德錚	斐　濟	11.20～11.29	應邀赴斐濟參加南太平洋區域性蔬菜生產研討會並至該國農業試驗總所演講及現場指導

六、八十三年專題討論

日　期	主講人	題　　目
83.02.21	洪梅珠	DNA多型性檢定及其應用
83.02.28	張林仁	簡易溫室環境對葡萄生育之影響
83.02.28	邱建中	泗水農技團介紹
83.03.07	楊嘉凌	種子水分含量與種子貯藏之關係
83.03.07	劉興隆	瓜類白粉病之發生及防治策略
83.03.14	張素貞	水稻抗白葉枯病之遺傳
83.03.21	蔡宜峰	有機質肥料發展潛力及未來開發策略
83.03.21	陳彥睿	玫瑰修剪之研究
83.03.28	郭俊毅	十字花科蔬菜之自交不親和性
83.04.11	劉達修	螺旋粉蝨之生態與防治
83.04.11	林嘉興	應用園藝技術方法誘導柑桔形成不時花
83.04.18	林再發	作物抗蟲之機制
83.04.25	黃秀華	Fusarium屬病原菌在土壤中之生態
83.04.25	黃勝忠	百合之育種及種間雜交之克服
83.05.02	陳啓吉	荔枝果實蛀蟲生物特徵，為害習性及其生態
83.05.02	李健拃	稻田土壤氮素的轉化、損失及其改善
83.05.09	曾勝雄	稻田轉作薏苡栽培技術之探討
83.05.16	陳武揚	酸雨對昆蟲族群之影響
83.05.23	許志聖	雜草的抗藥性
83.05.30	柯忠德	昆蟲病毒在害蟲防治之應用
83.06.06	沈　勳	綠肥作物與本省耕作制度之探討
83.06.20	古錦文	菜豆抗角斑病之抗病育種
83.06.27	許愛娜	發芽後水稻穀粒貯存物質之變化
83.06.27	陳慶忠	粉介殼蟲之簡介
83.07.04	王文哲	桃蚜之生態與防治
83.07.04	張隆仁	高粱子實品質之研究－臘質基因之遺傳
83.07.11	廖萬正	梨開花結果生理研究
83.07.11	方敏男	茄子害蟲種類與防治
83.07.18	王錦堂	磁氣作用對植物生長之影響
83.08.01	林正賢	線蟲之生物防治趨勢
83.08.01	宋　勳	稻米澱粉
83.08.15	李健拃	雜種稻產量優勢之機制探討
83.08.15	陳令錫	淺談 RS-232C 資訊傳輸介面
83.08.22	許志聖	台灣水稻直播栽培的研究與展望

日　期	主講人	題　　目
83.08.29	易美秀	白絹病之防治
83.09.05	林景和	土壤磷有效性與有機物質之關係
83.09.12	黃金助	番茄素對小菜蛾取食及產卵之影響
83.09.12	許愛娜	雜交水稻之穀粒品質
83.09.26	洪梅珠	稻米蛋白質之組成及特性
83.09.26	劉添丁	柑桔黑點病生態及防治方法
83.10.03	趙佳鴻	基因轉型植物在植物病毒病害防治上之運用
83.10.03	林嘉興	柑桔栽培密度與葉面積指數對果實生產力之影響
83.10.17	黃勝忠	台灣一葉蘭～從野生至栽培生產
83.10.17	田雲生	播種機具之介紹與探討
83.10.24	戴振洋	溫度對番茄開花著果之影響
83.11.07	廖萬正	園產品採收後處理簡介
83.11.07	林金樹	溫室效應對昆蟲的影響
83.11.14	張德前	豇豆主要病蟲害發生與防治
83.11.21	何榮祥	農產品物性與原理
83.12.05	陳鴻堂	綠肥作物利用探討 I
83.12.17	龍國維	農業生產自動化之介紹

七、八十三年度國科會研究獎助費受獎助人名冊

姓　名	級別	題　　目
林信山	甲種	Evaluation of Culture Media and Shading on Container-grown Oriental Pears in Taiwan's Lowland
陳慶忠	甲種	水稻萎凋矮化病毒之純化、特性及血清類緣關係
劉達修	甲種	梨瘤蚜(Aphanostigma Piri (holodkousky)對梨果之危害及其生態研究
洪梅珠	乙種	水稻穀粒性狀之遺傳研究
趙佳鴻	乙種	瓜類兩種屬馬鈴薯Y群病毒之傳播與生態學研究
林景和	乙種	利用廢棄菇類栽培介質製作堆肥之研究

其他獲獎名冊

姓　名	得　獎　項　目
劉添丁	獲得八十三年行政院模範公務人員
張隆仁	獲得中華農學會八十三年度鄭仲孚先生研究獎金
鄭健雄	獲得中國農業推廣學會優秀農業推廣人員

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S. H. Chuang(莊杉行) Assistant Horticulturist

附 錄（APPENDIX）

台中地區每月最高、平均、最低溫度及總降雨量，83年度

Monthly maxium, mean, minium, temperature and rainfall of central Taiwan, 1994

月份 Month	最高溫度(℃) Max. Temp.	平均溫度(℃) Mean Temp.	最低溫度(℃) Min. Temp.	降雨量(mm) Rainfall
January	26.7	16.3	6.4	25.5
February	27.9	16.9	9.7	120.0
March	28.7	17.3	8.8	57.0
April	33.3	24.6	16.5	17.5
May	33.1	26.0	17.6	437.5
June	33.8	27.7	22.3	170.0
July	34.4	28.5	22.6	125.0
August	33.5	27.7	23.5	299.5
September	32.0	25.9	17.8	95.5
October	31.5	23.5	16.0	3.0
November	36.0	22.2	15.4	0.0
December	30.7	20.4	12.6	11.0