RESEARCH AND DEVELOPMENT

RICE RESEARCH

Effects of Nitrogen on Bacterial Leaf Blight of Rice

Nitrogen application increased the incidence and severity of bacterial leaf blight (*Xanthomonas campestris* pv. oryzae) of rice. The purpose of this study was to evaluate performance of three rates of ammonium nitrate application on this disease. Nitrogen concentrations were applied at 80, 120, 240 ppm by hydroponic culture in greenhouse. Inoculated XP 13 strain of *X. campestris* pv. *oryzae* were done at tillering and booting stages, respectively. One susceptible cultivar TN1 and one resistant rice line TSWY 7 were tested, responsed similarly to the three rates of nitrogen at tillering stage, but differently at booting stage in respect to each tested rice material. At tillering stage, no significant differences were observed among three rates of nitrogen both the two tested rice materials. But the disease lesion length devloped fast in the susceptible cultivar TN1 and was more longer than that in the resistant rice line. At booting stage, there was significantly different response to nitrogen concentrations in cultivar TN1 and no significant effects of nitrogen on rice line TSWY 7. The disease lesion length of cultivar TN1 was increased with decreasing nitrogen concentration. The results of this experiment indicated that effects of nitrogen on bacterial leaf blight development depended upon varieties and growth stage of rice.

Study on the Damage of Rice by the Dipping Water

The second crop of 1991:

1. The dipping water trial at the beginning growth stage: the effect of dipping day on rice productions was lower than check treatment by 28-100%, 25-100%, and 17-100% under three treat- ments of seven, five, and three dipping days, respectively. For the rice production, the effect of dipping stage treated after transplanting gave lower yield by 45-100%, 32-100%, and 17-100% under the treatment of first, second, and third week after transplanting, respectively.
2. At later growth stage, the dipping water resulted in the yield loss under the treatment of seven, five, and three dipping days by 49- 65%, 45-56%, and 24-32%, respectively, compared with the check. The yield was lower by 27-65%, 24-63%, and 32-49% when the dip was treated at panicle initiation stage, full heading stage, and the third week after heading, respectively.

The first crop of 1992:

1. The dipping water trial at the beginning

growth stage: the effect of three dipping days on rice production was the least loss than check by 0-28%. On the other hand the effect of dipping stage treated by the first week after transplanting gave the least yield loss by 3-21%.

2. At later growth stage, the dipping water resulted in the yield loss under the treatment of seven, five, and three dipping day by 15- 56%, 12-57%, and 11-44%, respectively. The yield was lower by 17-40%, 11-57%, and 12-20% when the dipping water was treated at panicle initiation stage, full heading stage, and the third week after heading, respectively.

Effects of Soil Moisture Regime on Growth and Yield of Rice (Oryza sativa. L)

This experiment aimed to research on saving irrigation water, improving soil aeration and rice root activity by drying the paddy soil. Two cultivars, Taichung 189 (Japonica type) and Taichung Sen 10 (Indica type) were used in the field and in pots under green house during the first crop and second crop of 1992. Soil moisture tension of 0, 0.02, and 0.04 MPa were the beginning points for irrigation. The results of field experiment showed that yield of Taichung 189 treated by soil moisture tensions of 0.02 and 0.04 MPa were 25 and 31%, respectively, lower than that by 0 MPa. The yield of Taichung Sen 10 treated by soil moisture tension of 0.02 and 0.04 MPa were also about 18% lower than that by 0 MPa. The results of pots experiment under green house were the same as that of field experiment. Root activity, root weight, photosynthetic rate, leaf water potential and stomata conductivity of rice by 0.02 and 0.04 MPa treatments were lower than that by 0.00 MPa. Two cultivars, Taichung 189 and Taichung Sen 10, had the same response to soil moisture treatment, but Taichung Sen 10 showed more resistance to water stress than Taichung 189. When soil moisture tension higher than 0.02 MPa on the vegetative stage, physiological function of rice would significantly decreased, the yield of rice declined as a result of reduced rice tillers. On the other hand, yield and eating quality of rice was not affected by water stress after the full heading stage. Rice responded to water stress during the vegetative stage more sensitively than after the full heading stage.

Influence of Planting Time on the Yield and Quality Characteristics of Rice cv. Taichung Sen 10 Grown in the Second Crop Season

The purpose of this study was to investigate the effect of late planting on the performannce of yield and quality characteristics of indica rice cv. Taichung Sen 10 grown in the second crop season in central Taiwan. It was found that delay of transplanting from August 5 to August 20 could extend the days needed to heading and maturity by 29 and 39 days respectively. Low temperature was considered as the main factor in affecting the growth duration of rice plants. In comparison with normal-planting treatment, a decrease of 65% in grain yield was recorded as a result of reduced filled-grain percentage and 1, 000-grain weight for late-planting plants. Delay of transplanting also tended to decrease the width of brown rice and volume weight of both rough and brown rice. The protein content of rice grain increased while amylose content decreased significantly in response to late planting, presumably the result of abnormal starch synthesis and accumulation. Based on the consideration of economic land utilization, stable yield and high grain quality, early planting of Taichung Sen 10 cultivar in the second crop season was suggested.

WEED RESEARCH

Preliminary Studies on the Peroxidase and Acid Phosphatase Isozyme of Paddy Weeds.

In order to study the peroxidase and acid phosphatase isozyme zymogram of paddy weeds, the starch gel horizontal electrophoresis system was used on the organs of *Alternanthera nodiflora* R. Br., *Ammannia multiflora* Roxb., *Cyperus difformis* L., *Echinochloa crusgalli* Beauv. var. *formosensis* Ohwi, *Fimbristylis miliacea* (L.) Vahl., *Leptochloa chinensis* (L.) Nees, *Monochoria vaginalis* Presl, *Sagittaria trifolia* L., *Scirpus juncoides* Roxb., *Scirpus maritimus* L. etc. which were collected from different places of Tatsuen, Changhua county. The results showed that the zymogram of *Echinochloa crus-galli* Beauv. var. *formosenesis* Ohwi, *Leptochloa chinensis* (L.) Ness, *Alternanthera nodiflora* R. Br. and *Fimbristylis miliaces* (l.) Vahl. had more clearer pattern than other weed species. Furthermore, the zymogram analysis of *Echinochloa crus-galli* Beauv. var. *formosenesis* Ohwi and *Leptochloa chinensis* (L.) Nees showed that the existence of regulation of organ specification within different organs, but didn't show gene polymorphism between different plants.

RICE QUALITY

Study on Amylograph of Viscosity for Milled Rice Powder

The 8% milled rice powder of 60 indica and japonica type of rice varieties with different quality were evaluated for their viscosity by Brabenber's Amylograph. The data were analyzed by the method of cluster analysis. The result indicated that the viscosity of japonica and indica type of rice varieties could be classified into 4 groups and 5 groups, respectively. The relative breakdown for

japonica type was decreased, but the setback ratio was increased by the order of groups. The similar result was found for indica type, except the increase of breakage ratio. This indicated that the retrogradation of starch was also one of the major affecting factor for rice quality. Although amylose content is an important factor affecting retrogradation, but it is not the absolute limiting factor.

UPLAND CROPS

The Purification and Evaluation of Local Peanut Cultivars in Taichung District

A total acreage of 5,000 hectares of peanut were cultivated in Taichung district in which approximately 30-40% were cultivated with local cultivars. Although they were never offically released as a cultivar. Lichi-Tzae was the superior performancing one among local cultivars. Because the local cultivars were adopted by farmers widely and cultivated for a long period of time, these cultivar performances gradually became poor and its productivity decreased. Therefore, the objectives of the present study were to evaluate the effectiveness of purification and selection for three local peanut cultivars and to examine the relationship between agronomic traits and the environmental effects.

Lichi-Tzae, Lichi-Tzae-fan, and Youdou-fan were used as the source cultivars for purification. Purified lines for each cultivar were developed through utilizing mass selection in spring and fall planting in 1991. Progress from selection was evaluated in spring and fall planting seasons in 1992. In 1992, the C1 to C2 generations for each three cultivars and three check varieties were included to evaluate the grain yield in field experiment. The results indicated that the cultivar purification and selection would result in genotypes with larger seed size, higher grain yield, and greater harvest index than the original genotypes without purification. Nevertheless, progress is being made through purification and selection under two growing seasons. A continued selection and field evaluation to exploit purified peanut variety is needed. This purification task on local peanut cultivcars was undertaken continuously.

Studies on Increasing Yield and Quality of Buckwheat

In order to promote the grain yield and quality of buckwheat in Taichung district, trails of nitrogen rates and application method were conducted. The preliminary results were summarized as followed:

The trials conducted in different locations indicated that the Tatsuen was better than the Erhlin and Puli in term of yield and quality of buckwheat. The Tiachung Sel-Yu No.1 had good performance in grain yield. The Taichung Sel-Yu No.1, Ibaraki Zairai, Hitachi Akisoba and Shinano No.1 had better performance in quality. The suitable nitrogen rate 60 kg/ha was suggested to be applied for Taichung Sel-Yu No.1 and Hitachi Akisoba. The nitrogen appplication method for buckwheat by using nitrogen 50% as basal and 50% as top dressing in 15 days after sowing was suggested.

Development of New Wheat Cultivar: Taichung 34

Taichung 34 is a spring Wheat (*Triticum Vulgare* Vill) with powderly mildew, leaf rust, and head blight diseases resistance, as well as high grain qualities for making wine-yeast. It has high yield potential and more stable than that of the extended cultivar Taichung Sel. 2. The original name of Taichung 34 'W-3' was introduced from Japan in 1983, and developed by pure line selection breeding at the Taichung DAIS. Taichung 34 was released as a recommended cultivar in March, 1992.

Taichung 34 which has 124 maturity days after planting is considered as a medium-early wheat variety. This variety has plant height in 95 cm and has 314 effective spikes per m^2. The seed weight is 50.6 gram per thousand seeds, and test weight is 888 gram per liter. Its starch value is 63%. The regional yield trials showed that the average grain yield is 4416 kg/ha, that is higher than the Taichung Select 2 in 22%. Taichung 34 can be adapted to cultivate as an inter-winter crop in the paddy field after 2nd crop of rice, although the growth duration of Taichung 34 has 4 days later than the Taichung Select 2. Significantly, the 1000-seed weight, test weight, and the starch value of Taichung 34 showed that was superior to the Taichung Select 2.

For the resistance to the powder mildew and leaf rust, Taichung 34 has the same character as Taichung Sel. 2. Furthermore, Taichung 34 also showed good reisitance to head blight, while the Taichung Select 2 was highest susceptible to that disease which could cause grain yield in decrease.

As Taichung 34 has the high tillering ability, spread planting method is recommended to be used, otherwise it may produce more uneffective tillers and reduce the grain yield. For managing wheat cultivation at paddy field in Taiwan, the inter-winter cropping of wheat followed by the 1st crop of rice is widely adopted in Taichung district.

Development of Newly Hybrid Line of Sorghum: Taichung-Yu 77-12

Taichung-Yu 77-12 is a newly hybrid combination of soghum derived from the crosses between the restoring line of TCR-76432 and the cytoplasmic male-sterile line TCA-632. The male parent, TCR-76432 which was selected from the cross of 2R x TCR-76432, had the elite

traits of the semi-loosed head shape, well head exersion, and stable flowering time. While the seed parent, TCA-632, superior at the leaf zonat spot resistance, and stable flowering time. The results of regional yield trials showed that nonsignificant difference between Taichung-Yu 77-12 and the check variety Taichung No.5 on the traits of growth periods, plant height, head length, 1000-seed weight, and grain yield. The grain yield of Taichung-Yu 77-12 and the Taichung No.5 was 5,176 kg/ha and 5, 121 kg/ha, respectively. Although the grain yield data obtained were not superior to the check variety, Taichung-Yu 77-12 had the elite characteristics of easy to produce F1 seed, semi-loosed head shape and leaf zonat spot resistance. This elite hybrid will be offically named and released after the experiments on fertilization and plant density were done.

Fig. 1. Newly Developed. Hybrid Sorghum. Taichung-Yu 77-12.

VEGETABLE CROPS

Inheritance of Stringless Pod in Pea (*Pisum sativum* L.)

By crossing the stringy varieties of Taichung 11, Taichung 12 and Taichung 13 with stringless variety of Sugar Daddy, all plants of the F1 and backcross to the stringy parent had stringy pods. These results showed that stringlessness is a completely recessive character. Due to small number of stringless plants and no obvious or consistent pattern in segregation ratios in the progenies of F2 and backcrosses of F1 to the stringless parent, it is difficult to determine how many major genes controlling the stringlessness. Fixed differences in degree of stringlessness observed among the stringless parent and segregating populations indicated that there are modifying genes affecting expression of this trait. The lower percentage of stringless plants recovered in segregating generations in the winter crop than those of summer crop within each cross showed that temperature had influence on the expression of stringlessness.

Study on Bulb Dormancy of Garlic

The duration of dormancy period between different varieties and clover sizes of garlic (*Allium sativa*) were studied. The changes of bud length and weight of clover under indoor storage indicated that the dormancy period for three varieties Hsiehchia, Yuanlin and Homei is 10, 14 and 16 weeks, respectively. The bud length of Hsiehchia, Yuanlin and Homei began increased markedly at 5, 6 and 8 weeks after cold storage. There was 2 to 4 weeks difference of dormancy period between different clover sizes of the same variety (Hsiehchia). The larger of clover size, the shorter of dormancy period, and the smallest clover size have the longest dormancy period.

Pathogenic Specialization of *Uromyces Phaseoli* in Taiwan and Rust Resistance in Beans

The urediniospore samples of bean rust, *Uromyces phaseoli,* were collected from central Taiwan for single spore isolations and pathogenicity tests. Seven races, TW-1 - TW-7, were identified by using 19 differential varieties of beans. Among those cultivars, US. #3 and Pinto 650 were susceptible and cultivars Mexico 309, Actopan x Sonilac Selection 37 (AxS 37), NEP-2, Compuesto Negro Chimaltenango (CNC) were either resistant or highly resistant and immune to Taiwanese races. 30% isolates of the pathogen from our collections similar to the race TW-1 in virulence reaction. Race TW-1 is probably the most common race of rust on Phaseolus vulgaris L., in central Taiwan. Most of the cultivars of Taiwan beans were susceptible to all of the seven races, but cultivar Taichung #1 was resistant to races TW-2, TW-3. The cultivars of BARC-RR-13 and PI's were highly resistant to all of seven races. They may be potential germplasms for improving the rust resistance in the cultivars of Taiwan beans.

The Cultural Technique of Utilization of Bitter Melon Grafted on Luffa Rootstock

Bitter melon is tolerant to heat condition, but the stem and leaf could not tolerate the windy and rainy weather, especially in summer season. This is the major factor of plant wilting and yield reduction. Reports indicated that except bitter melon and bush pumpkin, most cucurbitaeous crops are resistant or tolerant to wilting disease. In order to improve the cultural conditions and ensure the production of bitter melon in summer season, the grafting method is adopted. The study of grafting different scions on bitter melon have revealed that pumpkin and bottle gourd are not good scions due to low grafting survival rate and incompatibility of grafting union. Using the long fruit luffa variety grafted on bitter melon have produced very sucessful union and vigorous plant growth. Results indicated that this grafting technique have increased the disease resistance of bitter melon, extended the harvesting period by 27 days, increased yield by 94% and improve fruit

quality. It will be recommended to the growers.

Effect of Mulching Materials on the Flower Bud Quality of Zingiber Mioga Rose

Effect of mulching materials and shading on the yield and quality of flower buds of *Zingiber mioga* were studied. Results indicated that shading could increase the flower bud yield by 8.5 to 20.1%. The shading material of nylon not with 50-60% shading have the best effect on yield, but no onhancement effect on quality of flower bud. Thus, it was not recommended this shading materials to growers. Among the mulching material, black-silver PE film have the best effect on quality of flower bud with less fiber and crisp pink bud, but have lower yield (39.7% yield reduction) due to poor air and moisture permeability. Although white non-woven have good light transparency, but the flower bud tend to be become unacceptable dark red due to light transmittance. Rice hull mulching could slightly reduced flower bud yield by 16.7% compared to control, but it produced acceptable bud quality. So it will be recommended to the growers.

FLORAL CROPS

Effect of Rehydration Timing on Quality of Cut Chrysanthemum (1) Water Uptake and Transpiration

Chrysanthemum cut flowers rehydrated in water for 4 hours at time intervals of 10 minutes, 2, 4 and 6 hours after cut from field. Water uptake and transpiration rate of cut flowers during rehydration were investigated. After flower rehydrated, cut flowers were packed in cartons over night and then vase life and flower qualities were determined from 2nd days to 19th days. The cut flowers were laid in shading condition after cut from field. The amount of water loss of cut flower were 0, 1.75, 2.1, and 3.36% for the treatments of 10 minutes, 2, 4, and 6 hours, respectively, while compare with the initial weight of cut flower. The amount of water uptake were 3.24, 4.94, 3.72, and 4.37% measured from above 4 treatments after 4 hour of rehydration. Transpiration rates were 6.47, 2.18, 2.45, and 2.51%. Vase life were 10.9, 12.2, 10.7 days for the treatments of 2, 4, and 6 hour shading before rehydration. The vase life of flower rehydrated in 10 minutes after cut was longer than 19 days and the flower quality was better than the other treatments.

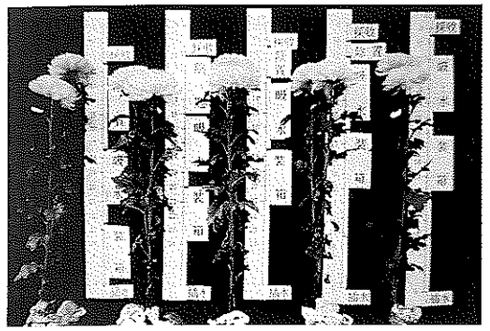

Fig. 2. Quality of Chrysanthemum cut flower in different time intervals. The cut flowers were treated by 4 hour-rehydration at time intervals of 10 minutes, 2, 4 and 6 hours after cut from field (from right to left).

Improvement of Harvest Technique and Vase Quality of Gladiolus.

Gladiolus is one of the important cut flowers in Taiwan. Although it has high value, the studies related to the harvest tehnique and improvement of quality were rare. The aim of this study was set to compare the efficiency of small carrier in the practice of cutting flower, and to compare the vase quality of 20 imported cultivars. The results showed the small carrier did not reduce the time demand of practice significantly, but it made the works easier. Based on the bend of stalk, vase-life, size of floret, and the no. of enjoyable florets at the time of 1 st floret reached stage 5, the cultivar. Peter pears and Dream party were better than others.

Investigation of Diseases and Insect Pests and its damage on *Strelitzia* spp.

Results of field investigation of diseases and insect pests on *Strelitzia* spp. in central Taiwan was summaried as follows. Three important diseases that was occurred at growth stage of Strelitzia spp. 1) Flower rotting, caused by *Alternaria* sp., the infected flowers stopped growing, resulted in off-shape flower type and unopen flower bud. 2) Bacterial blight, caused by *Pseudomonas solanacearum*, mostly appeared on hot and humid seasons during July to September. The leaves of infected plants became browning and wilting. 3) Leaf spot, the black spots occurred on leaf surface caused leaf wilting and eventually dropping. There are eight insect pests that was found during growth stage of *Strelitzia* spp. 1) *Postica* sp. have the highest population density during July, the larva gathered on underside of young leaves, 2) *Euproctis taiwana*, the larva gathered on leaf underside, occurred mainly on mid-July. 3) *Thosea sinensis*, appeared on July, the larva mainly feeding on leaves. 4) *Eumeta minuscula* mainly occurred on September, larva feeding on leaves. 5) *Nipaecoccus filamentossum* seriously attacked leaves on October to November, masses of adult and larva have found around leaf areas. 6) *Chrysomphalus ficus* appeared on October to November, sucking the leaf

nutrient resulted in yellowing leaves. 7) *Bradybaena similaris*, adults appeared on April to May, causing leaf yellowing by secrete mucus on leaves. 8) Green beetle, the adults appeared in mid May.

Fig. 3. *Pseudomonas solanacearum* on *Strelitzia reginae*

FURIT TREES

Microscopic Observation on Flower Bud Differentiation of Mei (*Prunus mume*)

The flower bud differentiation of Mei (*Prunus mume*) at orchard in Puli area was observed by means of micro-techniques. After two years of observation, it revealed that the flower bud differentiation of Mei occurred from early July and completed in mid-September. The differentiation procedure of each stage was as follows: the reproductive apex forming at early July, the floral primordia forming at mid-July, the perianth primordia forming at late-July, the stamen primordia forming at mid-August, the carpel primordia forming at late-August and the floral parts completed at mid-September.

The Effects of Production Location, Soil Conditioner and Growth Regulators on Harvest Seasons and Qualities of Loquat

The duration of flower bud differentiation of loquat at high altitudes was shorter, while the flower bud forming rate was higher and the ripened fruits were bigger and sweeter. But the shoots on trees of early flower bud formation bore less leaves and smaller fruits. Whereas the fruitset were late in those trees with strong vigor, they bore more leaves and larger fruits with high sugar contents. The leaves were increased after application of soil conditioner at the fruits harvested, but the stages of shoot growth cease and flower forming were latter than the controls. Spraying of cell division promotors during shoot growth coverted some vegetative growth to reproductive growth and promoted flower formation. The fruit weight could increased by the sprays of cell division promotors at blooming and 25 days after flowering.

Production of Oriental Pear in Low Altitude in Taiwan by "Twice Bud-forcing" Cultural Practice

Oriental pear variety 'Shinkou' was treated with 0.5% of hydrogen cyanamide at August to September to enhance bud

emergence. One month after treatment, the buds underwent flower initiation when the leaves matured. At January of the following year, the flower formation was completed, the percentage of flower buds could reached at 35.9% to 45.1%. Then the trees were treated with 2% of hydrogen cyanamide to promote uniform emergence of flower buds. This cultural practices designated as "Twice Bud-forcing Culture". This method could solve the problem of bud dying and abnormal fruit shape to ensure the production of Oriental pears at lowland areas in Taiwan. And, in the near future this cultural practice may replace the high labor and high cost "Top-grafting method".

Fig. 4. Production oriental pear by "twice bud-forcing" cultural practice in low altitude in Taiwan.

Integrated Management of Pear Phylloxera *Aphanostigma piri* (Cholodkovsky) on Grafted Pear

Pear phylloxera, Aphanostigma piri (Cholodkovsky), injures pears wrapped by the protection bag and causes fruit cracking and rotting. Spraying insecticides to pears with the bags already wrapped is usually ineffective. This work was carried out to investigate the proper measures which must be taken before fruit-bagging in order to effectively reduce the damage of this phylloxera. Full scale application of Sulfur 80% D.F. (400x dilution) 1 to 3 times between the harvest time in fall and next spring (September to February) reduced the pear phylloxera density by 76.6-81.2%. Dipping the scions in 80% Sulfur D.F. (200x and 400x) for 2 minutes could give 100% kill of the attached adults and eggs of pear phylloxera. Applying vaseline or some lubricating gel around the base of the grafts could prevent the phylloxera on the stocks to move in. In addition,dipping the open part of the bags in sulfur 52% F. (100x) could reduce 60% of the invasion of the pear phylloxera. Thus, the integrated management of the pear phylloxera involves: 1) spraying the pear trees at least once during fall/winter, 2) treating the grafts and bags, and 3) gel-applying around the graft base after grafting to cut off the invasion source. Full implementation of these measures could ensure proper control of pear phylloxera.

AGRICULTURAL ENVIRONMENT

Characteristics of Salt-Accumulated Soil under Protected Cultivation in the Central Taiwan

This study was to investigate the characterization of salt- affected soils under protected cultivation in the central Taiwan. The surface soils (0-60cm) from protected (30 sites) and unprotected cultivation (18 sites) were sampled to determine their electrical conductivity of soil solutions and concentration of water soluble salts. Salt accumulation was found in the surface soils (0-5cm) of the protected cultivation, and was more significant in slate calcareous alluvial soils than other three studied soil groups, i.e. sand stone-shale noncalcareous alluvial soils, sand stone-shale and slate alluvial soils and red soils. Significant correlations were shown between nitrogen as well as potassium fertilizers added and electrical conductivities of the soils under the protected cultivation. The concentrations of NO- that was high enough to inhibit the crop growth were increased with the amounts of nitrogen fertilizer added. The regression equations between electrical conductivity and salt content of soil solutions (1:5) were found to be: Total Soluble Cation (cmol Kg-1) =0.114+3.62EC (1: 5) , r=0.957; Total Soluble Anion (cmol Kg-1)=1.31+5.16 EC (1:5), r=0.926. EC unit was in dSm-1.

SOIL AND FERTILIZER

Effects of Different Organic Wastes on C, N, P Contents of Compost

In order to improve the maturity and nutrient quality of compost. An experiment was conducted to study the effects of different organic wastes on C, N, P contents of compost. Data showed that during the composting period, an increase in the content of N, P, K, and a decrease in C. When used sawdust and rice straw as carbon source, the loss ratio of N and C would be 31.1% and 58.7%, respectively, by using dairy waste as nitrogen source. The loss ratio of N and C would be 37.0% and 64.9%, respectively, by using chicken waste as nitrogen source. When used positive pressure aeration in composting the loss ratio of N and C would be 22.7% and 61%, respectively.

Composting and Application of Dairy Compost

Experiment was conducted to study the composting technology of dairy waste and the application effect of dairy compost. The result showed that both temperature changing pattern of compost and biological indices such as a germination test would be easily for farmer to make clear the degree of maturity. By adding urea and superphosphate at maturation could increase the total nitrogen and phosphate content of dairy compost sligtly, but increased the inorganic nitrogen content significantly. The high content of inorganic nitrogen would lower the germination rate of pai-tsai (*Brsaaica chinesis* L.). Therefore, it should be careful about the effect on inorganic compounds content of compost by adding chemical matter at the maturation. From of field experiments, the result showed that application of dairy compost could amend soil chemical and physical characteristics with lower soil bulk density, soil hardness and increased soil water content, pH., etc. There was significantly responsed on both yield and quality of rose, bitter gourd, gladiolus and grape at the block of applied dairy compost.

Effects of Synergistic Crops in Inter-cropping System

The purpose of these studies were to compare the effects of synergistic crops on the growth of main crops in inter-cropping system. The results showed that the average yield of main crops under single-cropping with organic manure application were 11.3% higher than that with chemical fertilizer. Yield of main crops under inter-cropping system were higher than that under single- cropping, by 19.3% for sweet corn in the fall, 6.5% for potato in the winter, 36.9% for vegetable soybean in the spring, and 5% for garlic in the winter crop. In case that under using organic fertilizer, growing sweet corn by inter-cropping system with bush kidney bean, green pea, flowering bean, peanut, edible rape and pole kidney bean in the fall, potato by inter-cropping with flowering bean, green pea and bush kidney bean in the winter, vegetable soybean by inter-cropping with radish, lettuce and Pai-tzai in the spring, garlic by inter-cropping with radish and spinach in the winter crop season are suggested to be good synergitic combinations.

Fig. 5. Field of garlic intercropping with green shell bean.

A Study on the Quality of Commercial Humic Acid Fertilizers

The study evaluated the quality of commercial humic acid fertilizers by analyzing their related features and compositions to soil and crops. The results showed that three of the eleven sampled products contained 8-10% humic acid which were slightly lower than the 10% down level of the Goverment standard on this kind of fertilizers. However, the ash

contents of the commercial humic acid fertilizers were below 32% and had significant differences among them indicating the various inorganic composition varied widely. As to the plant nutrient content aspects, they were listed as follows: 2.5-43.0% of carbon, under 0.25% of phosphorus which was similar to that of literature-issued 0.16- 1.60 of nitrogen, and humic acid from soil and ground water, 0.2-9.6% of sodium and 0.0-5.7% of potassium indicating products of higher content of sodium or potassium by using NaOH or KOH as original extractant for humic acid, respectively, under 0.67% of calcium, under 0.06% of magnesium, under 0.49% of sulfur which was lower to the published values of humic acids from soils or water bodies or composts, and under 0.01% of chloride to all the samples. Refering to heavy metal content aspects, the results are summarized as follows: under 3.39 ppm of arsenic, under 2.30 ppm of cadmium, under 11.9 ppm of chromium, under 21.8 ppm of copper, not detectable quanity of mercury except one liquid-type and one solid-type products, under 28.8 ppm of lead, and under 128.4 ppm of zinc to all sampled products. The results also showed that different extractable raw materials caused some products contained higher specific heavy metal elements. In the aspects of physical and chemical properities, all products but one are very alkali with pH value of 8.8-10.4 which offseted to that of so called academic humic acid with acidic feature. So it would be proper to know them as humic acid-containing alkali substances. The electric conductivity of 1: 250 or 1: 1000 diluted solutions of the sampled products were under 3200 umhos/cm and could be sprayed directly to soil without causing electric conductivity-induced harm to crops. All products' cation exchange capacity (CEC) were in 29-673 cmol/kg but the chemical groups contributed CEC were still obscure. The particle sizes of liquidtype products had two categories with one under 1 m and another over 5 m which could be devided into clay and silt-size respectively. The smaller particles would be more active on surface physical, chemical reactions and would be more effective to crop growth.

A Study on the Organic Farming of Sweet Corn and Vegetable Soybean in Central Taiwan

This experiment was conducted on an acid soil in the farm of Taichung District Agricultural Improvement Station at Tatsuen, Changhua. Three kinds of animal manures, hog manure, cattle manure, and chicken manure were respectively combined with rice hull, rice bran, and bone meal to make composts for the experiment. The experiment for sweet corn had been conducted without any chemical pesticides and any natural pest control meterial. In vegetable soybean, only four sprays of sugar vinegar solution with the additives of Ca $(H_2PO_4)_2$ and KH_2PO_4 were applied. This was the third consecutive year of experiment.

The results of the experiment showed that continuous application of the three different animal manure composts made more positive effects to the soil than the negative effects. The main positive effects were increases in soil pH, organic matter content, available phosphorus, exchangeable potassium and magnesium, extractable manganese, zinc and copper, and decreases in soil salinity and extractable iron. The main negative effects were the increases in exchangeable sodium and extractable nickel and lead.

The responses of crops to organic farming were different with the kind of crops. Under 20% higher rate of nitrogen than that of the chemical fertilizer plot, the grain yields of corn in organic plots were all lower than that of chemical plot, and hog manure compost plot was the lowest. Chemical analysis for the plants in organic plots showed that corn plants were deficient in manganese, however, its higher phosphorus in corn grain seemed to be more favorable to the consumers. On the contrary, the tender pod yield of vegetable soybean in all organic plots were higher than that of the control, but their differences were not statistically different. Besides the significantly lower nickel, cadmium, and lead in the tender pod of the organic plots suggested that its quality was better than that of the chemical plot.

The results of this experiment suggest that seeding cold tolerant varieties of sweet corn in November in central Taiwan may successfully avoid the damage of corn borer without using any chemical pesticides; and seeding vegetable sybean in the spring with occassional spray of sugar-vinegar solution may avoid the serious damage of thrip and other insect pests to obtain a good growth and yield.

PLANT PROTECTION

Studies on the Development of Biofertilizer

351 strains of fluorescent pseudomonads and 290 isolates of actinomycetes were isolated with King's B medium and peptone medium from rhizosphere and rhizoplane of cultivated cabbage, cucumber, radish, eggplant, kale and pea of natural infested soil. Dual cultures of each actinomycetes and fluorescent pseudomonads isolate against *Pythium aphanidermatum* were individually carried out on King's medium. Two strains of fluorescent psuedomonads (i.e. FP-13, Fp43) and two isolate of actinomyces were hence screened out from this experiment. These soil microorganisms exhibited antagonism not only to *P.*

aphanidermatum, but also to other *Pythium* spp. and soil borne fungi.

A Baiting Technique for Assay of *Rhizoctonia solani* in Vegetables

According to the investigation on much vegetables including spinach, black mustard, ipomoea, lettuce and Chinese cabbage, we found that all of them had been damaged by *Rhizoctonia solani,* and among which, spinach and black mustard were the most serious. Because the angle-spinach-seed which was larger, angle-shape and light brown, a baiting technique using the angle-spinach-seed colonization method provided a rapid, sensitive and accurate means of assessing inoculum potential and population of *Rhizoctonia solani* in the soil of the vegetable field. The most of *R. solani* from soil was recovered when forty angle-spinach seeds were evenly distributed in 100g soil with 12-15% (w/w) water content and incubated for 24hr at 24℃.The angle-spinach-seed colonization method gave a significant correlation ($r=0.96-0.97$, $p<0.001$) between the amount of inoculum and disease severity of kale seedlings.

Studies on Ecology of Cucurbit Viruses

For the purpose to study the fluctuation of aphids and incidence of ZYMV and PRV-W in central Taiwan, the alate aphids were trapped by means of yellow water pan (Moericke trap). During the period of May, 1991 to June, 1992, alate aphids were collected in quash field at Ta-tsun, Changhua. Among them, three species i.e., *A. gossypii, H. setariae, Malanaphis sacchari* rated 45%, 17% and 14% of total collections, respectively from May to October. During November to December, the majority of aphids collected belong to the *L. erysimi, M. persicae* and *A. gossypii.* The incidence of ZYMV and PRV-W in the quash field were detected by ELISA tests during 1989-1992. The results indicates two peaks of diseases incidence were detected during March to June and September to November. The spread of viruses into cucumber and the effects of these viruses on fruit yield were measured under field conditions in the Hsi-hu, Changhua on August, 1991. ZYMV and PRV-W were the major diseases detected in this experiment and they always found to be dual infection. The percentages of infected plants were 4 and 21% in seedling and flowering stage, respectively. When the test plants infected at seedling stage, the average number and weight of fruit per plant accummulated after harvest were measured about 18 and 42% of the virus-free plants; and about 80 and 92% of yield of virus- free plants when infected at flowering stage.

A Further Study on the Morphology of Rice Ragged Stunt Virus

Rice ragged stunt virus (RRSV) has been tentatively considered to be a member of the genus Fijivirus because it resembles most Fijiviruses in biological and other properties. The morphology of an intact virus particle has not yet been clearly determined, however. We prepared RRSV specimens for electron microscopy from diseased rice leaf tissue which had been prefixed in 2% glutaraldehyde (GA) or in a mixture of 1% acrolein and 2.5% GA in 0.2 M cacodylate buffer overnight. The leaf tissue pieces were finely cut in water with a razor and gently pressed. The crude sap was then mixed with an equal volume of 0.1% bacitracin and stained with 2% neutral phosphotungstic acid (PTA) . Stained specimens were examined by a JEOL 200 CX electron microscope. Subviral particles 55-60 nm in diameter with an inner shell, and some smooth viral cores, about 50 nm in diameter, were frequently observed in dip preparations. The subviral particles retained some of the B spike as often seen also with other Fijiviruses. Occasionally, intact particles, 75-80 nm in diameter, with extruding A spikes were observed. The A spike was a papilla-like structure 13 nm in width and 10 nm in length. The possession of an outer shell as well as the A spikes by RRSV as demonstrated in this study provides a basis, besides other known properties, for placing it in the Fijivirus genus. The close similarity of RRSV and Echinochloa ragged stunt virus (ERSV) in genome organization and in particle morphology, together with a serological relationship between these two viruses, may justify the inclusion of both RRSV and ERSV in a new subgroup, the fourth, of Fijivirus.

Screening Rice Varieties for Resistance to Bacterial Leaf Blight

Twelve released rice varieties were screened for their resistance to bacterial leaf blight at Tatsuen, Changhua county and Tali, Taichung county in 1st and 2nd crops of 1991. The rice plants were inoculated with five races of bacterial leaf blight pathogen with different virulence at late booming stage. Among the tested varieties, Taichung Native 1, 10 and Taichung Sen 3 showed the highest infected rate to five races of pathogen, followed by Kaohsiung 141 and Kaohsiung Selection 1. Other test rice varieties also reacted high infected rate to pathogen race XM-42 and XF-71-a. The varieties that showed high percentage of infected area and yield was greatly affected by bacterial leaf blight are Taichung Native 1, Taichung Sen 3 and 10, Kaohsiung Selection 1. While Taichung 65 and Tainung 70 showed medium rate of infected area and yield was also greatly affected by bacterial leaf blight.

Kaohsiung 139 and Tainan 9 showed medium rate of infected area to bacterial leaf blight, but yield was not significantly affected. Kaohsiung 141 have showed high percentage of infected area to bacterial leaf blight, but yield was not affected. It is recommended that Kaohsiung 141 is tolerant to bacterial leaf blight.

Population Fluctuations and Control Calendar of Major Insect Pests on Kidney Bean

In central Taiwan, soybean root miner (*Melanagromyza centrosematis* Kato), Soybean stem miner (*Melanagromyza sojar* Zehntner), smaller green leafhopper (*Edwardsiana flarescens* Fabricius) and bean aphid (*Aphis craccivora* Koch) are the major insect pests causing serious damage to young plants of kidney bean, *Phaseolus vulgaris* L. Spraying within 10 to 15 days after germination with bifenthrin (2.8% EC at 2000x dilution), cyhalothrin (2.8% EC 2000x) or naled (25% EC 1000x) has been found to be the satisfactory control measure. During the flowering and pod-forming stages, serpentine leafminer (*Liriomyza bryoniae* Kalt), two spotted spider mite (*Tetranychus urticae* Koch), eastern flower thrip (*Fraklimiella intonsa* Trybon), smaller green leafhopper (*E. flarescens*) and some lepidopterous insects are the major pests damaging the foliage, flower bud and peapod. Their populations reach the highest peak during September to November. Two consecutive sprays of the following chemicals while the population density is still low (before flowering and pod-forming stages) have proved effective. The control chemicals includes fibenthrin (2.8% EC at 2000x), Cyhalothrin (2.8% EC 2000x), deltamethrin (2.8% EC at 1000x), *Bacillus thuringiensis* (3% WP 1500x), malathion (50% EC 500x) or cypermethrin (75% WP 4000x) etc. These insecticides may be used in combination or alternately, depending on the occurrence of these pests. If chemicals are needed to reduce the insect pests during harvest period, insecticides of low toxicity should be used in order to avoid leaving residues on the vegetable.

Studies on the Ecology and Control of Bulb Mite *Rhizoglyphus robini*

Rhizoglyphus robini constitutes > 95% of the mites found on floral bulbs. Laboratory studies indicate that 24 to 28 ℃ was the optimal temperature for the development of this bulb mite, which was unable to survive at 23℃. Under constant temperatures of 16, 20, 24, 28, and 32℃, the egg stage lasted 7.3, 5.0, 3.2, 2.2 and 3.2 days, respectively; the larval stage lasted 5.3, 4.1, 2.4, 1.7 and 1.9 days; protonymphal stage lasted 5.3, 4.8, 2.6, 2.0 and 2.5 days; and deutonymphal stage lasted 5.8, 4.9, 3.2, 2.7 and 2.4 days. Pre-egg laying period varied from 2.7 to 4.6 days and the longevity of adult mites was 17 to 33 days. Between 53 and 190 eggs were laid by a female and the optimal temperature of egg-laying was 24 to 32 ℃. *R. robini* prefered humid to drought conditions and was able to survive 10 days in water. The occurrence of this mite was related to the damage and disease infection of the bulbs, and application of organic matter also had promotional effect to this mite. In a laboratory test of dipping floral bulbs in solutions for 30 min and 1 hr and recording the mite populations after 1, 4 and 7 days, Selecron 43% EC, Supracide 40% EC, Tokuthion 50% EC and Imidan 50% WP gave approximately 90% control efficacy toward eggs, nymphs and adult mites. However, these chemicals gave < 80% control efficiency in the field. Application of Prochloraz 25% EC and Tokuthion 50% EC (2000-fold dilution) to dip the bulb and at 1 month after planting gave better control of this mite. In addition, dipping the bulb in water at 40℃ for 2 hr or at 45℃ for 30 min and 1 hr was able to eliminate completely *R. robini*. This station has already commissioned the manufacturing of content-temperature water baths for floral farmers to use treating the bulbs.

Fig. 6. Symptoms of flower bulbs damaged by bulb mite.

Control Efficacy of Several Miticides and Non-Pesticidal Substances against Mites on Crops

Thirty four miticides were tested in the laboratory for their efficacy against two spotted spider mite, *Tetranychus urticae* Koch and Kanzawa spider mite, *Tetranychus kanzawai* Kishida. Morestan 25% WP and Talstar 2.8% EC gave > 95.4% control of Kanzawa spider mite on roses, and Vendex 50% WP showed the best ovicidal activity with 92.4% mortality. Talstar 2.8% EC and Dicarzol 50% WP were most effective toward two-spotted spider mite on roses with > 91.4% mortality; Talstar 2.8% EC and Peropal 25% WP gave > 87% ovicidal control efficacy. Among the non-pesticidal substances tested, plant nutrient solution (Fuji 4551), Bai-lan detergent and Action Research caused > 86.3% mortality toward two-spotted spider mites on chrysanthemums; plant nutrient solution (Fuji 4551) and urea

(200-fold dilution) showed >94% control against both eggs and adult mites collected from snap-beans. Field tests revealed that Morestan 25% WP and Talstar 2.8% CE gave 99.3% and 98.5% control, respectively, against Kanzawa spider mite; Omite 57% EC and Morestan 25% WP were effective toward two-spotted spider mite, with mortality of 94.5 to 98.2%, With sticky tape method to test for the insecticide susceptibility, two-spotted spider mites were found to develop tolerance to several miticides while Kanzawa spider mite still retained its susceptibility. Thus the chemicals recommended for the control of Kanzawa spider mite remain effective.

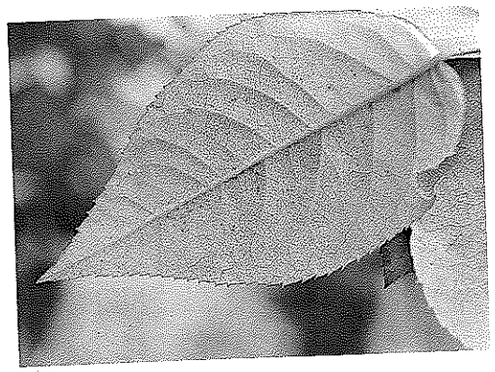

Fig. 7. Rose leaf damaged by Kanzawa spider mite.

Population Fluctuation and Control of *Liriomyza bryoniae* on Pea

Pea plants were usually attacked by tomato leafminer (*Liriomyza bryoniae*) since 20 to 30 days after sowing. The population density of the pest and their damage on plants increased gradually with the plant development. The rate of infested plant and damaged leaf could reach 100% and 34%, respectively at population peak of the insect on the varieties of Taichung 11, 12 and 13. The average number of *L. bryoniae* adults attracted by a yellow sticky card in the pea field mulched with black plastic film, rice straw and non-mulching plots were 50.5, 195.4 and 281.1 per week, however, there were no significant difference of larva population density in pea plants among three mulching treatments. The yellow sticky cards and yellow water pans placed on the ground level attracted a significant higher number of adults than those placed higher than the crop. When water-pan trap was used, adding 4ml detergent in 1600cc water in a trap could catch more adults than other treatments. The female adults attracted by the yellow water-pan trap was 3 to 4 times higher than male adults. Among the chemicals tested, 75% Trigard WP 6000X showed the best control of the pest, rate of control reached as high as 90%. Using yellow sticky cards, yellow waterpan trap or plastic film alone for control of *L. bryoniae* was far beyond satisfactory, but when they were used integrated with chemicals in a wide area could reduce the damage of the leafminers.

AGRICULTURAL MACHINERY

Research of Manure Applicator

Popular use of manure can solve the recycling problem of domestic animals waste, also can improve soil condition and the quality of agricultural products. But manure application work is very bulky, need suitable machinary to help raise efficiency and promote large quantity of manure usage. This research was set to investigate and analyze the distribution and using efficiency of manure spreader in Taiwan and to assort manure spreaders into different categories for reference. Manure applicator are generally divided into two categories, the first one is spreader for uniform applying manure on field surface and the second one is furrower with applicator for line fertilizing between crop rows. The manure spreader is a kind of popular machine using in America, Europe and Japan from long ago and has a lot of different types. The result of this report assorts those different types into four categories and furtherly divides into over ten kinds by different structures and functions. The furrower with applicator was developed in recent year for using in row crops. There are 40 or more spreaders in 9 brands distributed and used in Taiwan. From comparison tests result of a sigle one SASAKI GT-1110K spreader and manual spreading, the efficiency of the spreader is faster than labor about 10 to 70 times. The profit of using spreading machine compared with labor are NT $ 5594 saving per hectare when used for 50 hectare per year, and NT $ 4319 saving per hectare when used by a single farmer for only 8 hectar per year. Right now, only few farmers use manure applicator in Taiwan. About how to popularize these machines such as establishing a system of contractor or developing multipurpose function spreader and so on are very important topics for further research.

Fig. 8. Field testing of the agricultural carrier with manure spreader developed by Taichung DAIS.

Development of Agricultural Carriers for Melons and Vegetable Farm

This studies is based on present manufacturing technique and using experience of agricultural carriers in Taiwan. Two carrier types were designed and developed in this project for providing in-field transportation and fogspraying functions in row fields. The

first type is a mini-carrier, travelling in furrow, and can attach a fogsprayer. The carrier is drived by 5.3 Hp gas-engine with continuous variable-speed transmission or centrifugal pulleys plus a gear box for 2 stages forward and 1 stage reverse speed shifting. The performance of the machine was set up as max. speed 18 km/hr and max. loading capacity 300 kgs. Besides loading plastic baskets and paper boxes, the mounting platform can rapidly attach or deattach a fogspraying equipment for concurrent function of protecting from diseases and pests. This make the mini-carrier got multi-purpose functions and can reduced operating labors. Because of furrow width limitation, the tread of the carrier is only 37 cm. If driven on rugged furrow with heavy loading, it will be in danger of side-overturning. This defect needs to improve in near future. The second type was designed a over-ridge type and light structured carrier, its tread can be adjusted from 100 cm to 150 cm. This carrier is drived by 7 Hp gas-engine, and loading capacity is about 1,000 kgs. It can use for transporting in different fields of different ridge sizes. Also it was prospected and scheduled to be a machine with planting, transplanting, harvesting function and etc.. These parts will be gradually designed and assembled in near future.

Fig. 9. The mini-carrier for vegetable and melon when carrying water melon in field.

Development of Labor-saving and Low-cost Auto-fogsprayer for Plastic House Culture

The automatic fog-spraying system was developed to control plant diseases and pests under the plastic house culture condition. The facility can either be operated automatically or manually at a desired interval. When the power transformer was adjusted to DC 90 V driving voltage and at a spraying pressure of 25 kg/cm^2, the moving speed of spraying frame was 2.5 km/hr. An amount of 32-liter pesticide solution for an area of 330 m^2 plastic house need 78 second to finish spraying by this system. The spraying nozzles can be moved either vertically or horizontally according to the plant height and distance between plants. The number of nozzles and spraying pressure readily set before operation of the equipment, the amount of pesticide will depend on the moving speed of spraying frame. In the meantime, the distribution of droplet will be changed according to different speeds of spraying frame. A good spraying distribution was obtained at the speed of 2.0 km/hr and 2.5 km/hr. This system could save 40% of the pest control cost and also could save the amount of pesticide when compared it with the manual application. This system also able to apply chemical pesticide ina accurate way so that to ensure the safety of the farmer who handle the toxic pesticides.

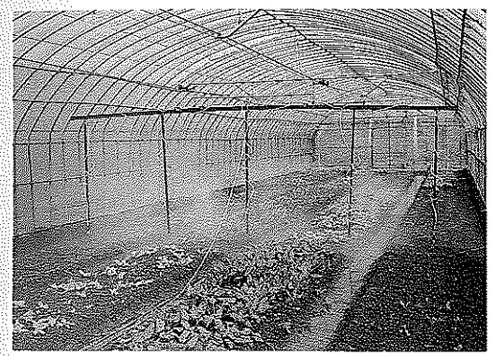

Fig. 10. Automatic fogsprayer is working in protected culture for multi-nozzles.

AGRICULTURAL MANAGEMENT

The Investigation of Enlarging Farming Scale-Entrusted Farming

In Taiwan, entrusted farming is the most effective method for enlarging the farming scale. The purpose of this study was to understand the status of entrusted farming in Taichung area during 1992. Data were collected from the information of investigations for entrusted farming and direct visiting to farmers. The results were summarized as follows: 1) The operator of family farm received the entrusted farming from neighbouring farm. The areas included Lung-Ching Hsiang, Da-Yia Hsiang, Hou-Li Hsiang, Wai-Pu Hsiang, Da-Chia Chen and Tien-Chung Chen etc. A total of 33 farmer families received entrusted farming from 207 farmers families. Total areas of farmlands were 131 ha and the average acreage per household were increased from 0.89 ha to 4.89 ha. 2) Nucleus farmers or the teams received the entrusted farming from neighbouring farm by Farmers' Associations recommended. The areas covered Da-Yia Hsiang, Wai-Pu Hsiang, Da-An Hsiang, Hou-Li Hsiang and Da-Chia Chen etc. A total of 19 farmers famlies received the entrusted farming from 360 farmers. Total areas of farmland were 228 ha, and the average acreage per household were enlarged from 0.81 ha to 12.8 ha.

The goal of enlarging farming scale could be obtained through the entrusted farming. But in practical operation, related policies such as farmland reconstruction, paddy field diversion and fallow of paddy field, knowledge and confinement of law etc. should also be conformable with it.

Analysis on the Seasonal Fluctuation of Vegetable Prices

In order to obtain a long-term trend and seasonal fluctuation for the vegetable prices, 18 kinds of vegetable field price in their production areas were analyzed. Data were collected from 1983 to 1991. The results indicated that long storage life vegetables, such as wax gourd and onions showed smaller scale of price variation while kindney beans, egg plant and cowpeas showed larger scale of price variation in the long-term trend. For the aspect of the seasonal fluctuation on vegetable prices, in general, most vegetables were sold at their peak prices in April and September. Especially in September, wax gourds, Chinese cabbage, cauliflower, celery, radishes and cabbage were sold at their highest price, about 180 % higher than their yearly average prices. In other words, the field prices of above mentioned six vegetables varied significantly with the changes of seasons.

Survey on the Efficiency of Fertilizer Application on Rice in Taichung Area

The purpose of this study was to understand the status of fertilizer application on rice in Taichung area and compare it with the fertilizer recommended by the Government Research Institutes. Data were collected by direct visiting to the rice farmers. The study was consisted of two parts: one was for the general fertilizer application situation of 1,150 rice farmers, and the other was for the efficiency analysis of fertilizer application involving 150 selected farmers. The results was summarized as follows: 1) There was no significant difference in the application of N, P and K fertilizers between two rice crop seasons. Except K fertilizer, the amount of N fertilizer applied on three types of rice was statistically no significant difference in each crop season. The results obtained from this study was not coincident with the fertilization quantities recommended by the handbook of rice fertilizer application. 2) Owing to the labour shortage in the rural area, the application of compound fertilizer was increasing. However, it should be noted that the kinds of fertilizer used were not appropriate. 3) In general, rice farmers tended to apply more fertilizers than the recommended rate, particularly for japonica and glutinous rice, or for the K fertilizer during the first crop and N fertilizer during the second crop. 4) The present fertilization times for rice did not significantly differ from the official recommended times, but the method of fertilizer application was not appropriate.

AGRICULTURAL EXTENSION

Studied on the Guidance for Start-up Farmers in Taichung Area

Compared with the rapid development of industry, agriculture in Taiwan grew slowly in the 1960's. Hence, farm productivity and family incomes tended to be lower than in other economic sectors. The rapid industrialization of this country drew the young peoper into the cities, and this made the problems of veteran peasants and part-time farmers even more serious. The education of rural youth is the foudation of future agricultural development. Those received specialized agricultural training to help obain a long-term and low-interest loads for funding farm start-up project or improving their farms. During this two years, a total of 208 rural youth were qualified to receive the low-interest loans from the government in Taichung area, but a total of 25 rural youth were rejected to receive the loan because they failed to meet the requirements. Results of the followups indicated that 51.1% of them was located at Nantou county, 93.6% of them was male farmers, 58.1% of them was 30-39 in age, and 48.9% of them had the diploma of senior high school, which about 33.8% was graduated from senior agricultural vocational school. The majority of loan is for guidance crops were ornamental plants, specialty crops and fruits. The most amount of start-up loans was NT$ 1, 000, 000- 1, 990, 000 dollars about 33%, and the most duration of loan was 6-9 years about 68.9%. It was concluded from this survey that more guidance in start-up farmers is necessary.

Studies on the Adoption of Protected Horticulture Technology by Rural Youth

In order to survey the adoption of protected horticulture technology by rural youth, a total of 209 trainees receiving an one-week specialized training course in 1989-1991 were evaluated by trainee fllowups according to the methods such as telephone interviews and questionnairs. The results indicated that 33.5% of trainees devoted themselves to non-agricultural job and 65.1% devoted to agricultural production. 28 trainees (13.4%) growing vegetables and using protected horticulture technology include 16 hydroponic vegetable farms and 12 protected structural vegetable farms. It was also found that the main factor of non-adopting new techniques was the cost of facilities too high. Consideration of the motivation of adopting hydroponic techniques was of industrial prospect, and then was of personal interesting. For the trainees worked at the protected structural vegetable farms, a marketing channal was indentified as the main reason, and then followed by the background of production techniques, personal interesting, industrial development in prospect. For the minority of trainees, the experts of Taichung DAIS and the extension workers of local Farmers Associations play an important role on

the impact on trainees adopting new techniques, but the most trainees decided to adopting new techniques by themselves.

Training Programs for Agricultural Technicians from Friendly Countries

As part of our national effort to strengthen substantial ties with countries friendly to us, Taichung District Agricultural Improvement Station has been carrying out training courses for foreign agricultural technicians. During 1985 and 1992, eleven sessions were organized with 124 persons from thirty seven countries participated. In order to evaluate the level of satisfaction from among the participants a questionnaire was distributed to 13 students attending a one month course in Rice and Upland Crop Production in Sept.-Oct. 1992. The result shows a 100% satisfaction with course content, 58% consider the faculty very good, 33% good. Teaching material receives a 92% of very good. 33% of the respondents think the length of the training course very good, 50% good. 58% think the food is very good. Only 50% think the living accomodation very good, another 50% good. As for recreational activities, 67% are highly satisfied while 25% are satisfied. A major reason for dissatisfaction in teaching was difficulties with the instructor's English. A preferred length of training program is two months instead of the current one month.

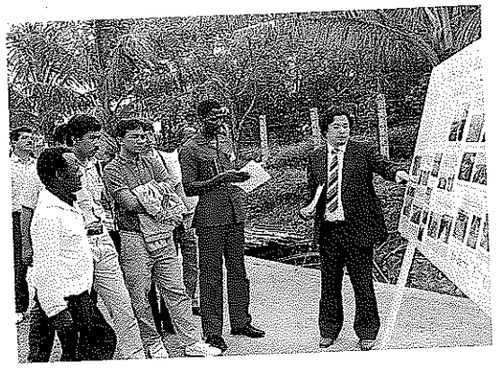

Fig. 11. The participants attending a study tour.

A Case Study on the Control Program for the Patients of High Blood pressure

Four patients of high blood pressure were selected from the members of home economic to deal with control program by daily diets and life guidance. Additionally, psychology, physiology, life style, dietary habits, their perceptions about high blood pressure and other related factors were analyzed. Results indicated that two of patients weren't take medicine for doctor's suggestion, and another two patients needed taking medicine continually. It was also found that the three of patient's over-weight were improved in the post-test. The total cholsterol of pre- and post-test were normal. The two of patient's triglyceride were abnormal in the pre-test, one of the patients was changed normal, and another one's triglyceride was decreased but still was abnormal in the post-test. The average score of perceptions about high blood pressure was 67.5 and 85.0 in the pre- and post-test, respectively. Generally speaking, in order to promote the controlled effectiveness of high blood pressure, it is suggested that: 1)Promotion of nutrition and health education and guidance of a good dietary habits can prevent the high blood pressure. 2) Measure the blood pressure from time to time, then can prevention is better than cure. 3)In order to promote the controlled effectiveness of high blood pressure, the psychology, physiology and their life style and dietary habits were analyzed earlie on the control. 4)The high blood prerssure to be cured for a long time, so patients need supports and assistance from other members in family. 5) The activity of control is good for the family because the controlled high blood pressure through balanced diet and daily life improvement.

RURAL LIFE

An Evaluation on the Control Program for the Patients of Chronic Diseases by Local Farmers Associations in Taiwan

The evaluated data of this study were based on the results of physical examination and their perceptions on the nutritional knowledge. A total of 11 chronic diseases controlled courses with 194 members throughout Taiwan on fiscal 1992 were evaluated. Terminal evaluation was employed by comparing pre-test measurements with post-test measurements of change in patient's perceptions about the nutritional knowledge and patient's results of physical examination included uric acid, triglyceride, blood pressure, total cholsterol, weight and glucose fasting. Results indicated that there were significant improvement for the items of total cholsterol, blood pressure and nutritional knowledge, but the difference between pre- and post-test of the uric acid, triglyceride glucose and weight is very small, which might indicated that perhaps not enough time was devoted to long-term control of chronic diseases. Finally, in order to promote the effectiveness of this program, the following two prerequisted need to be concerned. Firstly, the Government has made great effort in helping the local FAs to enlarged initiate the controlled courses of chronic diseases. Secondly, strenghening the prevention and control of the chronic diseases by the training, education and mass communications.

A Preliminary Evaluation on the Program of Living Environmental Improvement in Farm and Fishing Villages

This program was based on the Projects such as Strengthening of Promoted Population Policy, Improvement of the Residential Environment in Farming and Fishing Villages and the Integrated Agricultural Adjustment Program, and

was approved by the COA from July, 1991 to June, 1997. The major policy goals are improving the living environment in farming and fishing villages, balance the difference between urban and rural areas, and slowdown the rural migrators left to the city and town. During the last two years, seven and sixteen villages were selected in fiscal 1991 and 1992, respectively. Most of public facilities of this program are repair or maintenance of farming road and renovation of rural drainage facilities, but few of greening or beautifying environmental improvement. Approximately, NT& 1,276 thousands of subsidies were used for each target village in Taichung, of which budget 17.9% is in local government. The working day of each target villages was 89.2 days, and 15 villages were selected by local government and one village was selected by local FAs in fiscal 1992. The implemented process of this program can be indicated that were: 1) These constructions were executed efficiently, fast but poor qualitatively in the remote areas. 2) These target villages weren't selected to meet the integrated plan of the township. 3) The majority of target villages concentrated on the constructions and neglected for the greening or beautifying environmental improvement.

Fig. 12. Farmroad improvement of rural village in Tachia.

ACTIVITIES OF AGRICULTURAL EXTENSION IN 1992

Training and Educations

A total of two on-the-job training classes were held for extension workers of the Farmers' Associations, with 59 persons attended. Basic-level Farmers' Associations as well as agricultural cooperatives and farms were guided in carrying 313 training classes of which the teachers were invited from the staff experts of this station. A total of 17,711 persons attend co-organized training programs. Subject-matter training course of " Horticultural Crops Production " were held for young farmers in 1992, with 91 persons attended. A total of two foreign training classes were held with 36 persons attended. This training program sponsored by the Committee of International Technical Cooperation (CITC). And one foreign training class of "Agricultural Quality Control in Taiwan" was held for the agricultural techicians of Indonesia in 1992.

Education of Young Farmers

The education of rural youth is the foudation of future agricultural development. Those received specialized agricultural training programs were helped to obain a long-term and low-interest loans for funding farm start-up project or improve farming operations. A total of 236 rural youths were qualified to receive the low-interest loans from the government in Taichung areas in 1992, but a total of 3 rural youth applied were rejected to receive the loan because they failed to meet the requirements. The majority of loan is for guidance ornamental plants, fruits and tea crops- (table 2). The amount of start-up loans were followed as table 3.

Table 1. Activities of agricultural training center in 1992

Training activities	Class	Trainee
On-the-job training	2	59
Special-subjects training	4	91
Foreign training	3	36
Co-organized training	313	17,711
Total	322	17,897

Table 2. Number of operation items for rural youth in 1992

Item	No.	%
ornamental plants	110	47.2
fruit	34	14.6
tea	32	13.7
vegetables	13	5.6
mushroom	12	5.2
poultry	10	4.3
pairy cattle	5	2.1
fish farming	4	1.7
hog	3	1.3
agricultural product processing	3	1.3
others	7	3.0
total	233	100.0

Table 3. The amounts of start-up loans for rural youth in 1992

Amounts (million)	Applicant		Practice	
	No	%	No	%
Up to 0.99	17	7.3	28	12
1.0 ~1.99	55	23.6	75	32.2
2.0 ~2.99	66	28.3	68	29.2
3.0 ~3.99	68	29.2	34	14.6
4.0 and under	—	11.6	3	1.3
No applicant	—	—	25	10.7
Total	233	100	233	100

Analysis on the Visitors to the Station in 1991

Farmers service work remained an important activity of this station, and this year visitors to the station are increasing in number in comparison with the past years. A total of 10, 204 farmers visited our station. Results of analyzed document indicated that 43% of them was visiting the general business of agricultural extension with 4, 381 visitors, 30% of them was visiting the protected horticulture with 3,014 visitors, 11%, 7% and 4% of them was visiting rice, vegetable and floral crops, respectively, others included plant propection, upland crop, agricultural economic, fruits plant, soil and fertilizer as well as organic farming etc. with 40-240 visitors of each visited item. The number of visited groups indicated that a total of 108 groups visiting the station in 1991. 39 groups of them was visiting the protected horticulture, 28 groups of them was visiting the general business of agricultural extension, 14 and 13 groups of them was visiting the item of rice and vegetable crops, respectively, and the others same above. It was included from this analysis that most popular item of the visited farmers was the general business of agricultural extension and protected horticulture, then rice, vegetable and floral crops.

Farmer's Services

In 1992, by the joint efforts of all the staff in the station made the farmer's services work very productive and fruitful. A total of 360 farmer's letters had been answered. A total of 26, 649 extension bulletins had sent sent out. A total of 892 soil and 266 leaf samples sent by the farmers were analyzed and results of the analysis were sent back to the respective farmers for their use. A total of 9,946 local visitors and 854 foreign guests visited this station in 1992.

Agricultural Mass Communication

To strengthen the extension of agricultural technology for farmers, the station had not only put emphasis on training courses, but a series of agricultural audiovisual education had been also prepared for them. This station continued carry out the publication of the Quarterly "Taichung Agricultural Extension Newsletters" which has a circulation of 22,000 copies per issues and distributed to core farmers, young farmers, agricultural extension personnal and related persons. During this year the station also published 1000 copies per issue of the Monthly "Taichung Agricultural Extension Bulletins" which as one of educational materials for the training of core farmers and young farmers. A total of three kinds of video-tape materials and one kind of slide materials had been produced. In order to strengthen the effectiveness of mass communications, the station delivered 40 video-tapes, 31 audio-tapes and 41 newspaper informations to news media for broadcasting (Table 4).

Table 4. Agricultural information delivered to mass media

Media	News released	Percentage of adoption
Video	40	100
Radio	31	100
Newspaper	41	100

Improvement of Rural living

With the modern rural society developing rapidly, organizing the programs for improving the rural living enviroments and qualities are increasing.The mains items in this work are as follows: (a) Strengthening of sanitation and health services: Residents of 21/ farming villages were given dinection througth suth activities as household improvement group meeting and lectures, in recoginging the relationehip of sanitation and nutrition to health. (b) Guidance the ageing life of the rural aged peaple. In the work of home economices extencion, 13 classes of adjustment to adgeing life were organized in farming villages. Living improvement and educational work of various kinds was carried out throuth these classes. (c) Strengthening of the farmily function. A total of 13 home economice classes were organizing to strengthen guidance in farmily education, to provide counselling for aged people, married couples, young people, and to strengthen communication within farmilies. (d) Promotion of environmental improvement for rural community. Thirteen villages in major agricultural areas were selection for living environmental improvement in farm homes including the improvement of sanitation, yard disign, garbage disposal and the proper choice of flowers and trees for planting around rural community. A total of 17 villages throughout the Taichung areas were evere selected for the environmental improvement in farm village. This program including the strengthening of public facilites, farm roads, drainage systems greening and beautifying the rural environment. (e) Farm houseing improvement over these year, home renovation subsidies have been extended to low-income farm families for the renovation of 300 homes. In addition, farm houseing improvement loans have been extended for the renovation of 256 houses.

Table 5. Number of activities of rural living improvement in 1992

country & city	sanitation & health services (villages)	guidance of ageing life (classes)	strengthening of family function (class)
Taichung	12	12	1
Chunghua	7	0	7
Nantou	2	1	4
Taichung city	1	0	0
Total	22	13	12

Table 6. Number of environmental improvement of rural in 1992

country & city	environmental living improvement of farm families	environmental improvement of rural communities
Taichung	2	7
Chunghua	11	6
Nantou	0	4
Taichung city	0	0
total	13	17

Table 7. Number of farm housing improvement in 1992

country & city	home renovation subsidies (families)	farm housing improvement of rural loans (families)
Taichung	55	75
Chunghua	120	121
Nantou	111	55
Taichung city	14	5
total	300	256

Rural Cultural Development

The Council of Agriculturae is fully aware that in promoting rural cultural development, one should evoke the consciousness of rural people, protected rural areas with a better tranditional culture, established new rural culture to fit modern society, use hardware and software constructions to promote the rural developments, and established a new horizon of agriculture in Taiwan. Toward this end, the program of rural cultural development began in 1990 through the principles of starting from local communities and decision-making by local leaders. Under this program, the integrated activities of rural culture were held at the two demonstration villages such as Pi-tou, Changhua and Wu-chi, Taichung, a total of 14 villages were given guidance to set up farmer's classrooms, and a total of 14 township's activities of rural culture were held to promoting the traditional rural culture.

Table 8. The activities of rural culture in Taichung arers

County & City	Demonstration villages	Township' s activities	Farmer' s classrooms (villages)
Taichung county	1	2	4
Nantou county	0	2	3
Changhua county	1	5	6
Taichung city	0	1	1
Total	2	10	14

Agricultural Tourism Development

For the purpose of promoting the primary business of agricultural managements transfer to secondary and thirdly business, the program of agricultural tourism development began in 1990 provide the guidance to the farmers, Farmers' Associations, and Farmers' Cooperative Society to set up a recreational area for agricultural tourism development. In the past three years, a total of 31 recreational areas were chosen by the COA, including Ta-chia Livestock Farm of Taiwan FA's and Chunghisen Cooperative Society in Taichung county, Min-dien Farming Farm in Taichung city, Chi-Comding Farm of Taiwan Sugarcane Co. and Lu-ku Lodging Village in Nantou county, and Chi-lin Farming Farm in Changhua county. In the above recreational areas that were given technical and financial guidances for the hardware and software equipments from the COA. For the promotion of rural tourism development, a total of 15 farming tourism and two rural recreational areas were chosen by the Department of Agriculture and Forstry, Taiwan Provincial Government. In the future, the development of rural tourism will be grown prospectively.

Table 9. The planning of leisure farming and rural tourism in Taichung

County & City	Leisure farming areas	Farming tourism areas	Rural recreational areas
Taichung	2	3	1
Changhua	1	8	1
Nantou	3	4	0
Taichung C.	1	0	0
Total	7	15	2

PUBLICATIONS

A. Published on Bulletins of Taichung D.A.I.S. in Nos. 34~37:

1.Liaw, W. J., F. M. Wang and Y. S. Yang. Studies on Shoot Tip Culture of Hengshan (*Pyrus serotina* Rehd.) and Niauli (*P. kawakamii* Hay.) Pears. 34:1-9.

2.Tsai Y. F. and H. C. Huang. Studies on the Fertilization of *Cymbidium sinense* Wild. 34: 11-18.

3.Huang H. C. Huang, Y. F. Tsai and S. N. Huang. The Effect of Hog Manure Application on the Growth and Yield of Upland Crops. 34:19-26.

4.Lin T. F. and F. M. Huang. Influence of Planting Time on the Yield and Quality Characteristics of Rice cv. Taichung Sen 10 Grown in the Second Crop Season. 34: 27-33.

5.Guu J. W. Pathogenic Specialization of *Uromyces phaseoli* in Taiwan and Rust Resistance in Beans. 34:35-43.

6.Liu T. S. Liu, T. D. Liu, W. J. Wang and Y. S. Wang. Screening Chemicals for Control of Pear Phylloxera, *Aphanostigma piri* (Cholodkovsky). 34:45-53.

7.Tseng S. H. and S. C. Huang. Studies on Increasing Grain Yield of Buckwheat in Taiwan. 35:1-10.

8.Chen L. H., G. W. Long and Y. S. Tien. Development of Labor-saving and Low-cost Auto-fogsprayer for Plastic House Culture. 35:11-24.

9.Lin C. S. and S. J. Chang. Studies on the Resistance to *Xanthomonas Campestris* pv. *Oryzae* of Rice in Taiwan I. The Reaction of Newly Developed Rice Lines to Taiwanese Isolates. 35:25-31.

10.Day D. T. and Y. J. Lin. Studies on the Amount and Method of Fertilizer Application in Paddy Field in Taichung District I. The Amount and Frequency of Fertilizer Application in Paddy Field. 35:33-40.

11.Liu T. D., T. S. Liu and Y. S. Wang. Integrated Management of Pear Phylloxera *Aphanostigma piri* (Cholodkovsky) on Grafted Pear. 35:41-46.

12.Lin C. H. A Study on the Quality of Commercial Humic Acid Fertilizers. 35:47-57.

13.Lin Y. J. and Deng-Tsann Day. Studies on the Amount and Method of Fertilizer Application in Paddy Field in Taichung District II. Statistical Tests on the Amount of Fertilizer Application Within Rice Types, Crop Seasons and Localities. 36:1-6.

14.Liu T. S. and Y. S. Wang. Screening for Insecticides and the Application of Yellow Sticky Card in the Control of American Leafminer, *Liriomyza trifolii* (Burgess). 36: 7-16.

15.Fang M. N. Population Fluctuation and Control of *Liriomyza bryoniae* (Kaltenbach) on Pea. 36:17-28.
16.Cheng J. S. Surveys on the Adoption of Protected Horticulture Technology by Rural Youth. 36:29-38.
17.Hsieh S. C. and Y. J. Lin. Studies on Technology Transfer in Agriculture in Taiwan. 36:39-74.
18.Wang C. T., H. C. Huang and F. J. Lay. Studies on Technology of Organic Farming I. Effects of Synergistic Crops on Intercropping Systems. 37:1-9.
19.Sheu C. S. and M. T. Wu. Relationship Between Timing of Rehydration and Quality of Cut Chrysanthemum I. Water Absorption and Transpiration. 37:11-19.
20.Chang s. J. The Use of Genetic Diversity in Rice Production with Special Emphasis on Pest Management I. The Interaction of Inter-Variety Rice. 37:21-30.
21.Huang S. C. The Influence of Cropping Season on the Growth and Yield of Inbred and Hybrid Sorghum [*Sorghum bicolor* (L.) Moench]. 37:31-40.
22.Huang H. C. and Y. F. Tsai. The Effect of Hog Manure Application on the Soil Fertility and Physical Characteristics of Uplands. 37:41-49.
23.Cheng J. S. Studies on the Communication Process of Information Transfer Through Different Fields of FA Extension Workers in Taichung Area. 37:51-60.

一、研究成果摘要

水稻研究

不同營養元素對水稻白葉枯病抵抗性之影響

張素貞、朱桂芬、張美治

植物營養狀況會改變其對外界逆境反應程度，而水稻受白葉枯病感染情形，可視病害為水稻之一種生物逆境。本試驗目的在探討於不同營養元素條件下其對水稻白葉枯病抵抗性影響程度。本試驗營養元素包括氮、磷、鉀、鈣及矽，其N*K*Ca*Si或N*P*K*Ca等元素交感效應對白葉病菌在幼苗葉片內增殖有顯著作用存在。分析幼苗葉片還原糖及游離氨基含量，其與幼苗葉片內白葉枯病病原菌增殖相關情形，僅以游離氨基含量與病原菌增殖為極顯著負相關（r =-0.161**），此表示葉片內游離氨基增加，病原菌在幼苗葉片內增殖較慢。氨基(NH4*)主要成份是氮元素，且本試驗變方分析結果中顯著的交感效應中均包括氮素因子，所以氮素因子在幼苗抵抗性中扮演重要角色。試驗以生長箱環境條件下栽培水稻幼苗外，尚以溫室水耕栽培方式進行氮素對水稻分蘖盛期及孕穗期白葉枯病抵抗性影響之探討。結果顯示分蘖盛期氮素濃度並不會影響水稻對白葉枯病之抵抗性，其主要受品種特性所控制。而孕穗期水稻對白葉枯病之抵抗性雖仍與品種有極密切關係，但氮素濃度與品種交感作用亦達極顯著影響程度，而氮素主要因子卻無顯著影響。感病品種台中在來一號在孕穗期接種後病斑發展長度隨氮素濃度增加而長度減小，而抗病品種則隨氮素濃度增加而病斑發展長度增長，故氮素濃度對水稻孕穗期白葉枯病抵抗性正面或負面之影響，應視品種而定。綜合以上試驗所得的訊息是在溫室試驗氮素會影響水稻對白葉枯病之抵抗性，但在分蘖盛期其主要受品種影響，所以在育種篩選時當以分蘖盛期接種為較適當時期，另水稻生育後期若能施用適度氮肥，可以加強感病品種之抵抗性。

水稻浸水受害之探討

楊嘉凌

(一) 80年第二期作

1. 水稻生育初期淹水試驗：浸水日數處理對產量之影響，浸水7天處理產量損失28～100%，浸水5天處理產量損失25～100%，浸水3天處理產量損失17～100%。插秧後浸水時期對產量之影響，插秧後第7天處理產量損失45～100%，插秧後第14天處理產量損失32～100%，插秧後第21天處理產量損失17～100%。
2. 水稻生育後期淹水試驗：浸水日數處理對產量之影響，浸水7天處理產量損失49～65%，浸水5天處理產量損失45～56%，浸水3天處理產量損失24～32%。幼穗形成期處理產量損失27～65%，齊穗期處理產量損失24～63%，齊穗後21天處理產量損失32～49%。

(二) 81年第一期作

1. 水稻生育初期淹水試驗：浸水日數處理對產量之影響，浸水7天處理產量損失5～52%，浸水5天處理產量損失0～54%，浸水3天處理產量損失0～28%。插秧

後浸水時期對產量之影響，插秧後第7天處理產量損失1～34%，插秧後第14天處理產量損失0～54%，插秧後第21天處理產量損失3～21%。

2. 水稻生育後期淹水試驗：浸水日數處理對產量之影響，浸水7天處理產量損失15～56%，浸水5天處理產量損失12～57%，浸水3天處理產量損失11～44%。幼穗形成期處理產量損失17～40%，齊穗期處理產量損失11～57%，齊穗後21天處理產量損失12～20%。

土壤水分境況對水稻產量及生育之影響

李健捧、陳世雄

本試驗探討節省灌溉水之水田土壤水分管理方法，對水稻根系及地上部生育之影響。1991年一、二期作分別以台中189號（粳稻）及台中秈10號(秈稻)兩品種進行田間及溫室盆栽試驗，並分別以0（對照）、0.02及0.04 MPa土壤水分張力作為灌溉起點。田間試驗結果顯示台中189號以0.02及0.04 MPa處理產量較對照降低18%。盆栽試驗與田間試驗有相似的結果。0.02及0.04 MPa處理亦明顯較對照降低。上述試驗結果參試兩品種均有相似的反應，但台中秈10號除根重外各種農藝生理性狀的表現均較台中189號為優，且明顯的表現較為耐旱，綜合試驗結果顯示兩參試水稻品種，在營養生長期間土壤水分張力超過0.02 MPa，各項生理功能即顯著降低，抑制水稻分蘗而影響產量。增施氮肥可以有效改善因水分張力提高造成的不利影響。生育後期土壤水分處理對水稻生育及產量影響不大，顯示水稻營養生長期對水分的需求顯著較生育後期敏感。

第二期作水稻品種台中秈10號之移植期對產量及米質之影響

林再發、黃富美

台灣中部地區第二期作水稻之移植時間為七月下旬至八月上旬，本試驗目的在探討延遲栽植時間對台中秈10號水稻品種產量及品質性狀的影響。試驗結果發現如延後移植時間15日，則抽穗期及成熟期分別延後29及39日，主要係受低溫之作用；稻穀產量亦大幅下降65%，影響產量表現的最主要因子為結實率與千粒重。延遲移植處理降低糙米粒寬及稻穀與糙米之容重量，由於影響穀粒充實，使稻米蛋白質含量顯著上升，同時使直鏈性澱粉含量下降。晚植因可影響裡作及降低產量與品質，故第二期作栽培台中秈10號品種時，仍以提早插植較為理想。

雜草研究

水田雜草同功酶研究（初報）

許志聖、游素霞

本試驗旨在利用Pai et al. (1973)在水稻同功酶研究所開發之水平式澱粉凝膠同功酶電泳方法進行本省常見水田雜草的過氧化酶與酸性磷酸酶同功酶分析，以作為雜草族群遺傳變異、生物小種辨識、物種分化，甚至抗藥性研究的基礎。試驗材料採自大村鄉不同地點生長之稗草、雲林莞草、鴨舌草、螢蘭、球花蔦草、木虱草、多花水莧菜、節節花、畔茅、山芥菜、碎米莎草、墨菜等常見水田或畦畔雜草的不同器官，其結果顯示：稗草、畔茅、木虱草、節節花、山芥菜在過氧化酶與酸性磷酸酶的酶譜上均有較明顯的條帶可供分析酶球花蔦草，山芥菜則僅在過氧化酶酶譜上有較明顯的條帶，其餘雜草則在此二酵素電泳酶譜上無明顯條帶可供分析。稗草與畔茅不同器官的酶譜上發現有器官專一性之調節作用，且其酶譜條帶較水稻者豐富，唯在大村鄉不同地點的稗草與畔茅族群同功酶分析上尚無發現有多態性之現象，此可能與採樣區域太小所致，有待進一步之研究。

稻米品質

稻米粉及澱粉粘度連續變化圖之探討

許愛娜、宋勳、謝順景

利用不同性質之秈稻品種各約60個，分別測定其8%濃度之米粉米末及抽取之澱粉的Brabender's連續粘度變化圖，結果顯示有三種類型，第一類型為尖峰粘度、破裂粘度、回昇粘度，三者相近者，表不易變化；第二類型為尖峰粘度較低，破裂粘度較大，回昇粘度較高；第三類型為尖峰粘度高於回昇粘度。

雜糧作物

台中地區落花生地方品種之純化與評估

黃勝忠、宋勳

台中地區落花生栽培面積中有30～40%是栽培地方品種，此等地方品種經多年栽培有遺傳異質性及生產力退化現象，為純化地方品種，以提高產量與利用價值，利用本地之立枝仔、立枝仔返及油豆返等三個落花生地方品種，經1991年春作於台中場試驗農場及同年秋作於彰化縣大城之農家田，進行選種純化工作，淘汰可能帶有不良基因的植株。純化後之優良植株後裔，於1992年春作進行田間產量評估試驗，結果顯示經過兩期作純化後，立枝仔與立枝仔返的百粒重顯著增加，而三個地方品種的收穫指數與產量方面亦因品種之純化而提高，本項品種純化工作仍在繼續進行中。

提高蕎麥生產力及品質之研究

曾勝雄、楊錦蓮、楊淑媚

為提高蕎麥單位面積產量及品質，進行不同栽培環境對蕎麥產量及品質之影響、氮肥施用量及氮肥施用法等試驗，獲得如下結論：由於二林試地於蕎麥生育後期遭遇強烈季節風來襲及埔里試地發生倒伏現象，導致大村試地之產量及品質優於上述兩試地，供試品系（種）中以台中選育1號（已登記命名為台中1號）之產量表現較佳；品質則以台中選育1號、茨城在來、常陸秋及信濃1號較優。蕎麥之每公頃氮肥用量無論台中選育1號或常陸秋均以60公斤較宜。蕎麥之氮肥施用法以50%做基肥，50%做追肥，於播種後15日施用較佳。

小麥新品種台中三十四號

沈勳、張隆仁、黃秀華、邱萍菁

台中34號係台中區農業改良場為選育較推廣品種台中選2號為優，且適合本省中部水稻田冬季裡作栽培之豐產、質優適宜酒麴用途及抗銹病、白粉病及穗枯病之小麥新品種，於民國72年自日本引進20個新品系，經觀察比較試驗結果，選出具發展潛力之W－3品系，以純系選種法進行

純化選拔，再經各級產量比較，病害抗性檢定，酒麴成分分析及栽培法等項試驗，選育而成之新品種，因此於民國81年3月16日獲命名審查通過，納入推廣。台中34號之生育日數為124天，株高為95公分，每平方公尺有效穗數有314支，千粒重為50.6公克，容積重為888公克/公升，澱粉價為63%。區域試驗之平均公頃產量則為4,416公斤，較台中選2號增產22%。其生育日數雖較台中選2號略晚4天，惟仍適合於本省中部水稻田冬季裡作栽培期，因此栽培管理方法均可依照台中選2號之推薦田間栽培管理作業進度實施。株高表現比台中選2號高7公分，但其稈強耐倒伏，可適宜機械收穫。本品種之子粒外觀飽滿，其千粒重、容積重及澱粉價等製酒麴成份品質均優於台中選2號。且產量又高，因此極適合做製酒麴用途。

雜種育粱新品系台中育77-12之選育

張隆仁、黃美紅、賴順榮

台中育77-12係以TCR-76432為父本及TCA632為母本於民國77年育成之新雜交組合，經組合力檢定及各級產量比較試驗選育而成。其父本TCR-76432係以推廣品種台中五號之父本2R與新引進具半散穗、穗頸抽出度良好及花期穩定性高之TCR-76432 品系雜交選育而成之稔性恢復系統品系。其母本TCA632為新引進品系經觀察比較試驗結果具葉斑病強抗特性、花期穩定性高及採種容易之特性。本品系經區域試驗結果，其在生育日數、株高、穗長、千粒重等性狀之表現均與對照品種台中五號相近，其公頃產量平均為5,179公斤與台中五號之5,121公斤之間無顯著之差異，惟其具採種容易、穗型半散及葉斑病抗性較強之優點。因此，擬於完成肥料密度試驗後，提出申請命名審查。

蔬菜作物

豌豆豆莢無筋絲遺傳之研究

郭俊毅

以豆莢有筋絲品種台中11號、台中12號及台中13號，分別與無筋絲品種Sugar Daddy相雜交，所有F1植株及F1回交有筋絲親本(BC1)之後代均為有筋絲，顯示豆莢無筋絲性狀為隱性遺傳。由於各什交組合之F1及其F1回交無筋絲親本(BC2)時，出現無筋絲之株數非常少，而且毫無規則可言，故無法據以推斷該性狀由幾對因子所控制。惟本試驗發現無筋絲性狀有不同之等級，因此推測該性狀除了由主效因子控制外，尚有微效因子會左右其表現。此外，同一雜交組合內，在F2及BC2之分離世代，出現無筋絲之比率，在冬作期間較夏作期間為低，可見溫度對此性狀之表現亦有影響。

大蒜蒜球休眠性之探討

鍾維榮

大蒜蒜球成熟採收後即進入生理休眠期，蒜球休眠性的問題常常成為栽培及貯藏的限制因子。本試驗的目的為探討本省大蒜不同品種及不同蒜弁大小間休眠期的長短，以供日後生產及利用之參考。調查大蒜三個品種在一般貯藏情況下，蒜球生長點芽體變化的情形，來推算品種間休眠期的差異。其結果如下：學甲種之休眠期為10週左右，雲林種為14週，而和美種為16週。蒜球冷藏時生長點芽體之變化，學甲種於冷藏後第5週起芽體生長非常迅速，雲林種則於冷藏後第6週起芽體生長才急劇增加，和美種芽體之生長增加速度較為穩定緩慢。調查同一品種（學甲種）不同蒜弁大小之休眠性之差異情形，結果顯示大粒蒜弁休眠性較淺，小粒蒜弁休眠性較深，三個粒型休眠性差異範圍為2至4週左右。

台灣菜豆銹病菌病原性的分化與菜豆之抗銹病反應(一)

古錦文

利用19個標準判別品種鑑定台灣中部地區的菜豆銹病病原菌得七個生理小種。判別品種之U.S. #3、Pinto 650對這些生理小種呈極感(S)的反應，至於Mexico 309、AXS 37、NEP-2、CNC等則均屬抗性反應。30%的分離單孢分離菌株與生理小種TW-1引起菜豆銹病的反應一致，因此TW-1可能是台灣中部地區最普遍的生理小種。大部份的生理小種對此七個生理小種具極感反應，惟台中一號對TW-2、TW-3兩銹病菌之生理小種反應是極抗，BARC-RR-13及四個PI品種則全部表現抗、極抗或免疫反應。顯然這幾個品系是改良本省菜豆抗銹病之珍貴種源。

利用絲瓜根砧嫁接苦瓜栽培試驗

洪溼堂

苦瓜耐熱性強，但莖葉細弱不耐風雨，根部不耐水濕，尤其夏季栽培受多雨影響，容易引起萎凋枯死，為造成低產或減產之主因。依據中興大學林教授益昇報告，該病原菌僅危害苦瓜和矮性南瓜，其他瓜類作物則具有強抗性或免疫性，茲為改進苦瓜生產技術，擬參考番茄嫁接抗青枯病，西瓜嫁接扁蒲抗蔓割病，以及柑桔嫁接廣東檸檬增抗黃龍病等之實例，爰用嫁接方法，過去曾將有親和性的南瓜、扁蒲或絲瓜與苦瓜嫁接，結果顯示南瓜嫁接苦瓜成活率不高，扁蒲根砧耐熱性不佳，嫁接處腫大，易罹患根腐病，而以長筒絲瓜為根砧，利用絲瓜根群耐濕及再生力強的特性，嫁接苦瓜的成績最佳。本試驗專以長筒絲瓜為材料嫁接苦瓜，結果獲得抗病力大為增強，採收期比對照無嫁接區延長27天，苦瓜產量亦增加94%，且苦瓜皮光亮白皙，品質佳，值得推介瓜農採用。

不同覆蓋資材對促進蕹荷花蕾品質之影響

林天枝、莊杉行

為提昇蕹荷蔬菜花蕾產量與品質，試從株上遮蔭與根際覆蓋探討其對促進軟化效果，結果顯示株上遮蔭對花蕾產量有增產效果，比無覆蓋對照區增產8.5～20.1%，以50～60%寒冷紗遮蔭處理較顯著，但對產品品質提昇效果不大，其花蕾顏色均呈暗綠色，纖維質多，脆度差，與無遮蔭處理CK同列為三級品，商品價值差，不值得採行。三種根際覆蓋資材以銀黑色塑膠布覆蓋區花蕾品質最佳，呈白紅色，纖維質少，脆度好，唯因地面覆蓋塑膠布空氣對流差，水氣蒸散不易，使產量偏低，比對照區減產39.7%，非理想資材，而白色不織布覆蓋因具有透光性，新生花蕾易受陽光滲透而變暗紅色，品質變差，列為2～3級品，亦非理想資材。稻殼覆蓋區雖然品質稍遜於銀黑色塑膠布覆蓋，但仍可

歸列於一級品，且其產量只差無覆蓋對照區16.7%，為三種根際覆蓋材料中表現較可被接受的一種。

花卉作物

菊花採收後吸水預措時機對品質之影響

許謙信

菊花黃秀芳品種切花採自田尾產區，以剪取後10分鐘內，陰置二小時、四小時、六小時後，插入水中吸水四個小時後，取出裝箱、隔夜、再置入水瓶觀察其瓶插品質，並計量切花吸水或失水及蒸散量。採收後陰置二小時、四小時及六小時，切花損失之重量依序為1.75、2.10及3.36%。各處理插水四小時後，切花枝增加之重量分別為10分鐘內直接插水者3.24%，陰置二、四、六小時為4.94、3.72及4.37%，切花插於水中時之蒸散量，四小時內，四處理，依上述次序，依序為6.47、2.18、2.45、2.51%。瓶插品質於19天後觀察，剪後10分鐘內直接插入水中者，品質較陰置後再插入水中之各組為佳。

改善唐菖蒲採收及保鮮技術

蔡素蕙

唐菖蒲是本省的重要切花之一，但其切花過程及之後的處理或對於品質的提昇等之研究並不多，因此，本試驗試著探討以簡易搬運車輔助切花作業，及探討新引進品種之切花品質，藉以改進唐菖蒲之市售品質。試驗結果顯示以手推車輔助切花作業時，對於減少工時的效果不彰，但可使工作較為輕易。供試之20個品種中，若以花穗彎曲情形、瓶插壽命、小花之大小及同一時間保持較多可觀賞之花朵數等條件為基準，品質較佳的品種為Peter pears及Dream party。

天堂鳥花之病蟲害種類及為害調查

黃金助

天堂鳥花(*Strelitzia reginae* Banks.)，為中部地區新興花卉之一。在田間調查發現，其生育期間主要病害有三種(1)由 Alternaria SP 所引起花腐病。罹病部停止生長，造成花朵畸型，花苞無法開展。(2)由 *Pseudomas solanacearum* 所引起之青枯病。主要在7～9月高溫多濕季節發生，被害株率達6%，被害葉片褐化乾枯而萎凋枯死。(3)葉斑病使葉片和葉尖部位呈褐色或黑色病斑，受害葉片提早枯死。常見害蟲有八種，(1)小白紋毒蛾發生在7月間發生棲群密度較高，常見幼蟲群集於葉背剝食葉肉。(2)台灣黃毒蛾以7月中旬密度較高，幼蟲群聚於葉背，取食葉肉。(3)黑點刺蛾發生在7月間較多，幼蟲多於葉面取食。(4)避債蛾發生在9月間較多，幼蟲取食葉片造成缺口。(5)粉介殼蟲發生在10～11月間，於葉柄、葉片可見成蟲及若蟲群集為害。(6)褐圓介殼蟲發生在10～11月間，在葉上吸收養分，使葉片轉黃生育不良。(7)扁蝸牛發生在4～5月間較多，在葉片分泌黏液，阻礙葉片之光合作用。(8)金龜子於5月中旬有成蟲出現。

果樹

梅花芽分化之顯微觀察

張林仁、林嘉興、莊杉行

本研究利用植物顯微技術，以本場埔里分場之臘脂梅為材料，進行梅之週年花芽分化觀察。經由掃描電子顯微鏡及組織切片之觀察結果，將梅之花芽分化過程區分為數個階段，並針對各階段之發生時期加以探討。

枇杷栽培產區土壤與生長調節劑處理對產期及果實形質之影響

林嘉興、張林仁

本試驗針對各海拔高度枇杷之修剪與結果枝形質對抽穗期、抽花率及果實大小進行調查，收集各產區田間管理資料，並於新社鄉選擇一處枇杷園進行土壤改良劑與生長調節劑處理，俾便建立各產區生育期管理之基準。高海拔地區日夜溫差大，花芽分化期較短，花芽形成率高，成熟期果粒大、糖度高。但花蕾形成期愈早，結果枝片數愈少且果粒小；而生育稍強之新梢結果期較晚，葉數多、果粒大、糖度高。枇杷園在果實採收後施用土壤改良劑具有增加新梢葉片數的效果，但停心期及花芽形成期較對照區晚。在新梢生長期噴施細胞分裂劑，可使部份營養生長之新梢轉變成生殖生長，提早花芽形成；開花期及盛花後25天噴施細胞分裂劑，具有提高果粒重的效果。枇杷之產期與果實形質受到果園管理與各年度氣候變化之影響，每年各產區均有不同反應，必須長期間收集各項田間資料，俾便擬定各產區之生育管理基準。

利用〝二次催芽栽培法〞在低海拔地區生產高需冷性東方梨

廖萬正、張林仁

種植於本場之高需冷性東方梨新興、豐水及幸水等三品種，於80年8～9月間，以1% cyanamide噴施植株，可促其落葉，並整齊萌芽，於一個月後葉片成熟時芽體即可進行分化，至翌年1月間，花芽可分化完成。花芽形成率新興品種為42～50%，豐水品種為35～40%，幸水品種為17～20%。於1月至2月間以1% cyanamide噴施植株，以促進萌芽及開花。其結果為較遲處理者萌芽率較高，以豐水品種之萌芽率為最高達90%，其次為新興59.5%，幸水較差僅28.5%。果實可在7～8月間收穫，平均果重幸水為131公克，豐水為228公克，新興為302公克。利用此種以二次催芽之栽培方法，應可漸次取代需高人力、物力之高接法，而在低海拔地區生產高需冷性高品質之東方梨。

高接梨梨瘤蚜之綜合防除技術

劉添丁、劉達修

梨瘤蚜(*Aphanostigma piri*)主要危害套袋內之梨果，致引起果實表面粗糙、龜裂和腐爛。果農為保護果實免於被害而於結果期頻頻施藥，但往往無濟於事，因此如何在果實套袋前採取有效的防治措施，以減少其發生與危害，實為當務之急。防治試驗結果顯示，(1)於梨樹採果後之秋冬季（9月～翌年2月）全面施用80% Sulfur D.F. 400倍1～3次，對越冬期間殘留於枝幹上之梨瘤蚜可殺滅68.7～75%，(2)將高接用之接穗用80% Sulfur D.F. 200倍或400倍液浸2分鐘，可將存活於接穗上梨瘤蚜的蟲及卵完全殺滅，(3)於高接梨接穗基部環狀塗以凡士林或黃油，可有效防止梨瘤蚜由枝幹往果穗處遷移，(4)將套袋口浸52% Sulur F. 100倍液，以防止梨瘤蚜浸入套袋

內，亦有約50%左右之效果。若能配合上述諸綜合防除技術，應可有效減少梨瘤蚜對套袋中梨果之危害及減少結果期之施藥。

植物營養

台灣中部設施栽培土壤鹽分累積之特性研究

陳鴻堂

本研究乃針對防雨設施栽培內土壤鹽類累積，探討其累積特性，提供累積鹽分之土壤改良參考。調查中部地區設施栽培30點和對照區18點，設施栽培表土0～5公分水溶性離子濃度，遠大於設施外對照區表土，尤其以NO_3^-、SO_4^{2-}、Cl^-、及K^+為明顯，以粘板岩石灰性沖積土為例，設施栽培表土水溶性Ca^{2+}、Mg^{2+}、K^+、Na^+、Cl^-、NO^-、SO_4^{2+}濃度分別為5.378、2.359、2.158、2.109、4.821、7.323、7.545 cmol kg-1，而對照區為1.649、0.269、0.492、0.435、0.808、0.610、1.675 cmol kg-1，此證明設施栽培土壤確實有鹽分累積，而累積發生在表土0～5公分。粘板岩石灰性沖積土、砂頁岩非石灰性沖積土、粘板岩及砂頁岩混合沖積土及紅壤等四種土類中，以粘板岩石灰性沖積土的設施栽培鹽分累積最明顯。設施栽培土壤施用化學肥料氮素及鉀素的量與土壤電導度呈顯著的正相關，化學肥料氮素施用量也顯著的影響設施土壤水溶性硝酸根濃度，而影響作物生長。設施栽培土壤水抽出液 EC (1:5)值與全部陽離子相關係數為0.957，與陰離子相關係數為 0.926。相關式分別為所測定全部陽離子 (cmol kg-1) = 0.114 + 3.622EC (1:5)所測定全部陰離子(cmol kg-1) = 1.305 + 5.158 EC，EC單位為dSm-1。土壤水抽出液EC(1:5)值與飽和抽出液ECe值的相關係為 0.99，相關式為 ECe = 6.11 EC(1:5)，以土類而言，例如粘板岩沖積土則為ECe=5.64EC(1:5)。

土壤肥料

有機廢棄物資材對堆肥中C、N、P成分之影響

蔡宜峰、黃祥慶

本研究目的在探討C、N、P在不同有機物之堆肥化過程中的變化與其相關影響因子，以期能依不同有機物之特性，調配適當的用量及比例，使製成堆肥的腐熟度及營養成分含量達到所要之品質，如適合不同作物之養分需求等。由不同有機物用量及比例之堆肥化試驗結果顯示，腐熟堆肥之N、P、K成分含量均增加，C成分含量則減少。以堆肥中各成分乾重含量而言，C及N的增減率與堆肥中氮源不同及有否通氣有關，P及K的增減率極小。如固定以木屑、稻草為碳源，再以牛糞為氮源時，堆肥化中氮的損失約31.1%，碳的損失約58.7%。如以雞糞為氮源時，堆肥化中氮的損失約34.6%，碳的損失約64.9%；同樣以雞糞為氮源下，在堆肥化中持續實施通氣處理，則氮的的損失為20.5 %，碳的損失為61.1%。

牛糞堆肥製作及對一般作物效應之研究

蔡宜峰、陳清文

為配合加強廢棄物處理政策，本研究實施多項牛糞堆肥製作及肥效試驗。結果顯示利用溫度測量及種子發芽率調查，可做為輔導酪農户自行製作牛糞堆肥時，檢測堆肥腐熟度之簡易方法，以確保牛糞堆肥品質。在牛糞堆肥製作前添加尿素及過磷酸鈣等，可使堆肥之全氮及全磷含量略增，惟堆肥之無機氮含量相對提高，致使種子發芽率下降，所以在堆積材料中實施添加化學肥料處理，仍有待進一步審慎評估。由田間試驗結果顯示，牛糞堆肥有改良土壤理化性之效果，如降低農田土壤總體密度、土壤硬度，提高土壤水分含量及pH值，且能增進包括玫瑰、苦瓜、唐菖蒲及葡萄等作物之產量及品質。

有機農法相關技術之研究—共榮作物之利用

王錦堂、黃祥慶、賴嘉珍

本試驗探討有機肥之施用與間作栽培對主作物之栽培，以選出適宜共榮與有益作物組合。試驗結果顯示；施用有機肥較化肥處理，在單作區平均增產11.3%，施用有機肥間作區比單作區，主作甜玉米增產19.3%。馬鈴薯6.5%，毛豆36.9%，大蒜5%。而施用化肥間作區比單作區，主作毛豆增產55.4%，大蒜增產7.9%。適宜之共榮作物組合為秋季甜玉米間作毛豆、矮性菜豆、豌豆、花豆、花生、油菜、蔓性菜豆。冬季主作馬鈴薯間作花豆、豌豆、矮性菜豆。春季主作毛豆間作蘿蔔、萬苣、白菜。冬季主作大蒜間作胡蘿蔔、菠菜等。試驗顯示間作可顯著提高主作物糖度。

市售腐植酸肥料品質研究

林景和

本試驗在調查市售腐植酸肥料中與土壤及作物營養有關之成分和一般理化性質，以評析各種市售腐植酸肥料之品質。試驗結果發現測試的十一種腐植酸肥料，有三種肥料之腐植酸含量在8～10 %之間，而未達政府目前對該類肥料所訂之10% 含量低限；所有測試肥料之灰分含量均在32% 以下，且彼此間有極大差異，顯示產品間無機成分含量差異很大。一般植物養分元素含量方面：碳含量在2.5～43.0%；氮含量在0.16～1.60%。磷含量0.25%以下，其中磷含量接近文獻記載之土壤及地下水中腐植酸之磷含量範圍。樣品之鈉、鉀含量依次分別在0.2～9.6%與0.0～3.5%之間，隨其使用NaOH或KOH為萃取劑萃取含腐植酸材質而分別含甚高量的鈉或鉀。樣品之鈣含量低於0.67%；鎂含量低於0.06%。硫含量低於 0.49%。硫含量低於文獻記載之土壤，水體或堆肥之腐植酸者。樣品之氯含量均低於 0.01%。重金屬含量方面：砷含量在 3.39 PPM 以下。鎘含量在 2.30 PPM以下。鉻含量在11.9 PPM以下。銅含量在21.80 PPM以下。供試固態、液態樣品各有一種之汞含量達0.06 PPM，其餘樣品均無法測出。鎳含量在20.4 PPM以下；鉛含量在 28.8 PPM 以下；鋅含量在 128 PPM以下。此結果亦顯示，樣品因原料來源不同而使部分產品具較高之某重金屬。理化性質方面：除一種為酸性外，其餘產品之pH在8.8～10.4，顯示大多數市售腐植酸肥料為強鹼性；此與學術上所稱之腐植酸為酸性者不同，故嚴格而言，這些商品宜稱為含腐植酸之鹼性物質。測試樣品之250 及 1000 倍稀釋液電導度均低於 3200 umhos/cm，故以此濃度直接灌注土壤對作物應無鹽害。供試腐植酸肥料之陽離子交換能量在29～673 cmol/kg，但形成CEC之化學基如何，有待研究。供試液態產品

之粒徑大小測試結果可歸兩類： 一類約 1 m屬粘粒之範圍， 另一類在 5 m 以上屬坋粒規格。 就粒子比表面積影響表面物理及化學反應而言， 粒子較小之液態腐植酸具有較高活性，應有利於田間施用的表現。

甜玉米與毛豆有機栽培之研究

謝慶芳、徐國男

本試驗是在台中區農業改良場本場農場一處經過客土之酸性土壤舉行。使用之有機質肥料為豬糞、牛糞和雞糞等三種分別混合穀殼米糠與骨粉製成之堆肥。有機處理之甜玉米完全未使用任何化學農藥和自然農藥，毛豆也未使用化學農藥，但全期噴施添加磷酸一鈣和磷酸一鉀之糖醋液四次，今年是第三年。試驗結果發現連續使用上述三種有機堆肥對土壤之正面影響為 pH 、有機質、有效磷、交換性鉀和鎂、可萃取性錳、鋅、銅之增加，以及土壤鹽分和可萃取性鐵之降低，而負面影響則為交換性鈉和可萃取性鎳和鉛之增加，但兩者比較，負面影響似乎相當微小。作物反應則因種類而不同，在與化肥處理同量氮肥下，有機處理之甜玉米產量都低於化肥處理，尤其牛糞處理最低。植物體分析結果也顯示有缺錳現象，但玉米粒之磷含量較高，似乎對人體較有幫助。毛豆則有機處理之產量都較高，但其差異未達到顯著水準，毛豆仁之重金屬鎳、鎘、鉛含量顯著降低，糖度顯著增加，表示其品質較好。本試驗證明甜玉米採用耐寒品種於11月間播種即可不用任何化學農藥也可避開玉米螟之嚴重為害，毛豆採用春播也可避開薊馬等害蟲之嚴重為害，只用自然農藥糖醋液即可達到理想之生長。

植物保護

微生物肥料的開發

黃秀華

土壤中存在許多微生物，雖然有些對植物有害，如 *Pythium* spp., *Phytophthora* spp., *Fusarium* spp.及 *Rhizoctonia* solani。但亦有眾多的有益菌存在其中。本試驗目的欲自土壤中分離有益菌並加予篩選及培養。利用平板稀釋法將各地採回的土壤作系列稀釋，培養於King's media, Peptone media 中， 再將出現的微生物菌落單挑出來培養，以對峙培養法篩選對上述病原菌有拮抗作用之菌株，作為供試菌株。由二林、溪湖、埔里、彰化、新社、鹿港及名間等地之不同作物上， 分離根圈及根表之微生物， 各得螢光性 *Pseudomonads* 菌株226（根表）、125（根圈）菌株及放線菌在根表183菌株、根圈107菌株，經拮抗試驗結果在螢光性*Pseudomonads*菌株共得13個拮抗菌， 放線菌則得 5 菌株， 其中以FP13，FP43及A-02，A-33的效果最好。

菜類蔬菜立枯絲核菌病之偵測技術

劉興隆

調查發現菠菜、芥藍菜、空心菜、萵苣及白菜等葉菜類蔬菜均受立枯病為害，其中以菠菜及芥藍菜最嚴重，本病主要由立枯絲核菌病菌(*Rhizoctonia solani*)(AG-4)所引起。在土壤中，利用誘餌法，比較六種葉菜類蔬菜種子被本菌纏據之百分率，以本地角粒菠菜種子，纏據效果最佳，並可縮短誘餌時間，由於角粒菠菜較大、成角形、顏色淡褐色，在挑出時易從土壤中選取，可節省操作時間。自土壤偵測本菌的方法是：(1)利用燒杯盛裝 100 公克之帶菌土壤後，隨即調整土壤水分含量為12～15% (W/W)，(2)把40粒角粒菠菜種子均勻與土壤拌合，並在24℃培育24hr.(3)從土壤中回收種子並以清水漂洗後， 放在 2% 水瓊脂（含300 ppm鏈黴素）平板上，(4)在 24 ℃經 20 ～ 24hr ， 即可檢視R. solani (AG-4)纏據種子的百分率。在八種不同菌量密度的土壤中，R. solani (AG-4)纏據角粒菠菜種子的百分率與菠菜及芥藍立枯病的發生率間呈直線迴歸正相關。這種角粒菠菜種子的誘餌法，可快速、敏感且準確的預估R. solani (AG-4)的菌體密度與為害葉菜類蔬菜的百分率。

瓜類毒素病之生態學研究

趙佳鴻、陳慶忠

1989～1992年間在本場農田設置0.05公頃固定觀察圃，每月將50盆溫室培養之健全矮南瓜移植於試驗田，隔月收回，並以ELISA偵測矮南瓜感染ZYMV、WMV-1病毒植株之比率。結果顯示3～5月及8～10月此二病毒較易發生，而11～2月發生比例偏低。另於1991年5月至1992年4月以黃色水盤誘集田間有翅蚜蟲並製成標本，每日調查蚜蟲種類及棲群密度，結果得知5～10月以棉蚜(*Aphis gossypii*)、無肘脈蚜 (*Hysteroneura setariae*) 、 高粱蚜(*Melanaphis sacchari*)密度較高， 而偽菜蚜 (*Lipaphis erysimi*) 、 桃蚜 (*Myzus persicae*)、棉蚜(*A. gossypii*)則在11～12月間數量較多。一般瓜類是棉蚜的寄主植物故它可能在此一地區扮演傳播ZYMV、WMV-1二種病毒之重要角色。1991年8月底於溪湖調查瓜類病毒病害對花瓜產量、品質之影響評估（供試品種為農友喜燕），結果發現花瓜生育初期感染病毒之植株果實數目為健全植株之18%，平均果重為健全植株之80%，除無商品價值果實數目增加外，發病嚴重者植株矮化、不開花、完全不結果而致植株死亡；開花期以後感染病毒者其對花瓜產量、品質影響較初期感染者輕微，但果實數目僅及健全植株之42%，以致開花期感染病毒者產量及收益尚不及健全對照之一半。

水稻皺縮矮化病毒形態之再研究

陳慶忠、趙佳鴻、柯文華

水稻皺縮矮化病毒 (rice ragged stunt virus, RRSV) 由於完整之病毒粒子未被確認，致其分類地位未定。我們將罹病稻葉先以2% glutaraldehyde 隔夜固定，再將罹病組織於水中切碎， 粗汁液加入等量之bacitracin 混合後做成標本並以2% PTA 陰染，行電子顯微鏡觀察。在電顯下常可觀察到具有內層蛋白之病毒次粒子 (subviral particle) 直徑約55～60nm，無突起中核粒子(core particle)直徑約50nm及含有B spike之次粒子直徑約65～67nm。偶也觀察到直徑約75～80nm之病毒粒子，此種粒子表面有 A spike 突起， 外形呈棍棒狀， 寬約13nm，長度約10nm。本研究證明RRSV具有完整病毒粒子，含蛋白外殼及A spike構造，加上已知其他生物特性，在分類上應置於 plant reovirus 之 Fijivirus 屬， 如與Fijivirus 屬之其他三個血清亞群相比較，RRSV 與稗草皺縮矮化病毒 (Echinochloa ragged stunt virus，ERSV)病毒形態及核酸組成相近似，二者又具血清類緣關係。據

此建議RRSV與ERSV可於Fijivirus屬中成立第4亞群。

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12個，分別於民國八十年第一、二期作在彰化縣大村及台中縣大里兩地進行對水稻白葉枯病不同菌系之耐病性試驗。供試水稻於孕穗末期，即劍葉展開時接種5種不同致病力菌系觀察其致病情形。試驗結果顯示不同供試水稻以台中在來1號、台中秈10號及台中秈3號品種對白葉枯病5種菌系之感病性為最高，其次為高雄141號及高雄選1號，其餘品種對XM-42及XF-71-a兩菌系有較高感病性。此外，白葉枯病罹病面積率較高影響產量較大者有台中在來1號、台中秈3號、台中秈10號及高雄選1號；罹病面積率中等，但對產量影響較顯著者有台中65號及台農70號；罹病面積率中等而對產量影響較不顯著者有高雄139號及台南9號。白葉枯病罹病面積率高，但對產量影響少者有高雄141號，顯示該品種對白葉枯病具有耐病性。

菜豆主要害蟲族群消長及防治曆之訂定

張德前、陳慶忠

中部地區菜豆幼株期主要害蟲為根潛蠅(*Melanagromyza centrosematis* Kato)、莖潛蠅(M. sojae (Zehntner))、小綠浮塵子(*Edwardsiana flarescens* (Fabricius))及豆蚜(*Aphis craccivora* Koch)等，其危害植株影響菜豆幼株生育甚大，播種萌芽後10～15天內為其防治適期，以2.8%畢芬寧E.C. 2000倍、2.8%賽洛寧E.C. 2000倍或25%乃力松E.C. 1000倍等藥劑防治效果較佳。菜豆開花結莢期主要害蟲為斑潛蠅(*Liriomyza bryoniae* Kalt)、二點葉蟎(*Tetranychus urticae* Koch)、花薊馬(*Fraklimiella intonsa* (Trybon))、小綠浮塵子(*E. flarescens*)及鱗翅目害蟲(*Lepidoptera*)等，主要危害葉片、花蕾、豆莢等，以秋作9～11月棲群密度最高。欲防治前述害蟲，宜於菜豆開花結莢前即害蟲密度低時選用下列藥劑一種即2.8%畢芬寧E.C. 2000倍、2.8%賽洛寧E.C. 2000倍、2.8%第滅寧E.C. 1000倍、3%蘇力菌W.P. 1500倍、50%馬拉松E.C. 500倍或75%賽滅淨W.P. 4000倍等藥劑連續施藥防治2次。噴藥時可依害蟲發生情形，相互配合輪流使用，減少抗藥性。菜豆結莢採收期，如遇害蟲密度較高必需防治時，宜選用低毒性藥劑，以確保蔬菜無農藥殘留之虞。

羅賓根蟎(*Rhizoglyphus robini*)之生態與防治研究

劉達修、曾阿貴

羅賓根蟎(Rhizoglyphus robini)為球根花卉重要害蟎，在根蟎類中本蟎約佔95%以上。24℃～28℃為其發育最適溫度，於12℃定溫中無法生存。在16、20、24、28、32℃定溫中其卵期分別為7.3、5.0、3.2、2.2、3.2天；幼蟎期為5.3、4.1、2.4、1.7、1.9天；前若蟎期為5.3、4.8、2.6、2.0、2.5天；後若蟎期為5.8、4.9、3.2、2.7、2.4天；產卵前期在2.7天～4.6天；成蟎壽命約17～33天。每雌之產卵量約52.6～190粒，以24～32℃之產卵量較高。本蟎極耐濕，不喜乾燥環境，在水中可存活10天以上。根蟎在唐菖蒲球根發生程度，與球根受傷或發生病害與否有關，而施用有機物也可助長其發生。於室內將種球浸藥0.5及1小時，經1、4、7天調查，以43% Selecron E.C.、40% Supracide E.C.、50% Takuthion E.C.及50% Imidan W.P.等4種殺蟲劑對根蟎之成若蟎及卵約有90%之殺蟎效果，但田間防治率低於80%。於浸種時及定植後一個月灌施25% Prochloraz E.C.＋50% Takuthion E.C. 2000倍可得較優之防治效果。另用40℃溫水浸種2小時或45℃溫水浸種0.5及1小時，可獲得近100%之殺蟎率，本場已委託廠商研製成功恆溫水箱，可供花農做為浸種之用。

數種殺蟎劑及非農藥物質對作物害蟎之防治效果

王文哲、劉達修

在室內選用34種殺蟎劑對二點葉蟎及神澤葉蟎進行防治效果試驗，結果25% Morestan W.P、2.8% Talstar E.C對玫瑰上神澤葉蟎之致死率達95.4%以上。對卵則以50%Vendex W.P致死率92.4%為最佳；對玫瑰二點葉蟎以2.8% Talsar E.C、50% Dicarzol W.P效果最好，殺蟎率在91.4%以上。對卵則以2.8% Talstar E.C、25% Peropal W.P較佳，致死率在87%以上；另外測試非農藥物質對菊花二點葉蟎之殺蟎效果，以植物營養劑（富士4551）、白蘭洗潔精、及Action Reserch較好，殺蟎率在86.3%以上；從菜豆上採得之神澤葉蟎，以植物營養劑（富士4551）及尿素200倍最好，殺蟎及殺卵效果均在94%以上。田間防治神澤葉蟎結果25% Morestan W.P之防治率達99.3%，2.8% Talstar E.C為98.5%，對二點葉蟎防治效果，則以57% Omite E.C及25% Morestan W.P較佳，防治率在94.5%～98.2%。另以膠帶黏浸法測數種殺蟎劑對二種葉蟎之毒性(LC 50之值)得知二點葉蟎對數種藥劑已產生耐藥性，但神澤葉蟎則無此種現象，顯示目前部份政府推廣之殺蟎劑對神澤葉蟎仍有防治效果。

番茄斑潛蠅在豌豆上之族群變動與防治試驗

方敏男

番茄斑潛蠅Liriomyza bryoniae自豌豆播種21天後整個生育期均可造成危害，其族群密度在台中11、12、13號豌豆及台中11號豌豆搭架與匐伏不同栽培方式之差異不顯著。12種藥劑於新社鄉及大村鄉進行藥效試驗結果，以75% Trigard WP 6000倍之防治率達92%最佳。洗潔精＋鹽＋清水混合液與單獨使用清水對番茄斑潛蠅之誘捕蟲數約為40～50：1。不同顏色水盤對番茄斑潛蠅之誘捕蟲數以黃色水盤每日每盤17.1隻最多，黑色水盤0.47隻最少，各種顏色誘捕雌雄成蟲比約為3: 1。黃、白、綠、紅、藍、及黑等6種不同顏色粘蟲板分別以向東、西、南、北及平放等五種不同方向及距地面0、50、100及150公分四種不同高度誘捕結果，各種顏色不同方向間差異不顯著，但高度間以距地面0公分之誘捕蟲數最多，150公分最少。將豌豆田分為75% Trigard WP、2.8%畢芬寧EC、黃色水盤+畢芬寧、黃色粘板+畢芬寧、黑色塑膠布＋畢芬寧、銀色塑膠布＋畢芬寧等6種不同處理進行綜合防治試驗結果，以75% Trigard WP 6000倍之防治率達96.2%最佳。綜合上述試驗結果，黃色粘

板及水盤可以大量誘捕番茄斑潛蠅成蟲，減少豌豆植株幼蟲密度， 應用 75% Trigard WP 6000倍防治番茄斑潛蠅可以達到92%以上之防治率。

農業機械

畜禽堆肥施用機械研究

龍國維、田雲生、陳令錫

堆肥普遍使用可解決畜禽廢棄物出路問題，亦可同時改善地力，提升農產品質量。但施用堆肥是十分笨重的工作，極需機械來配合以提高效率並促進堆肥的大量使用。本研究為了解堆肥施用機械資料及效益等， 除對各類機型收集整理並分類外，另對國內使用堆肥撒佈機情形及分佈做調查統計以及就堆肥撒佈機效率及效益做一分析。畜禽堆肥施用機械可概分為田面均勻撒施用之堆肥撒佈機與做作物行間施用之堆肥挖溝施肥機兩大類。 前者為歐美日等國使用多年機械，型式繁多，概略以四大類別細分為十餘種不同結構功能之機型； 後者為近年來針對作物行間使用堆肥需求而發展出之機型。 國內目前所使用均為前者，計有九種進口廠牌共40餘台，分佈於全省，以中部最多。堆肥撒佈機之效率由日製SASAKI GT-1110K單一機型測試結果與人工撒施做比較，結果顯示較人工撒施快7～10倍。使用機械堆肥撒施方式，若年使用50公頃，可較人工撒施節省成本達每公頃5594元；若採個別農户購置，年使用 8 公頃， 則可較人工撒施節省每公頃成本4319元。目前國內應用堆肥施用機械仍不普遍，對於如何推廣此類機械，如建立代撒施制度或發展堆肥撒施機多用途功能等之可行性仍有待探討。

瓜果用田間搬運車研製

龍國維、田雲生、陳令錫

本研究以現有農地搬運車之製造技術及使用經驗為基礎，設計研製兩類型搬運車，以解決作畦栽培田於田中至一般道路間之運輸、噴藥等作業需求。其中第一型為行走於畦溝中之小型搬運車及其附屬噴藥裝置： 該機以 5.3Hp 汽油引擎為動力，無段變速皮帶輪 (Continuous variable-speed transmission CVT) 或離心式皮帶輪配合前進二檔、後退一檔變速箱傳動，最高行走速度 18km/hr，最大載重量 300kgs。 其承載台除可置放塑膠籃、紙箱等載物外，又可迅速換裝容量 110L 藥桶與折疊式噴桿等整體噴藥裝置，兼作病蟲害防治工作，使本搬運車具多功能的作業目標，並可減輕農民一部分人工作業之辛苦。 惟礙於畦溝寬度限制，使輪距僅為37cm，若負重行駛於崎嶇路面上，則尚有側傾之虞，故將針對此缺失繼續改良； 另一型則設計為跨畦式行走，並可調整輪距自100至150cm之輕架構搬運車，其以 7Hp 汽油引擎驅動，承載量約 1,000kgs，除可因應不同畦型尺寸田間運輸作業外，亦可規劃修改為播種、移植或收穫等作業機應用， 此部分正逐步試驗研究中。

簡易設施用自動噴藥設備研製

龍國維、田雲生、陳令錫

開發完成噴霧架自走式省工噴霧裝置一套，由鋼索軌道、行走架、噴霧架、行走驅動組、電氣控制裝置及藥液輸送管路等六部份組成，可自動操作亦可採手動控制方式行部份區間噴撒， 當 DC 馬達驅動電壓調整在 90V，噴霧行走架行進速度為 2.5 km/hr，調整噴霧壓力在 25kg/c㎡，每一畦溝一支垂直噴桿配置 4 粒單孔扇形噴頭，噴頭位置可依作物高度適度調整，垂直噴桿位置亦可按畦寬左右調整， 330 平方公尺（55m×6m）之設施田78秒可完成單程噴藥作業，藥液撒佈量為32公升，在噴頭數量及噴霧壓力等噴霧條件設定後，行進速度之快慢變化是決定藥液單位面積撒佈量之主因， 同時亦影響葉表附著結果，經試驗，行進速度以2.0～2.5km/hr有較佳葉表附著效果。 電氣控制裝置採用傳統電機元件依所設計之電氣控制順序流程圖之功能要求組裝電氣元件及線路， 外部設定及檢知條件輸入後， 經設計之電路研判能夠自動進行控制任務。 採用自動噴霧系統每次防治可節省 40% 費用及減少藥劑用量， 更可適時地在發病前採取防治措施，減少感染機會，防治次數必可降低，且不受人工不足之限， 已達到操作者不必進入作物行間，遠離藥霧的省工及安全目的。

農業經營

擴大農場經營規模—委託經營之探討

陳清文

在台灣， 委託經營為目前擴大農場經營規模最有效的方法。 本研究為期瞭解台中地區委託經營之現況，於台中轄區利用委託經營審查之書面資料為主， 調查訪問為輔，進行分析。結果顯示(一)家庭農場自行接受毗鄰耕地之委託經營： 計有龍井、大雅、外埔、后里、大甲及田中等鄉鎮辦理， 共計委託農户 207 户， 受託農户 33 户，總積131公頃，平均每户面積由0.89公頃擴大為4.87公頃。(二)核心農民或稻作代耕代營隊經農會轉介獲得毗鄰耕地之委託經營：計有大雅、外埔、大安、后里及大甲等鄉鎮辦理， 共計委託農户 360 户，受託農户 19 户，面積228公頃，平均每户面積由0.81公頃擴大為12.8公頃。

委託經營可達擴大農場經營規模之目的，唯在實務推動上，須相關措施配合，諸如農地重劃、稻田轉作與休耕政策、法規之認知與規範等配合，方可落實。

蔬菜價格變動分析

戴登燦

本研究試以十八種蔬菜之產地農場價格來探討其時間數列方面之長期變化趨勢及季節變化。 就九年來之資料觀之 (1983～1991)， 冬瓜及洋蔥等耐貯藏性蔬菜價格長期變動幅度較小；敏豆、茄子及豇豆等蔬菜變動較大。就季節變化而言，每年四月及九月為一般價格之最高峰。 甜椒、小白菜、花椰菜、芹菜、蘿蔔及甘藍等類蔬菜其九月最高農場價格更在全年平均價的 180% 以上， 因此這六類蔬菜之農場價格受季節影響較深。

台中地區水稻施肥效率之調查

林月金、戴登燦、黃祥慶

本研究的目的是為瞭解台中地區水稻施肥現況， 並與試驗研究單位所提出的推薦施肥比較， 所引用的資料是直接訪問農民獲得。 因此， 本研究包括兩部分：第一部分為調查1,150户稻農的一般施肥狀況，第二部分為對 150 户稻農的施肥效率分析。結果摘述如下：(1)稻農對氮、磷、鉀肥

的施用並未因期作而有別；相同期作下氮肥的施用亦未隨水稻類型不同而異，但鉀肥的施用則呈顯著差異。此與作物施肥手冊中水稻田氮肥推薦量依期作別與水稻類型別而不同，磷、鉀肥推薦量則隨期作別而異之情況不一致。(2)由於農村勞力缺乏，複合肥料的使用增加，但施用種類多屬不當。(3)水稻施肥量普遍高於推薦量，其中粳稻與糯稻尤為嚴重；就肥料要素別而言，一期作以氧化鉀、二期作以氮素情況最為嚴重。(4)水稻施肥次數與推薦次數比較雖不致太離譜，唯其施用方法大多不恰當。

農業推廣教育

農村青年創業輔導工作調查

李嘉元

近年來，由於本省工商業的快速發展，削弱了農業在各項產業中的競爭力，然而農業仍是整個經濟發展的基礎，必須于以延續和維持成長，而高素質的青年農民培養，並使其投入現代化的經營模式，是目前農業轉型期提高農業競爭力的必要條件，培育優秀的青年農民具有現代化的農場經營能力，乃目前刻不容緩的工作。輔導農村青年創業並對有志留農而缺少資金之青少年，依照創業計畫，由政府給于十年期限之低利貸款，協助其從事農場經營。二年來，透過本場技術輔導台中區下之創業青年做追蹤訪視，在233個案中得到的結論是創業人數以南投縣的51.1%最多，性別則男性佔93.6%，年齡分佈以30～39歲者佔58.1%，作業項目花卉最多佔了47.2%，創業青年農民的學歷以高（中）職最多佔了48.9%，其中高農學歷就佔了總人數的33.8%，顯示高農學歷的青年留農意願很高，實際貸款額度則以100～199萬元之間佔33%，貸款年限以6～9年最多佔了68.9%，兩年來實際創業貸款人數則相當平均，八十年度佔52.9%，八十一年度佔47.1%。由上面統計可以推論輔導農村青年創業貸款專案計畫，在現階段的農村仍有加強繼續推展的空間，對突破農業經營的困境有莫大鼓舞作用。

農村青年設施蔬菜班結訓學員對新技術採用之調查

鄭健雄

本研究為瞭解『農村青年設施蔬菜專業訓練班』參訓學員採用新技術情形及其影響因素，乃以78～80年度間曾至本場參加『農村青年設施蔬菜專業訓練班』的所有參訓學員為考評對象，採取對參訓者事後調查的方式，以電話訪問法及郵寄問卷法搜集研究資料。由資料分析發現209名參訓學員中有 33.5% 從事非農業工作，65.1%從事農業生產，其中包括13.4%（28名）採用設施蔬菜生產技術，這其中16名是從事設施水耕蔬菜生產，12名從事設施土耕蔬菜生產，且64.3%的創新採用者在受訓前即已從事目前的工作。研究亦發現未採用設施新技術的最主要原因是設施成本太高，而從採用新技術的主要動機來看，從事水耕的學員表示是基於未來水耕行業深具發展潛力，其次是個人興趣所在，從事設施土耕的學員則表示是因自己能夠掌握蔬菜銷售市場，加上熟悉生產技術、個人興趣所在及未來深具發展潛力。就採用創新的決策制定情形來看，大多數是受自己的決策影響最大，對少數學員而言，改良場專家及農會指導員具有決定性的決策影響。

友邦農業技術人員來場受訓成果及展望

陳廷煥

為配合政府的務實外交政策，加強與友邦國家的農業實質外交，本場接受有關機關團體的委任代辦國際性的農業教育訓練，自民國74年至81年底計辦理訓練十一班，訓練124人參與國家馬拉威等三十七個國家。為了探討來場受訓人員之績效，曾於本（八十一）年九月廿一日起為期一個月之稻作旱作栽培班作一問卷調查顯示，課程安排100%表示很好，師資方面58%很好，33%尚好，講義教材92%表示很好，訓練天數分別為很好佔33%，尚可佔50%，伙食58%表示很好，住宿環境分別為50%很好，50%為尚可，休閒活動分別為67%很好，25%尚可。

由此可見，需改進之處為師資方面，尚未達到滿意，部份講師英語口音，外國學員聽不懂，訓練天數他們都希望延長為二個月，住宿環境及休閒活動有待增加設備及改善。

本場軟硬體設備部份均具水準，業務量繼續成長，學員結訓時紛紛表示謝意，對本場員工之親切招待感到溫馨，離開時依依不捨，可見已發揮團隊精神，又成功地作了一次國民外交。本場對於配合政府敦睦外交，貢獻甚鉅。

高血壓防治個案輔導

張嘉真

本研究以四名患有高血壓之家政班員為對象，進行高血壓防治輔導個案研究，經調查其生理、心理狀況，對高血壓的認知，家庭環境及社會醫療資源，以瞭解患者現況，然後進行飲食控制、日常生活保健輔導。結果有二名經醫師指示不用服藥，二名繼續服藥，其血壓都控制在正常範圍內。個案中有三名體位屬肥胖，輔導後體重都有減輕；血液檢驗值膽固醇在輔導前後都在正常值範圍，三酸甘油脂輔導前有二名超過正常值，輔導後有一名降為正常範圍，另一名雖未達正常範圍，但其值有下降。輔導前後之營養常識測驗平均分數由67.5分進步到85.0分。根據本研究輔導之經驗，對高血壓防治提出以下建議：㈠對國人灌輸營養知識，以養成良好飲食習慣，預防高血壓之發生。㈡定期測量血壓，以期早期發現早期診治。㈢高血壓之個案輔導應先瞭解其生理、心理及環境現況，進行輔導，才能增加學習效果，以達行為的改變。㈣高血壓之治療屬長期性工作，須賴家人之支持與鼓勵，尤其找出患者最信任之家人或朋友協助。㈤高血壓之飲食為建康飲食，日常生活保健亦是一般人保健之道，輔導個案間接也影響全家人採用高血壓之均衡飲食及生活保健法，可促進家人健康。

農村生活

台灣基層農會執行農村慢性疾病防治計畫之考評

鄭健雄、張嘉眞、邱阿勤

本研究為了解本省基層農會執行農村慢性疾病防治計畫之辦理成效，乃以八十一年全省11個基層農會所成立之『慢性疾病防治班』班員共計194名，採用終端考評的模式，以研習後與研習前比較之衡量方法，評估受訓班員研習後與研習前體檢之尿酸、三酸甘油脂、血壓、總膽固醇、體重及營養常識等指標的表現情形。考評結果顯示受訓班員研習後之總膽固醇、血壓及營養常識具有顯著改善，研習後之尿酸、三酸甘油脂、空腹血糖及體重未獲得明顯改善。若就個別農會辦理成效之考評顯示，除因名間鄉及草屯鎮農會因缺乏最後一次完整的體檢資料，無法進行考評工作外，為期三個月的『慢性疾病防治班』，使大多數班員研習後的總膽固醇、血壓及營養常識獲得明顯改善，然因缺乏長期而有效的飲食療法，短短的三個月研習與飲食控制，大部分班員研習後之尿酸、三酸甘油脂、空腹血糖、體重並未獲得有效改善。因此，由資料分析得知今後欲增進農村慢性疾病防治計畫之效果，可以朝下述二個方向努力：（一）必須鼓勵基層農會擴大辦理慢性疾病防治計畫，計畫期限由目前的三個月延長為一年以上，計畫對象應包括所有鄉村中老年人。（二）加強辦理教育訓練及透過大眾傳播管道宣導慢性疾病的致病因素及防治之道。

台中地區農漁村社區實質環境改善計畫之初步考評

張嘉眞、陳美秋

本計畫係依據行政院核定『加強推行人口政策方案』，『改善農漁村社區環境實施計畫』及『農業綜合調整方案』而訂定之農建計畫，全程計畫由80年7月至86年6月止。其方法為經費補助鄉鎮辦理農漁村社區實質環境改善，以達到改善農漁村人口外流之目的。本場對此計畫之職責為轄區計畫之技術輔導、計畫彙整及協助；會同縣政府辦理初審以排列優先順序；參與全省性計畫審查工作。近兩年來，在台中地區80年度共有7村里辦理，81年度16村里辦理，目前未完成的為霧峰鄉完工日期將延期至12月。以81年度為例，工程項目以AC路面最多，水溝次之；綠、美化方面則較缺乏；　每鄉鎮補助款平均約120萬6,000元，鄉鎮配合款為17.9%，平均工作天數為89.2工作天，主辦單位以鄉鎮公所為主，有15單位，農會申請的只有1鄉鎮。在輔導本計畫過程中，本場得到以下發現：(1)偏遠地區之效率高、速度快，但品質亦較差。(2)大多數鄉鎮均未配合該鄉鎮之整體規劃來選定施工地點。(3)本計劃精神為農漁村實質環境改善，唯大多數均著重在硬體環境之改善而忽略綠化、美化之實質意義。

二、農業推廣教育成果

農業推廣工作

教育訓練工作

本中心教育訓練研究室協調場內同仁支援基層農會或有關農政單位之訓練活動，共計313班，受益數達17,711人次，訓練內容兼及農業技術、農村環境及農民生活三方面。為提昇基層推廣人員的工作技能，今年度本場辦理2班次的農業推廣人員在職訓練『投影片製作班』，受訓練學員59人。為增進青年農民之農業新技術新知識；亦辦理花卉、設施蔬菜、有機農業、農場經營等4班的農村青年專業訓練班，結訓學員9人。同時並接受海外會委託代訓友邦農技人員『花卉班』及『稻作與旱作班』和印尼推廣人員『台灣精緻農產品生產與促進講習班』，共計36人（表一）。

表一　農業推廣中心之訓練業務

訓練班別	班數(班)	人數(人)
支援基層農會講師	313	17,711
農村青年專業訓練	4	91
推廣人員在職訓練	2	59
友邦農技人員訓練	3	36
合計	322	17,897

培育青年農民

為明瞭農村青年創業貸款申請計畫之可行性，由本場及相關試驗改良場所組成『農村青年創業申請書之經營及產銷技術評估委員會』，由場長擔任召集人，定期召開委員會議，對台中區四縣市之申請個案進行技術評估工作，以做為中國農民銀行貸放創業基金之依據。過去一年提報技術評估委員會審議之案件有236件，其中有3件因未列產銷計畫、超齡、專業訓練項目與貸款作業要點不符、申請資格不符、申請書內容填寫不完整等因素，無法進行評估而退件，諸申請案件中以花卉、果樹及特作案件最多，貸款總額如下列表（表二、表三）。

表二　創業青年農民作業類別

作業別	人數	%
花卉	110	47.2
果樹	34	14.6
茶	32	13.7
蔬菜	13	5.6
菇類	12	5.2
家禽	10	4.3
乳牛	5	2.1
水產養殖	4	1.7
養豬	3	1.3
農產加工	3	1.3
其他	7	3.0
合計	233	100

表三　創業青年農民申請貸款與實際貸款人數比較表

金　　額	申請貸款數		實際貸款數	
	人數	%	人數	%
99萬元以下	17	7.3	28	12.0
100～199萬元	55	23.6	75	32.2
200～299萬元	66	28.3	68	29.2
300～399萬元	68	29.2	34	14.6
400萬元以上	27	11.6	3	1.3
未貸款者	—	—	25	10.7
合　　計	233	100.0	233	100.0

註：實際貸款數欄未貸款的原因系申請人無法提供十足擔保品或再行外出就業，或因農民銀行核貸額度不足而放棄借貸。

來場參觀人員分析研究

歷年來，來場參場訪問或觀摩研習的農民，呈現逐年增加之趨勢，在八十年度自一月到十二月期間，來場訪問的農民已達10,204人，依據來函公文統計分析結果，參觀一般推廣業務者為4,381人佔43%，其次為設施園藝3,014人佔30%，水稻研習1,090人佔11%，蔬菜763人佔7%，花卉379人佔4%，其餘還包括植保、雜糧、農經、果樹、土壤肥料及有機農業等在240～40人之問。再者從參觀次數來分析，八十年度一年中一共有 108 次團體來場參觀，其中設施園藝有39次，一般性參觀有28次，水稻有14次，蔬菜有13次，而植保、雜糧、農經各為二次，果樹、土壤肥料及有機農業各一次。據此可知，目前農民最感興趣者為一般推廣業務，其次為設施園藝，然後為水稻、蔬菜、花卉等可作為本場工作人員之參考，以及輔導農民之方針。

農民服務工作

本課農民服務中心設置農民服專線電話 (04-8527455) 及電傳專線 (04-8525841) 以來，非常便利農民服務工作之推展。為使農民諮詢服務日臻完善，今年度起更指派推廣專家及植物蟲害診斷專家各乙名駐守農民服務中心，專責辦理農民服務工作。一年來共計解答農民信件 432 件，提供技術刊物與教材192,850冊，接待來訪貴賓及農民51,039人、外賓833人，提供優良種苗130件，辦理土壤分析367件，以及派員擔任基層農會講習會講師488人次。

農業傳播

為加強本場農業新知技術之推廣，除透過教育訓練傳達給農民外，亦透過大眾傳播管道週知農民。今年度共計編印四期『台中區農業推廣簡訊』季刊92,000冊，編印十二期『台中區農推廣專訊』12,000冊及發行52期『台中場週訊』5,200份，贈閱區下核心農民及有關農建人員。同時亦製作三套錄影帶教材及一套幻燈片教材，以提供基層農會辦理農民講習之用。農業訊息之發布，亦是推廣中心的重點工作，今年度共計發布報紙稿件41件，電視錄影帶稿件40件，廣播電台稿件31件，刊登或播放率達100%以上（表四）。

表四　八十一年度辦理之農業新聞傳播

稿　　源	件　數	刊登或播出率
報紙新聞	41	100%
廣播節目	31	100%
電視節目	40	100%

農村生活

農村生活改善

現階段農村在急速變遷過程中，為提高農民生活素質，積極推動農村生活改善工作，其重點為（一）預防保健服務：加強膳食、營養、衛生、保健教育，輔導均衡飲食之攝取及運動與健康等，以積極預防中老年疾病之發生，本年度共有21村里組班辦理此項工作。（二）高齡者生活輔導：農村人口有高齡化現象，衍生老人生理及心理的健康、經濟及生活問題，亟待輔導調適，因此有13村里辦理高齡者生活輔導班。（三）強化家庭功能：81年度有12村里組班辦理，由心理輔導、改善家人關係、培養合宜的家庭倫理關係、充實家庭生活內涵，使農家有健康的心理發展。（四）農村環境改善：有13村里辦理農家生活環境改善工作，包括家户及村里環境衛生之改善、垃圾處理及綠化、美化村里工作，並有17村里辦理農漁村社區實質環境改善工作，工作項目包括農漁村公共設施、農路、排水溝改善及綠化美化工作。（五）農宅輔建：81年度輔導農民住宅輔建，包括補助 300 户低收農户整建農宅，並提供 256 户農户申請農宅貸款，以改善農家居住品質，開創農村社區新面貌。

表五　八十一年度台中區農村生活改善

縣市別	預防保健(班)	高齡者生活輔導(班)	強化家庭功能(班)
台中縣	12	12	1
彰化縣	7	0	7
南投縣	2	1	4
台中市	1	0	0
合　計	22	13	12

表六　八十一年度台中區辦理農村環境改善工作情形

縣市別	農家生活環改善（村里）	農漁村社區實質環境改善(村里)
台中縣	2	7
彰化縣	11	6
南投縣	0	4
台中市	0	0
合　計	13	17

表七　八十一年度台中區辦理農宅輔建情形

縣市別	補助整建(戶)	農宅貸款(戶)
台中縣	55	75
彰化縣	120	121
南投縣	111	55
台中市	14	5
合　計	300	256

鄉村文化發展

行政院農委會為喚起農村居民的自覺，維護農村優良傳統文化，建立適應現代生活的新農村文化，以平衡鄉村建設的硬體與軟體發展，使農民、農村、農業三者相結合，塑造具有鄉土性的社區文化，建立和諧安寧的現代化鄉村社會，協助推動農業的全面發展，乃自七十九年度開始辦理農漁村文化發展計畫，希望透過由下而上及地方自主性的計畫原則，以農民日活動、農民教室及鄉土文化活動來達到上述目標。過去一年，本場輔導轄區14個村里設置農民教室及10個鄉鎮辦理鄉村文化系列活動，並輔導彰化縣埤頭鄉及台中縣梧棲鎮農會設置農村文化示範村里。

表八　八十一年度台中地區辦理鄉村文化活動情形

縣市別	農村文化示範(村里)	鄉村文化系列活動(鄉鎮)	農民教室(村里)
台中縣	1	2	4
南投縣	0	2	3
彰化縣	1	5	6
台中市	0	1	1
合　計	2	10	14

休閒農業發展

近年來，行政院農業委員會為將農業經營原以提供軍糈民食、工業原料的初級產業，導向提供農產加工品的二級產業及提供農村自然景觀與文化資源之觀光休閒遊憩的三級產業，乃大力推動休閒農業之發展，並從民國七十九年度起開始鼓勵各種農民團體（如農漁會、合作社）及農民發展休閒農業，三年來，全省已有31個地點核定為休閒農業區，這些休閒農業區在政府大力的經費及技術支援下，已逐步完成硬體設施及充實軟體資源，並陸續開放中。目前台中地區核定為休閒農業區除台灣省農會經營的大甲農牧場，台糖公司的埔里赤崁頂農場及鹿谷鄉農會經營的鳳凰休閒農業民宿村等三處外，81年度行政院農業委員會又核定台中縣新社鄉的中興合作農場、台中市民德里休閒農業區、南投縣埔里鎮麒麟休閒農業區及彰化縣竹塘鄉的醒靈休閒農業區。

表九　八十一年度台中地區休閒農業及遊憩觀光規劃成果

縣市別	休閒農業區	觀光農園(班)	農村鄉土旅遊(據點)
台中縣	2	3	1
彰化縣	1	8	1
南投縣	3	4	0
台中市	1	0	0
合　計	7	15	2

三、出版刊物

A．發表文章(臺中場研究彙報第30～33期)

1.廖萬正、王芳美、楊耀祥 橫山梨及烏梨莖頂組織培養之研究 34:1～9。
2.蔡宜峰、黃祥慶 報歲蘭肥培技術之研究 34:11～18。
3.黃祥慶、蔡宜峰、黃山內 乾豬糞對旱作生育及產量之影響 34:19～26。
4.林再發、黃富美 第二期作水稻品種台中秈10號之移植期對產量及米質之影響 34:27～33。
5.古錦文 台灣菜豆銹病菌病原性的分化與菜豆之抗銹病反應（一） 34:35～43。
6.劉達修、劉添丁、王文哲、王玉沙 防治梨瘤蚜藥劑之篩選試驗 34:45～53。
7.曾勝雄、黃勝忠 提高蕎麥生產力之研究 35:1～10。
8.陳令錫、龍國維、田雲生 簡易設施低成本省工自動噴藥裝置之開發 35:11～24。
9.林金樹、張素貞 水稻抗白葉枯病之研究I.新品系對不同病原群之反應 35:25～31。
10.戴登燦、林月金 台中區水稻施肥量與施肥方法之調查研究 I. 水稻施肥量與施肥次數 35:33～40。
11.劉添丁、劉達修、王玉沙 梨瘤蚜在高接梨之綜合防治技術 35:41～46。
12.林景和 市售腐植酸肥料品質研究 35:47～57。
13.林月金、戴登燦 台中區水稻施肥量與施肥方法之調查研究 II.水稻期作、類型及地域間施肥量的統計檢定 36:1～6。
14.劉達修、王玉沙 非洲菊斑潛蠅(*Liriomyza trifolii*(Burgess))之藥劑篩選及黃色黏板在防治上之應用 36:7～16。
15.方敏男 番茄斑潛蠅(*Liriomyza bryoniae*(Kaltenbach)) 在豌豆上之族群變動與防治試驗 36:17～28。
16.鄭健雄 設施蔬菜訓練班參訓學員採用新技術之調查研究 36:29～38。
17.謝順景、林月金 臺灣農業技術轉移之研究 36:39～74。
18.王錦堂、黃祥慶、賴惠珍 有機農法相關技術之研究I.共榮作物之利用 37:1～9。
19.許謙信、吳明哲 吸水預措時機對菊花切花品質之影響 I.切花吸水量與蒸散作用 37:11～19。
20.張素貞 品種遺傳異樣性及病蟲害發生之管理在稻米生產上之利用研究I.水稻品種間之交互作用 37:21～30。
21.黃勝忠 期作對高粱自交系及F_1雜交種生育的影響 37:31～40。
22.黃祥慶、蔡宜峰 乾豬糞對旱作土壤理化性質之影響 37:41～49。
23.鄭健雄 台中地區基層農會推廣人員資訊傳播過程之研究 37:51～60。

B．台中區農推專訊(月刊)

119期 南投縣鹿谷休閒農場
120期 彰化縣竹塘鄉醒靈休閒農場
121期 台中縣外埔鄉台灣省農會大甲農牧場
122期 台中縣東勢鎮彰化縣農會東勢林場
123期 台中縣新社鄉中興合作農場
124期 台中市民德里休閒農業區
125期 彰化縣楊桃觀光果園
126期 彰化縣芬園鄉荔枝觀光果園
127期 彰化縣溪湖鎮葡萄觀光果園
128期 彰化縣大村鄉葡萄觀光果園
129期 南投縣水里鄉上安葡萄番石榴觀光果園
130期 南投縣信義鄉葡萄觀光果園
131期 南投縣魚池鄉香菇觀光農園
132期 台中縣豐原市鎌村里葡萄觀光果園
133期 台中縣豐原市雲仙谷綜合觀光果園
134期 台中縣東勢鎮高接梨觀光果園

C．台中區農業推廣簡訊(季刊)

第14卷1期 永續性農業專輯
第14卷2期 花卉產業專輯
第14卷3期 營養診斷專輯

四、八十一年度國內外來賓訪問及參觀本場統計表

Local Visitors
國內部份

81.01.16 南投縣八十一年度輔導農民團體辦理水果共同運銷觀摩研習會共50人研習水果運銷研習產期調節有機農業。

81.01.17 南投縣北門鄉等六鄉鎮田間調查員觀摩研習共45人參觀研習農業新技術。

81.01.22 台中高農農場經營科學生共45人來場參觀農場經營。

81.01.22 南投日新國中四健會蔬果組共50人來場參觀花卉、花卉栽培。

81.01.25 台中圖書館青年育樂活動－鄉間採果之旅共90人來場參觀蔬菜水耕及花卉栽培。

81.01.29 永靖永興國小教職員共38人來場參觀。

81.02.11 板橋後埔國小少年自然科學勵進會小朋友共52人參觀水耕栽培、花卉栽培、有機農業栽培等。

81.02.13 辦理八十一年度區域性保育利用及公共設施計畫及八十一年度坡地農村綜合發展計劃－保育利用農地講習班及田間研習會共90人來場參觀蔬菜水耕栽培。

81.02.14 彰化民生國小八十一年度中區國小智優班學生鄉野冬令營活動共 213人來場參觀水耕。

81.02.19 國語日報附設之科學班學生共65人參觀水耕植物及花卉植物。

81.02.20 婦女幹部自強活動共65人來場參觀水耕、花卉栽培。

81.03.12 永康鄉農會所屬王行村農事研究班員共90人前來參觀有機農業。

81.03.17 苗栗農工與三所國中學生職業試探與輔導活動參觀水耕栽培花卉及陳列館。

81.03.18 二崙鄉農會核心農民蔬菜栽培與分級包裝研習會共90人來場參觀甜豌豆栽培管理及病蟲害防治。

81.03.21 僑信國小員工共90人來場參觀水耕蔬菜栽培。

81.03.26 三灣鄉農會冬梨產銷班班員共90人參觀橫山梨、高接溫帶梨高接技術、高接梨花期處理。

81.03.26 埔心鄉農事研究班員共50人參觀水耕蔬菜栽培。

81.03.28 員林國中一年級師生共196人前來本場參觀。

81.03.31 八十一年度農業推廣教育觀摩研習共100人來場參觀。

81.04.09 員林國小智優班二、三、四、五年級師生共93人來場參觀。

81.04.09 深坑地區農會八十一年度農事研究班區外觀摩研習活動共45人參觀水耕栽培。

81.04.11 梧棲鎮中小學少年科學研習活動共107人參觀水耕栽培。

81.04.15 新竹農場王培禮率領農技觀摩共40人來場參觀水耕蔬菜及花卉。

81.04.15 旗山農工教師農業建設觀摩研習會共 2人來場觀摩研習有關一般業務及良質米與水耕栽培。

81.04.17 北港國小師生共40人參觀展覽室、花卉栽培、水耕栽培。

81.04.17 嘉義農專農業經濟科四年級師生共58人前來參觀園藝作物及水耕栽培。

81.04.21 八十一年度區域性保育利用及公共設施計畫、農民田間研習訓練共50人前來參觀研習有機農業栽培。

81.04.23 草屯鎮新庄里農事研究班班員共50人前來參觀農業新科技介紹。

81.05.04 苗栗縣獅潭鄉公所田間觀摩研習會共45人來場參觀桃、李栽培管理技術。

81.05.06 八十一年度良質米產銷計畫研習會共80人來場參觀良質米產銷。

81.05.07 岡山農工師生共38人來場參觀農機。

81.05.08 安定鄉農事研究班員共45人參觀水稻品種改良技術。

81.05.12 省立花蓮高農師生共36人參觀實習有關蔬菜水耕栽培。

81.05.14 大吉國中四健會共41人參觀水耕與花卉栽培。

81.05.22 農地利用綜合規劃蔬菜產銷班區外觀摩研習會共50人來場參觀水耕蔬菜栽培。

81.05.23 苗栗國中四健會作物栽培組師生共50人來場參觀水耕蔬菜、水耕花卉。

81.05.25 霧峰鄉農會農事小組長及水稻研究班幹部共50人來場參觀。

81.05.25 大埤鄉班幹部及班會員共90人參觀溫室栽培。

81.05.30 內埔農工農場經營科三年級學生共33人來場參觀。

81.06.02 二崙鄉農會核心農民甜豌豆產銷班研習觀摩甜豌豆栽培管理及病蟲害防治。

81.06.03 新店地區農會夏季蔬菜生產改進計畫，搭建塑膠網室措施班員共48人前來參觀葉菜類網室栽培模式。

81.06.03 彰化縣仲東國小教職員共30人來場參觀花卉、水耕栽培及有機農業等。

81.06.08 造橋鄉農民研習觀摩共40人來場觀摩水稻新品種。

81.06.09 峨眉鄉農會農業幹部及核心班員共 130人前來參觀各項農業及有關蔬菜水耕栽培。

81.06.10 南投縣仁愛鄉公所八十一年度山地農業綜合發展、山地重要病蟲害綜合防治、山地植物保護技術推廣計畫核心農民研習觀摩共45人來場觀摩農藥安全使用與中毒急救、高山地區夏季花卉栽培管理、山地農業綜合經營自然生態保育。

81.06.11 宜蘭縣政府及各市鄉鎮公所、農會等辦理稻米生產及稻田轉作計畫工作人員共45人前來參觀台中秈10號水稻。

81.06.12 石岡鄉農會四健會作業組舉辦區外觀摩活動共80人前來參觀花卉栽培。

81.06.12 行政院國軍退除役官兵輔導委員會各農場技術人員及場員子弟精緻農業經營觀摩研習共80人前來聽取簡報。

81.06.13 大里國中師生共45人前來參觀水耕栽培及花卉栽培。

81.06.13 員林國中學生共50人前來參觀本場。

81.06.23 三級農會農藥安全使用宣導研習觀摩會來場研習農藥安全之使用。

81.06.26 三級農會農藥安全使用宣導研習觀摩會來場研習農藥安全之使用。

81.07.02 和平鄉八十一年度山地鄉及山胞農業綜合發展建設計畫－輔導農民運用農貸發展山地經濟計畫共40人前來參觀蔬菜水耕栽培暨梨栽培管理。

81.07.27 省立北斗高商學生共46人前來參觀水耕花卉栽培。

81.07.28 大湖地區農會選任人員共60人參觀高接梨、柑橘等栽培。

81.08.03 台大農學院上級單位國立台灣大學行政會議、訓育會議、學生獎懲委員會議出席人員及其眷屬共40人前來本場參觀水耕栽培、介紹稻米品種。

81.08.05 黃昭夫等共4人前來本場學習水耕栽培技術。

81.08.08 國小五、六年級學生及輔導教師工作人員共80人前來本場參觀水耕蔬菜及家庭園藝蔬菜之栽培。

81.08.20 後壁鄉稻田轉作缺水休耕等有關工作人員及田間協助調查員共31人前來本場參觀研習。

81.08.22 八十一學年度台灣省國中生物科教學研習班前來本場參觀。

81.08.27 台東地區農會八十一年度核心農民、農事、四健、家政二部門幹部聯合區外觀摩研習活動共45人前來本場參觀。

81.09.02 第六屆國際農村青年世界會議代表共65人前來本場參觀水耕蔬菜栽培。

81.09.07 八十一年度農業推廣教育農事幹部共90人前來本場觀摩研習。

81.09.08 苗栗縣獅潭鄉農會總幹事率領農事、家政、四健三部門義指幹部共50人前來本場參觀水耕蔬菜栽培。

81.09.14 宜蘭縣礁溪鄉農會選任幹部共50人前來本場觀摩研習水耕栽培。

81.09.14 嘉義縣竹崎鄉農會八十一年農事研究班幹部觀摩研習會共80人前來本場參觀自然農法及各種作物實驗成果。

81.09.21 台北市北投區農會水稻農事產銷研究班班員共 140人前來本場參觀自然農法發展概況與水稻永續性栽培法、糖醋液與油粕肥製作示範。

81.09.24 嘉義縣竹崎鄉農會八十一年度農事幹部觀摩研習會前來本場參觀自然農法各種作物實驗成果及高接梨栽培品種。

81.09.25 台北市農會農事精緻農業尖端科技化經營農場研習觀摩活動共50人前來本場參觀組織栽培及糖醋液、油粕肥料製作。

81.09.25 青果社新竹分社卓蘭集貨場青峰葡萄產銷班班員共20人前來本場參觀及葡萄栽培管理技術。

81.09.25 台中縣東勢鎮農會輔導明正果樹研究班區外觀摩研習前來本場參觀梨新品種栽培管理。

81.10.03 宜蘭三星地區農會八十一年度四健會青創户及南山地區蔬菜班聯合觀摩研習會共50人前來本場觀摩，為期三天。

81.10.05 社頭鄉蔬菜生產隊實際種植蔬菜之班員前來本場講習訓練及實際參觀有機質肥料廠。

81.10.08 高雄市小港區農會八十一年度農業推廣教育觀摩研習，參加選任人員暨農業幹部、班員共130人前來本場參觀有機農業技術。

81.10.12 坑口村核心農户共41人前來本場參觀水耕栽培。

81.10.19 八十一年度農業推廣教育聯合觀摩研習活動共65人前來本場研習三天。

81.10.21 彰化仁愛實驗學校家政科師生共40人前來本場參觀水耕、花卉及蔬菜。

81.11.05 為八十一年度農事推廣教育幹部自強活動共50人前來本場參觀相關有機農業經營。

81.11.11 高雄橋頭鄉農會業研究班員共46人前來本場研習水耕栽培設施及管理方法。

81.11.16 核心農民幹部研習觀摩共150人前來本場參觀有機農業。

81.11.16 高雄縣內門鄉農會共90人前來本場參觀水耕蔬菜栽培。

81.11.23 農業成果觀摩會來場參觀，為期二天。

81.11.25 台北景美區農會農事精緻農業尖端科技化經營農場研習觀摩活動共50人前來本場參觀組織栽培及糖醋液、油粕肥料製作。

81.12.02 南投魚池農會四健推廣教育辦理青創會員，青年農民講習觀摩會共45人前來本場參觀。

81.12.05 魚池國中四健會會員及教師共188人前來本場參觀水耕及花卉。

81.12.10 水保局輔導農友共45人前來本場參觀梨樹新品種介紹高接梨之管理技術。

81.12.15 屏東縣長治鄉農會農事、四健核心農民培育幹部班組教育活動訓練共45人前來本場參觀水耕栽培及今後農產運銷展望。

81.12.15 八十一年度核心農民精緻蔬菜產銷改進班班員先進地區研習觀摩共10人前來本場參觀蔬菜設施栽培及蔬菜田。

81.12.16 新竹縣竹北市農會八十一年度農業推廣教育核心農民班幹部班員共 4人前來本場參觀蔬菜(番茄)有機栽培。

81.12.23 金門區漁會漁村家政班幹部共17人前來本場參觀高齡輔導推廣工作觀摩。

Foreign Visitors
國外部份

81.01.03 尼泊爾前國會議長蘇貝地夫婦暨蒙藏委員會委員張駿共 3人前來參觀水耕，為期二天。

81.01.24 波布那農業部長莫克齊共4人來場參觀本場。

81.01.30 美國華盛頓農業暨林業領袖訪問團共31前參觀本場。

81.02.19 日本長野縣長丘葡萄部會研修旅行團共4人參觀葡萄栽培技術。

81.02.20 かつらぎ町台灣農業考察團共30人參觀碗豆栽培技術。

81.02.21 旅居象牙海岸華僑李承谷先生等共 3人來場參觀水稻栽種種技術及碾米過程。

81.03.02 土地改革訓練所第四十一期中南美洲及加勒比海地區高級官員特別班共25人來場簡報、參觀。

81.03.03 美國溫室公司(VAN WINGERDEN)總裁 Mr. John Hoogeboom共2人參觀本場。

81.03.09 尼加拉瓜共和國農牧部部長龍棟 (Roberto Rondon Sacasa)夫婦一行陪同尼加拉瓜總統查莫羅夫人共3人參觀本場。

81.03.12 中南美洲五國之經貿主管官員共16人前來參觀、簡報。

81.03.21 巴哈馬農工商部農業司長波那密及漁業司長湯普生共2人參觀本場。

81.03.26 國科會講席，德州農工大學教授Larry Wilding共2人來場研討農地及森林土壤相關問題。

81.04.06 旅居美國地區華僑葉照雄先生共1人來場參觀。

81.04.06 越南人士共2人參觀學習園藝作物設施及栽培。

81.04.08 中興大學黃裕銘副教授率同英國牛津大學資深教授Dr. Beckett共2人來場參觀。

81.04.08 日本愛知縣農協共42人參觀一般野菜、果樹栽培

81.04.11 美國花卉專家朱耀源博士前來參觀田尾永靖花卉區。

81.04.14 日本專家長憲次教授及小林康平教授來場指導有關稻米。

81.04.15 美國密西根州立大學人類生態學院安妮、所羅門博士、農委會陳秀卿技正共3人來場參觀、簡報。

81.04.17 史瓦濟蘭考察團Mr. Magalela Ngwenya前來參觀彰化縣蔬菜及花卉生產情形。

81.04.21 日本重要地方報社訪華團團長桑尾泰行共9人前來簡報參觀。

81.05.22 馬達加斯加、象牙海岸和埃及等三國高階層官員共 7人參觀本場及聽取簡報。

81.06.04 琉球農業訪問團共18人來場參觀研習果樹栽培。

81.06.10 大韓民國青年農漁民訪問團暨陪同人員共26人前來參觀水耕栽培、設施園藝、葡萄栽培。

81.06.10 美國農部經濟研究局稻米專家Dr. Nathan Child 與美國在台協會官員等共6人前來參觀稻作生產改進良質米育種。

81.06.12 日本農業訪問團共22人前來參觀果樹。

81.06.16 土地改革訓練所第四十二期加勒海地區高級官員研習班共10人前來本場聽取簡報及參觀。

81.06.18 日本專家西尾敏男先生及竹下博人先生前來本場參觀埤頭仲港再生稻及直播情形。

81.06.19 土地改革訓練所農工業暨經濟發展研討班中外學員共18人前來參觀業務簡報及參觀本場。

81.06.19 中南美洲新聞界人士訪華團共17人前來參觀本場。

81.06.19 馬來西亞農業部主任秘書Y.Bhg.Bato. Wan Jaafar Abdullah共6人前來參觀本場。

81.06.22 亞蔬中心生產處處長Dr. Midmae及學員Mr. Sugar和助理員吳登琳共3人前來參觀水耕設施。

81.06.27 委內瑞拉「波帝米亞雜誌」編輯Mr. E. Goraoz共2人前來參觀本場。

81.06.27 日本芳井町議會共19人前來參觀水耕蔬菜及果樹方面。

81.07.02 日本鹿兒島縣大島郡知名町公民代表共26人前來本場參觀 。

81.07.07 Mr. Takao Sugi-yama (日本籍)及Dr. Yun Jin Oh(韓國籍)兩位農機專家共2人前來參觀有關農業機械及其他之研究。

81.07.09 馬達斯加 Mada-gascar Tribune 總編輯Franck Raharison共2人前來參觀本省米生產事宜。

81.07.10 亞蔬中心鄒副主任及西非稻米研究中心 West Africa Rice Development Association (WARDA)主任Dr.Eugene R.Terry共 1人前來本場參觀水稻及蔬菜。

81.07.24 巴拉圭考察團Mr.Gerando Lopez Zarate等共3人前來本場觀摩及研習園藝作物應生產與研究。

81.08.20 馬拉威總統府暨內閣秘書長 M.A. Banda共2人前來本場拜會。

81.08.21 東京日本語學院兒童教室學生共35人前來本場參觀蔬菜水耕改良等農業項目。

81.08.28 應行政院新聞局邀請參加一九九二年「進步夥伴展」各國記者共29人前來參觀本場。

81.09.07 大陸記者共18人前來本場參觀。

81.09.19 沙烏地阿拉伯「國家日報」總編輯Dr. Abdul Aziz Al-Nahari前來拜會參訪本場。

81.10.09 泰國財政部轄下農業暨合作社銀行之工作人員共15人前來本場參觀。

81.10.14 日本鹿兒島加世田市農業協同與田尾鄉農會推廣人員前來本場參觀水耕栽培。

81.10.20 土地改革訓練所理事會共同主席美籍大衛林肯博士暨美方理事及陪同人員共9人前來本場拜訪。

81.11.02 鹿兒島本島南部振興協議會共17人前來本場參觀訪問。

81.12.01 亞洲農村復興組織會員國農業專家共6人前來本場參觀，為期14天。

81.12.05 大陸中央電視台人員鄒友開共11人前來本場參觀。

81.12.15 Robert E.Jacobson 教授吳明敏前來參觀本場業務及推廣工作。

81.12.24 韓國農業技術交流協會一京畿道農村指導者共13人前來本場參觀及簡介。

81.12.28 日本福岡縣立嘉穗中央高等學校教師高山謙一共 4人前來本場參觀研習水稻、蔬菜栽培。

五、八十一年度出國人員統計表

姓　名	前往國家	出國日期	目的及任務
謝順景	泰　國	1.18～1.25	參加自然農法研討會並考察研究開發中心及農場
謝順景	菲律賓	2.24～2.29	參加稻田生產玉米之綜合性技術研討會
古錦文	美　國	4.01～5.30	研究「菜豆銹病新生理小種發生之對策、生理小種之鑑定與分類、鑑定銹病生理小種之設備建立與應用」
林景和	美　國	3.25～4.09	參加農業生態之研究與學習及進行永續性農業科技交流
宋　勳	英　國	4.18～5.04	研習改進稻草等作物殘留物處理技術及利用對策
鄭健雄	德　國	4.01～5.15	研習熱帶與亞熱帶鄉村發展之推廣
謝順景	韓　國	5.18～5.25	參加亞洲及大洋洲之永續性農業國際研討會
高德錚	安哥拉、肯亞厄利垂亞	5.16～5.31	赴非洲三國家考察
許愛娜	菲律賓	4.20～4.26	接受一九九二年研究水稻傑出年青女性頒獎並發表專題演講另並參加國際稻米研究會議
林信山	美　國	6.23～7.13	研究果園水分管理及省工灌溉技術
劉達修	荷　蘭	6.27～8.10	研習自動化病蟲害防治技術
謝順景	美　國	7.13～7.22	參加「第一屆國際作物科學大會」
林信山	夏威夷	7.29～8.07	出席第八十九屆美國園藝學會年會並發表論文
陳慶忠	大陸北京	8.18～8.28	出席「兩岸植物病理學術研討會」
宋　勳	大陸西北地區	8.17～9.03	蒐集農藝作物及瓜果蔬菜種源
曾勝雄	大陸太原	8.19～8.27	出席「第五屆國際蕎麥學術研討會」
黃勝忠			
許謙信	荷蘭、德國	8.22～9.04	研習花卉產業自動化
廖萬正	大　陸	8.24～9.05	考察溫帶梨主要產地並蒐集選擇接穗品種有關資料
謝順景	美　國	9.04～9.10	參加華府國建聯誼會一九九二年學術研討會
劉達修	日　本	9.27～10.10	應臺灣區花卉輸出業同業公會函邀組赴琉球及日本為我國外銷菊花產及運銷訪問
許謙信	硫　球		
高德錚	南非路丁堡	9.29～10.11	參加第八屆國際無土栽培會議
高德錚	香　港	11.08～11.18	應香港大學之邀，赴香港擔任「設施栽作與蔬菜無土栽培講習會」講師

六、八十一年專題討論

日　期	主講人	題　　目
81.02.17	劉達修	亞洲地區二化螟蟲最近發生趨勢
81.03.02	黃秀華	應用堆肥防治土壤傳播性病害之原則
81.03.23	方敏男	蕃茄斑潛蠅之生態與防治
81.04.06	陳武揚	殺菌劑對蘇力菌防治效果之影響
81.04.13	陳令錫	倉儲中穀物含水率及溫度變化之探討
81.05.04	張德前	韭菜主要害蟲根蠕危害及防治對策之探討
81.06.09	龍國維	電動搬運車動力系統探討
81.07.06	林正賢	拮抗菌在植物病害生物防治上之應用
81.07.13	陳慶忠	番茄斑點性萎凋病毒(**Tomato Spotted Wilt Virus**)之簡介
81.07.20	田雲生	果蔬大小選別裝置之探討
81.08.03	陳啓吉	台中地區稻熱病之發生與回顧
81.08.17	陳鴻堂	土壤鹽分累積與改良
81.09.14	林金樹	褐飛蝨之發生與水稻品種之關係
81.09.19	王文哲	二點葉蟎抗藥性之探討
81.10.05	王錦堂	有機質肥料的肥效與應用
81.10.05	林景和	腐植酸之使用
81.10.19	趙佳鴻	植物營養與病害發生之關係
81.10.19	黃金助	臺灣植物青枯病菌之生態與防治
81.11.09	劉興隆	主枯絲核菌之性質及防治(上)
81.12.07	柯忠德	甘藷蟻象之生態與防治
81.12.07	劉添丁	東方果實蠅成蟲之取食與產卵習性
81.12.14	陳聰富	十字花科蔬菜根瘤病菌之生態

七、八十一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	以接插繁殖東方梨(**Pyrus Serotine Rehd**)可行性之探討
陳慶忠	甲種	玉米條紋病毒之電子顯微鏡研究
高德錚	甲種	動態浮根式水耕系統之開發與利用
劉達修	甲種	對作物之為害及防治研究
許愛娜	乙種	單粒新舊米檢定方法之研究(第二報)
廖萬正	乙種	利用「二次催芽栽培法」在本省低海拔地區生產高需冷性東方梨
蔡素蕙	乙種	氮鉀肥用量對唐菖蒲之生長與切花品質之影響
林月金	乙種	台灣農業經營之個案研究
鍾維榮	乙種	大蒜生長特性之分析
趙佳鴻	乙種	蚜蟲傳播木瓜輪點病毒西瓜統之研究
林景和	乙種	粘板岩老沖積土鎘含量與玉米植株吸收及生長關係之研究

八、台中場主要職員
MAIN PERSONNEL

S. C. Hsieh(謝順景) Director
H. S. Lin(林信山) Vice Director
L. S. Yang(楊麗賢) Secretary
H. C. Kao(高和增) Head of Comptroller's Office
S. P. Kin(金松坡) Head of General Affairs Office
S. M. Chu(朱孝茂) Head of Personnel Office (1)
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