

RESEARCH AND DEVELOPMENT

RICE AND QUALITY RESEARCH

Identification of Glutinous and Non-glutinous Rice in Moisture Condition

The present experiment was conducted to discriminate glutinous rice and non-glutinous rice when glutinous rice was sold to Farmers' Association in the form of wet rice. The results are summarized as follows:

Before drying, there was no difference in appearance of brown rice between non-opaque waxy kernels and non-glutinous rice. When rice grains cut into half were rinsed in the iodine solution, the endosperm of glutinous rice showed brown color but non-glutinous rice showed deep purple. However, the cutting process took more labor.

When it took more than 17 hours to reduce the moisture content of rice to 14% with the temperature of 45°C, brown rice of non-glutinous rice showed the better translucency than that of glutinous rice which turned into opaque. But when it took about 5 minutes to reduce the moisture content of rice to 14% with microwave, we couldn't distinguish non-opaque waxy kernels from non-glutinous rice by translucency of brown rice both of which kept translucent. It suggested that after using microwave to reduce the

moisture content of rice under 18% at which rice grains were hard enough, and using kett dehuller and kett milling machine to convert rough rice into milled rice, milled rice were rinsed in the iodine solution, then non-glutinous rice could be distinguished from glutinous rice, due to milled rice of glutinous rice showing brown color, but that of non-glutinous rice showing deep purple.

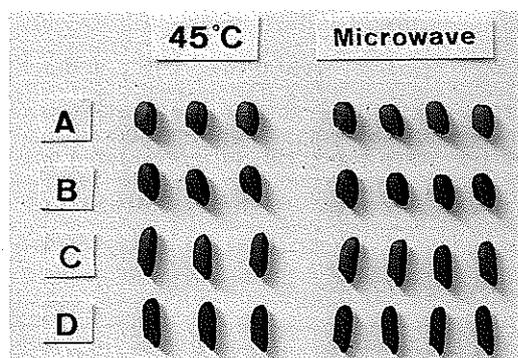


Fig. 1. The color reactions for milled rice of glutinous rice and non-glutinous rice in Iodine solution after drying. A: Taichung glutinous 70, B: Taikeng 9, C: Taichung sen glutinous 1, D: Taichung sen 10.

Establishment of Estimated Regression Model for Overall of Sensory Evaluation of Cooked Rice

117 rice varieties with different amylose content were used in the study. The general regression analysis was applied among physicochemical properties of rice quality and overall of sensory evaluation of cooked rice in order to

establish the regression model for overall evaluation of eating quality. The estimated regression model for overall of sensory evaluation of cooked rice, if based on the viscosity of milled rice flour, it was $Y = -0.000562(Sb) + 0.22037(RBd) - 0.68627(C/H) + 1.03301$, Sb: setback, RBd: relative breakdown, C/H: total setback ratio. If based on the viscosity of extracted rice starch, the proper regression equation was $Y = -0.017647(GTI) - 0.000188(P^*) + 0.16332(RBd^*) - 0.32714(C/P^*) + 1.06069$, GTI: gelatinization temperature of initiation, P*: peak viscosity, RBd*: relative breakdown, C/P*: setback ratio. While general physicochemical properties were used, the suitable model was $Y = 3.69783(Ba) - 0.010924(AC) - 0.016333(SA) + 0.20298(TS) - 0.21049(Lip) - 0.04273(Pro) + 0.13234$, Ba: balance of cooked rice, AC: amylose content, SA: soluble amylose content, TS: total sugar content, Lip: lipid content, Pro: protein content. The results of combined all physicochemical properties including viscosity of milled rice flour, the best equation was $Y = 3.04484(Ba) - 0.00037(Sb) + 0.23907(RBd) - 0.6118(C/H) + 0.69057$, Ba: balance of cooked rice, Sb: setback, RBd: relative breakdown, C/H: total setback ratio. If viscosity of rice starch was included, the proper model was $Y = 2.57177(Ba) - 0.0156(SA) + 0.11692(TS) - 0.05073(Pro) - 0.01218(GTI) - 0.000244(Sb^*) + 0.54597$, Ba: balance of cooked rice, Pro: protein content, GTI: gelatinization temperature of initiation, Sb*: setback.

Effects of Air Temperature and Solar Radiation on Rice Quality

Solar radiation and temperature are the two most important factors affecting crop growth. These two factors determined the crop production potential. Understanding for the production potential under various solar radiation and temperature, will promote the efficiency of management for crop production. This experiment aimed to investigate the effects of solar radiation and temperature on yield and quality of rice. The solar radiation was controlled by different degrees of artificial shading and the temperature was adjusted by different planting dates. Field experiment was conducted in Taichung DAIS during 1994. Three rice cultivars, Tainung 67 and Taichung 189 of Japonica type, and Taichung sen 10 of Indica type were planted in March and September in 1994. About 4-6 seedlings were transplanted each hill. 80% and 50% shading were practiced to reduce solar radiation while control plots accepted full solar radiation. Experimental results showed that amylose contents were positively correlated with the differences of temperature between day and night during grain-filling stage. On the other hand, amylose contents were negatively correlated with mean solar radiation and mean temperature. Degrees of white belly and white center were

positively correlated with mean solar radiation and mean temperature during grain filling stage, while they were negatively correlated with differences of temperature between day and night. Degrees of white center and white belly are negatively correlated with amylose and crude protein contents. Volumetric weights of rice grain were positively correlated with degrees of white center, white belly, and 1000-grains weight, respectively.

The Seed Fertility White Belly of Rice and Selection Rate of Elite Lines in Early Generations of Indica-Japonica Rice Hybrids

The eight crossing combinations of Indica and Japonica rice were made in 1993 by using Taichung Sen 10 and Tai-Sen yu 1774 as maternal parents and Tai Keng 6, 8, 9 and 10 as pollen donors. To investigate the F1 and BCF1 seed-fertility and grain shattering of F2 and selection rate of elite lines in F3 generations. In general, the grain shattering of hybrids are greater than their parents. However, the crossing of Taichung Sen 10/Tai Keng 9 was found to be the best in all crossing combinations, not only degree of shattering, less white belly in grains but selection rate (2.4%) of elite lines as well in this particular cross. The selection rate was about 4.2% in the back cross combination (BCF1).

Diallel Analysis of Bacterial Blight Resistance in Rice (*Oryza sativa* L.)

The main objectives of this study were to investigate the inheritance of bacterial blight (BB) resistance among the main breeding lines of Indica rice and Japonica rice, respectively. A total of 5 Indica rices (namely the susceptible TN1 and TCS10 and the resistant TCSW1, TSWY7 and TSWY1157) and 4 Japonica rices (namely, the susceptible TC189, the moderately susceptible TNG67 and TN5, and the resistant TKY6287) were used; their genetic inheritance of resistance against BB were explored by diallel set crosses. The F1 progenies generated were challenged with the XM42 strain of *Xanthomonas oryzae* pv. *oryzae* by clip inoculation at their maximal tillering stage in greenhouse and in field. The analytical method of Hayman (1954a, & b) was adapted to evaluate the heritability of the resistance characteristics. The results obtained indicated that resistance among TSWY7, TSWY1157, TCSW1 and TKY6287 were all dominant gene conferred properties. In the presence of a complementary recessive gene, the dominance effect of these genes appeared to be partial; the maternal effect was not detected. In regard to the resistance expression among these resistant rices, an additive effect appeared to play a greater role as compared to that by dominance

effect. The overall performance of the F1 progenies indicated that the resistance of tested Indica rices were governed by polygene, whereas that of tested Japonica rices involved at least two genes. The heritability of these traits were all rated high--over 80%. The accumulated evidence suggested that pedigree method might be a feasible way for routine screening of the RBB resistance among bred rice progenies at their early stage of development.

Cultivation of Self-Growing Seedling on Rice in Taichung District

There are two labor-saving cultivations, directed-seeding and ratoon, on rice so far in Taiwan. Lately, the way that some farmers have utilized the dropping grains of rice as the direct germinated seedlings of second crop after the harvest of first crop, was temporarily called "cultivation of self-growing seeding on rice". The trial was studied the difference on the distribution of rice seedling.

We set up 6 - 9 investigated points on tillage and non-tillage lands, respectively. The seedling numbers per meter square were recorded after two week of harvesting rice and the tiller numbers per investigated point were collected at one week interval, besides investigating plant height after three week of harvesting. The yields were collected and compared with the difference of quality after harvesting. The original results were showed as following:

The seedling and tiller numbers were

decreased about 35 and 45 days, respectively, after germinating. The tillers per meter square, about 100 - 110 on the stage of reproductive growth, were 1/3 of machinery transplanting way. The distribution of seedling on tillage land was better than that on non-tillage, but the production cost was higher, in addition the rice quality of the former was better.

Development of Rice Cultivar 'Tai-keng Glutinous 5' in Taiwan

Rice cultivar 'Tai-keng Glutinous 5' (*Oryza sativa* L.) (TKW5, formerly called bred line Tai-keng-yu 9480) is an early maturing, high-yielding, glutinous endersperm cultivar which developed cooperatively by Chiayi Experiment Station, of Taiwan Agricultural Research Institute (TARI) and Taichung District Agricultural Improvement Station (DAIS) by hybridization. TKW5 was officially released on December, 1995 through Rice Breeding Committee of Taiwan Provincial Government.

TKW 5 was selected from a cross Tainung 67/Tainan-waxy-yu 17 which made at Chiayi Station of TARI in 1987 and accomplished breeding works in Taichung DAIS. Parent Tainung 67 is a leader cultivar in Taiwan had an erect culms and leaves, high yielded, and pest tolerance characteristics, but poor in rice quality such as white belley.

The parent Tainan-waxy-yu 17, an experimental line developed at Tainan DAIS, is an early maturing, short-

statured, resistant to lodging and blast disease, and has a bigger kernel but yield less than a popular Taichung Glutinous 70 (TCW 70). It is therefore desirable to develop high yield such as Tainung 67 productivity, early maturity, with big kernel glutinous rice. TKW 5 met with this requirement.

In seven regional yield trials conducted from 1993 to 1994 in Taiwan, TKW 5 matured at 123 and 107 day (d) in the first and second season crops, respectively, which are earlier 6 and 7 d than TCW 70 by transplanting. TKW 5 has 104 and 99 cm plant height in 1st and 2nd season crops, respectively. Grain yield of TKW 5 at nitrogen 120 kg/ha fertilization yielded averaged 6663 and 5136 kg/ha (13% moisture) are increased more 9 and 15.6% than TCW 70 as a check cultivar.

TKW 5 has shown moderate resistance to blast, but susceptible to bacterial blight, sheath blight, and hopper insects after tested in Taiwan Uniform Rice Nurseries from 1992 to 1994. The endersperm of TKW 5 is glutinous, nonromantic, and has a light brown pericarp. Results obtained from the Rice Quality Research Laboratory, Taichung DAIS, indicating that TKW 5 has good milling quality and low gelatinizing temperature according to alkali (1.7% KOH) spreading reaction of 6.

TKW5 is recommended to can be grown in both single and double season crop fields in Taiwan. Due to respondent

of nitrogen application test, this cultivar will be lodged at dressing high level of 240 N kg/ha. The refer fertilizer is recommended to be moderate and applied as early as possible. In order to obtain the high quality of glutinous rice, irrigation should not be cut off too early before harvest, and harvest should be done at sunny day.

UPLAND CROPS

The Purification and Evaluation of Local Peanut Cultivars

The agronomic and yield performances of local peanut cultivars has deteriorated gradually during the prolonged period of cultivation. Efforts have been made by this station to purify these cultivars in order to enhance their yield potential.

Two generations of purification were executed in the spring and fall crop of 1991 for the source cultivars of Lichi-tzæ, 'Lichi-tzæ-fan, and Youdou-fan. The plant-to-row trial was conducted in the spring crop and fall crop of 1992 and 1993, two years and each at two areas, respectively. And in the first year of preliminary yield trial, 30 superior lines were selected in the spring crop and fall crop of 1994. The second year of preliminary yield trial was conducted at the two locations in the spring crop and fall crop of 1995.

In the spring crop of 1995, eight elite lines were 2-61% higher in pod yield than the check, Lichi-tzæ. While the other two lines were decreased 2-3% than the check.

After Two years and four crop seasons of the preliminary trials, two superior lines will be selected for the regional yield trials.

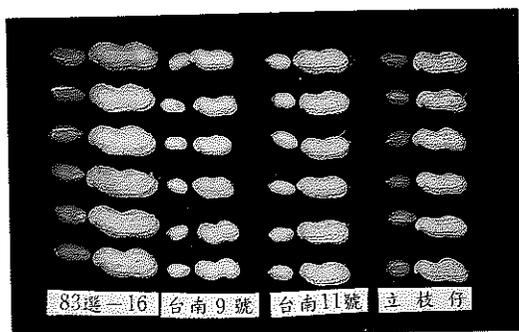


Fig. 2. Elite selected line 83-s-16 and check varieties.

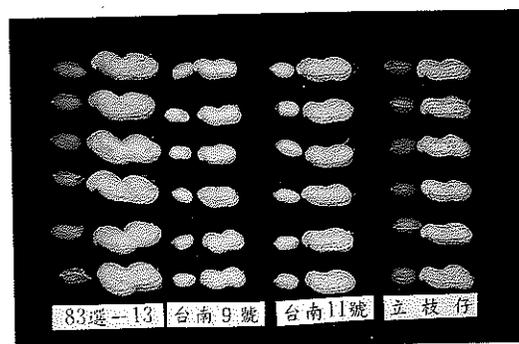


Fig. 3. Elite selected line 83-s-13 and check varieties.

The Development of A New Job's-Tear Cultivar Taichung No.1

Job's-tear is used as a healthy food of high economic value in many Asian countries. Six lines of Job's-tear were introduced from Japan in 1982 and evaluated for their adaptability in the spring crop of 1983. One of the introduced lines, Obanzawa Native, was high in yield potential but exhibited inferior agronomic characteristics in plant height and tillering ability. Accordingly, mass

selection method was employed to improve the lines for four consecutive crops (two spring and two fall crops) from 1983 to 1985. A superior line, 74-T5 was selected and later renamed as Taichung Selection Yu No.5. Advanced, regional, and local yield trials, as well as chemical analysis and other field tests were then conducted between 1986 and 1993. The combined results indicated that Taichung Selection Yu No.5 possessed strong stem, resistance to lodging, drought tolerance, high yield and wide adaptability. The new line was therefore officially registered as job's-tear cultivar Taichung No.1 in January, 1995 and released to farmers for commercial production.



Fig. 4. The plant of Job's-Tear Taichung No. 1.

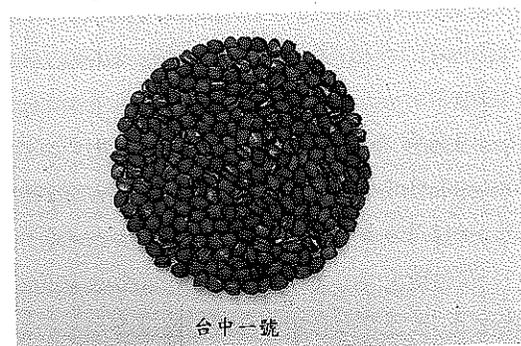


Fig. 5. The brown rice of Job's-Tear Taichung No. 1.

Lipid Peroxidation and Peroxide-scavenging Enzymes of Natural Aged Edible Soybean Seed

Aging is known to reduce seed viability in many crop species. The phenomenon is due in part to the aging-induced lipid peroxidation, which has the potential to damage membranes of the seed tissues. This study was undertaken to evaluate the effect of natural aging on germination and several physiological characteristics related to peroxidation in the seed of two edible soybean cultivars produced in different seasons. Natural aging was achieved by sealing the seeds in aluminum foil bags coated with polyethylene and storing the seeds at 5 °C or 25 °C for 3, 6, 9, and 12 months. The results indicate that both 5 and 25 °C natural aging inhibited seed germination and enhanced lipid peroxidation, but with more rapid seed deterioration and greater extent of lipid peroxidation in the latter. Aging also inhibited the activity of peroxidase, catalase, ascorbate peroxidase, superoxide dismutase and lipoxygenase. The seeds harvested from spring crop were more susceptible to aging than the seeds harvested from autumn crop. The changes in germination and physiological activities, expressed as a function of growing season and aging condition, were similar in the two cultivars.

Effect of Sethoxydim 12.5% E.C on Weed Control in the Peanut Field

In the study it contained six treatments: 1) Sethoxydim 12.5% E.C 2.0l/ha. 2) Sethoxydim 12.5% E.C 3.0l/ha. 3) Pendimethalin 34% E.C 5.0l/ha. 4) Fluazifop-butyl 17.5% E.C 1.0l/ha. 5) Weed control with man. 6) no weed control.

The results showed that Sethoxydim 12.5% E.C 2.0l/ha had best weed control on Gramineae of weeds in both spring season and autumn seasons, but no effect on Cyperaceae and wide leaf of weeds. Sethoxydim 12.5% E.C and Fluazifop-butyl also showed good result on the weed control.

In the autumn seasons, it showed that weed control with man, the peanut production was the greatest; Pendimethalin 34% E.C 1.0l/ha the next, and Sethoxydim 12.5% E.C 2.0l/ha the third.

In the spring seasons, it showed that weed control with man, the peanut production was the greatest too; Pendimethalin the next, and Sethoxydim 12.5% E.C. 2.0 l/ha the third.



Fig. 6. Experimental field of peanut herbicide trial.



Fig. 7. Field day of peanut herbicide trial.

VEGETABLE CROPS

The effect of climate factors on pei-choi growth in Taichung area

Feng Shan pei-choi and local variety (San Feng) were compared in this study. From May to October in Taichung District, pei-choi were sowed every month, and the effect of climate factors in growth period were investigated. The rainfall and temperature could affect the growth and yield of pei-choi significantly, according to the data of two years. The best growth and yield were found in the low temperature during September to October. While, in high temperature during May to July, the growth and yield of pei-choi were worst.

The regression analysis showed that the significant relation between the growth, yield and climate factors (rainfall, temperature....etc).

Effect of Spraying Salt Solution on Seed Set in Self-incompatible Lines of Cabbage

In order to explore the effect of salt solution on breakdown of self-incompatible lines of cabbage, 20 inbred lines were used in this study. The results showed that the cabbage flowers which bloomed on that very day and were treated by spraying with 2% or 4% concentration of salt solution 10-15 minutes before or after the pollination could overcome the self-incompatibility and yield the inbred seeds. Depending on the different salt treatments, the average seed sets of treated flowers were 29.5-62.0% of that of the bud-pollination treatment.

Because flowers were easily damaged by the 4% salt concentration, the seed sets of 4% treatments were lower than that of the 2% ones. Besides, the seed sets of the before-pollination treatments were a little higher than that of the after-pollination treatments.

There were different seed sets among the tested inbred lines in response to the salt treatments. The seed sets of the lines which had a good reaction were 16.8 - 82.5% of that of the bud-pollination treatment, and 5.7-18.1% for the bad-reaction lines.

Yield Trial of Early Line of Water Bamboo

This trial focus on currently cultivated varieties in the major water bamboo (*Zizania latifolia*) production areas (Puli and Yutsh areas) in order to select early maturity, high yielding, disease resistance

and high quality water bamboo line. The tested lines included "White-Shell early", "Pai-ho early", "Gandang early", and the "Green-shell" is the check variety. The stock rhizome was planting at late December and transplanted at early February. The results of spring crop indicated that the "Gandang early" is matured earlier than other varieties, the shoot length, shoot size, shoot weight showed better performance than that of "Green Shell". The average yield is 1,053kg per 0.1ha, which is 24% increase than check variety. The yield of "Pai-ho early" and "White-Shell early" is 21 - 30% lower than check variety. The result of fall crop is quite similar to spring crop. The yield of Gandang early is 950kg per 0.1ha, which is 8.3% higher than check variety. It's recommended that "Gandang early" is a potential variety, it will undergo regional and local yield trial before application for register and naming.

Effects of Fertilizers on the Growth of Plug Seedlings in Different Cabbage Cultivars

The objective of this research was to study the effect of fertilizers on the quality of plug seedling in different cabbage cultivars. Experiment with three cultivars (K-Y, Kaiya, Chun-Chon No.1) and three fertilizer treatments (F1: control; F2: N-P₂O₅-K₂O, 20-20-20; F3: N-P₂O₅-K₂O, 31-10-10) were conducted in summer season in central Taiwan. The

results showed that there were good responses on the growth, seedling index and G value of absolute growth rate (AGR) for plug seedling of Chun-Chon No.1 and Kaiya. It indicated that the cabbage plug seedling of Chun-Chon No.1 and Kaiya were satisfactorily sown in summer season in the central Taiwan. Significant differences were found on the plant height, number of leaves, leaf area, shoot fresh weight, leaf length, and leaf width of cabbage plug seedling in different fertilizer treatments. For that the positive effects were obtained from three fertilizer treatments, the best one is F3 treatment and followed by F2 and F1 treatment. However, as considering the balance of seedling index and G value of AGR of cabbage plug seedling, the superior treatment is F2. Reviewing all results, it indicated that both seedling index and G value of AGR could be utilized to evaluate the quality of cabbage plug seedlings.

The Effect of Amending a Zn and Ni Polluted Soil on the Growth of Pai-tsai (*Brassica campestris* L. *Chinensis* group)

The objective of this study was to investigate the growth enhancement of Pai-tsai which was planted in an amended mixture of serious Zn-Ni metal polluted soil and unpolluted soil by different dilution rates. The results showed that the germination rate was only 62% when seeded at the original polluted soil. The

length, and width of leaf or cotyledon and height of seedling were significantly smaller or lower than that of the control at the stage of 18 days after seeding. At the harvest stage, the length and width of leaf and height of seedling at the original polluted soil was only 40, 60, and 36% to that of the control respectively, and the edible fresh weight was 8% to the control. Diluting its Zn and Ni metal content to about 50 and 25ppm respectively with an unpolluted soil could increase the germination rate to 92%. The amendment of adding normal soil to the polluted soil also could much improve the plant growth. However, it should be borne in mind that the amendment did not lower significantly the Zn and Ni content of the edible leaf.

FLOWER CROPS

Improving Cut-flower Quality by Shading Culture of Spray Chrysanthemum

In order to improve the cut-flower quality of summer Chrysanthemum in Taiwan, the shading experiment was carried out at this station. The tested varieties were "Little Lady", "Golden Yellow" and "Pink Ali". The shading treatments included 40%, 50% and 60% shading nets, the control plot was without shading. The data of plant height, leaf number and node number were collected for each treatments every 15 days from pinching stage after transplanting to

blooming stage. At harvesting period, the horticultural characters, quality and vase life of cut flowers were also investigated.

Results indicated that chrysanthemum plant under shading condition grew faster and plants were higher than that of open field. Under shading treatment, it showed that cut flowers had longer stems, leaf and node number increased, the leaf area, chlorophyll content of leaves, fresh and dry weight of cut flowers also increased. It was also found that the cut flowers under shading condition had less dry weight percentage, slender stem on the middle part, smaller flower size. While stalk length of 2nd flower to 5th flower from top was increased, the difference of number of ray-florets showed not significant. The leaf yellowing cause by aging process was slower and vase life was increased at shading plots compared with that of non-shading plot. The results showed that shading culture could improve the florescence distribution form of spray chrysanthemum, increased cut-flower quality, prolonged vase life. The optimum shading percentage was suggested 50%, it will avoid producing slender cut flowers under too much shading.

Effect of Different Shade Levels on Plant Characters and Vase Life of Asiatic Lily

Asiatic lily, cultivar London, was cultivated in a simple facility environment to determine the plant characters and

vase life with and without shade. Shade was provided by covering black shade cloth which shade density are 50%, 60% and 70%. All shades were removed when flower buds were visible.

There was no difference in day-to-flower and flower number in all treatments. As shade percentage increased, plant height, fresh weight, leaf number, floral-bud length and peduncle length increased. The diameter of stalk with 60% shade treatment is the largest of all. According to the experimental results, we find shade removed in floral buds visible stage can significantly improve the quality of cultivar London.

The other effect of shade percent in vase life is the increase of transpiration rate and absorption rate. Fresh weight changes rate and water balance are not significantly different. The 6th day in vase the petals fell in all treatment, so the vase life is the same. In the vase 60% and 70% shade treatment, we can find the numbers of valuable florets are more than others from the first day to the fourth day. On the other hand, from the fifth day to the sixth day in vase, the controlled and 50% shade treatments can offer the more valuable florets.

Effect of Basal Arching technique on the yield and Quality of Cut Roses under Facility

Several varieties of roses were cultivated on the rockwool with nutrient

drip irrigation under protective greenhouses. A new technique, arching method, was evaluated. Seedlings were transplanted on June 6, 1994. The new sprouts which were bent or twisted on the basal part of stem were so called arching. The arching was started on 35 days after transplanting. 3-4 branches were bent down on the basal part of stem. Varieties Eskimo, Samantha, Super Star, and Tog clown were tested. Preliminary Results indicated that Toy clown had the best performance of growth vigor, yield and vase-life of cut flower. Eskimo, Samatha and Super Star were next in the order. The average wholesale price for cut-flower of Toy Clown, Eskimo, Samatha and Super Star is NT\$5.03 - 10.18, 6.19 - 4.29, 4.40 - 3.92 and 5.12 - 3.80, respectively. It is recommended that the flower growers who choose right varieties and were care about cut flower quality could get more profit.

Influence on the Growth and Cut-flower of Lilies by Using Precooled Bulbs and Seedlings

In order to promote the cut-flower quality and to solve the problems of diseases and physiological disorders due to continual cropping of lilies in field, the Oriental hybrid lily bulbs used for cut-flower forcings were received and then grown in cultivation boxes. Two Oriental hybrid lilies (Casablanca and Star Gazer) were used in this experiment. The 8, 10, and 12 °C day/night temperature were

treated while the bulbs were cultivated in peat moss medium keeping high moisture in cultivation boxes. The forcing periods were 2, 3, and 4 weeks in growth chambers in a dark condition

The result indicated that plant height, the number of leaves, leaf area, and the diameter of stem increased by forcing treatment. The leaf area of Star Gazer reached the highest in the forcing 10°C for 2-3 weeks, and the Casablanca in the treatment of 12°C in 2 weeks obtained the highest leaf area. Generally, it is suggested that the cut flower quality of Oriental lilies can be promoted by using forcing bulbs and seedlings in 10 or 12°C for two weeks.

Study on the Arching Culture of Rose VAR. "Samontha"

A new technique "Arching" culture of roses was introduced from Japan and then studied. Some new shoots which were bent or twisted on the basal part of stems were so called vegetative branches. The other shoots which sprouted upright and produced cut flowers was so called flowering branches.

The results of different proportion of vegetative and flowering branches indicated that: (1) The highest productivity was investigated of 2 vegetatives: 3 flowerings. The fewer vegetative branches produced more cut flowers when vegetatives were kept from 2 to 4. (2) The earliest harvest was from 2 vegetatives block. (3) There

were more than 90% of first grade cut flowers, higher than 86 cm, were harvested. Stem diameter of 2 vegetatives: 3 flowerings block was wider than the others. The fifth expanded foliage of 4 vegetatives: 3 flowerings block was smaller than the others. The number of petals of 4:4 and 4:5 were less than the others. Height of flower buds was not significant of all treatments.

FRUIT TREES CROPS

Study on Two-harvests a Year of Oriental Pears at Low-lands in Taiwan

The high quality Oriental pears was produced by top-grafting method at low-lands. The price of flower bud scions and labor on grafting is a prime cost in cultural practice each year. For the purpose of decreasing production cost, our station has explored a method of producing Oriental pears at Low-land on "Hosui", "Shinko" and "Kosui" varieties. Spraying 2% hydrogen cyanamide in February effectively promoted budbreak and blooming, and the fruits could be harvested during July to August.

For the purpose of enhancing the production efficiency, experiment on two-harvests a year of Oriental pears at low-lands was conducted by spraying 0.5% hydrogen cyanamide in September. The trees were treated with 0.5% hydrogen cyanamide at Sep. 2nd, 8th and 15th, the days to budbreak after treatment were

8-9 days, the rates of budbreak were 76.8%, 61.5%, 56.7% for "Hosui"; 72.1%, 64.9%, 55.2% for "Shinko"; and 56.0%, 61.8%, 55.3% for "Kosui", respectively. The rate of flowering were 27.2%, 24.0%, 18.4% for "Hosui"; 26.0%, 24.8%, 18.3% for "Shinko"; and 13.2%, 18.1%, 10.8% for "Kosui", respectively.



Fig. 8. "Hosui" pear harvested in mid-January.

Studies on Flowering Characteristics of Native Pear Scions for Top-grafting Pear Production

This study was conducted to observe and improve the flowering characteristics of native pear scions, and eventually to increase the ratio of supply of native scion and to diversify the cultivars in top-grafting pear production. The shoots which contained flower buds of 5 cultivars, namely "Shinko", "Shinseiki", "Hosui", "Shinyuki" and "Niitaka", were collected from orchards at Lishan in December 1993, the scions were then top-grafted on the trees in the station at January 24th, 1994. The flower shoots of "Hengshan" and "Niauli" cultivars were collected from Cholan, Tungshi

and the station, a comparison on the pollen germination rate of their pollens and those of the Lishan cultivars were undertaken.

The results showed that the budbreak percentage of Hosui and Shinseiki scion reached 100%, 86.7% for Shinko, 61.5% for Niitaka, and the Shinyuki had the lowest of 11.6%. The days from grafting to first bloom was 29 days for Shinko which bloomed more concentrated and uniformly, the others bloomed 3 days later, the rate of flowering had the same trend. The pollen of different source were incubated under 6 temperature, from 12-30 C, in the media to investigate the rate of germination. The pollen germination rate of Hosui and Shinseiki were the highest. Over 60% of germination occurred in all treatments when the temperature was 24 C or higher. The germination rate in Shinyuki decreased when the temperature increased, but the temperature reaction in the cultivars was highly different. The pollen germination after 1 hour of incubation was 38% for Niauli and Shinko, Hengshan and Kosui had the lower of 25.4% and 22.0%. After 4 hours of incubation, the higher ones were 60.6% for Kosui and 60.0% for Niauli. The curve of pollen germination were different among the cultivars, and the germination decreased as the cold storage prolonged.

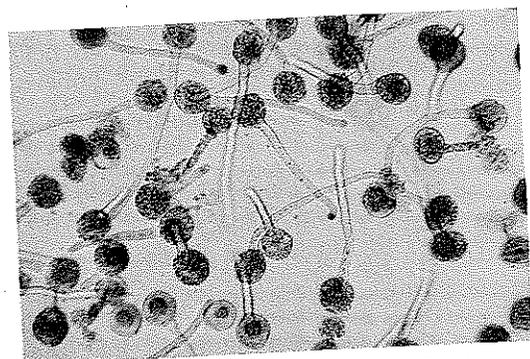


Fig. 9. "Shindo" pear pollen germinate after 2hrs of incubation under 20°C.

Studies on the Flower Bud Formation of Loquat at Different Altitudes

The production area of loquat spread at 100m to 900m of altitude in Taiwan. This study was conducted to discuss the influence of altitude and pruning on the shoot growth, flower bud formation, blooming and fruit setting of loquat. Five loquat orchards in Taichung and Nantou, the altitudes were 250m to 1000m, were chosen as the investigation sites, the shoots were labeled at 1-2 months after harvest and pruning, and the observation of shoot growth and flower bud growth were taken periodically.

Many typhoons during the autumn in 1994 caused severely damages to the loquat trees in central Taiwan. The flower buds of highland areas, as Erhqui and Touqui at 800m to 1000m, were pruned after the disasters to rebuilt the shoots and flower buds, therefore their blooming were postponed. The cold days during December 1994 to early Spring 1995 caused damages to the growing fruits,

consequently the yield was decreased and the fruit quality was lowered down.

The observation on the shoot growth in 1995 revealed that the length of the shoot was longer at low altitudes and shortened as the altitudes were higher, the number of leaf had the same trend. The first flower bud formation was observed at Touqui of 1000m altitude during August to September where the orchard was severely damaged last year. The result of observation on the degree of flower bud formation showed that the loquat trees at higher altitudes, such as 500m to 1000m, had early formed flower buds, whereas those trees at 250m to 400m bore flower buds later. The period and rate of flower bud initiation might fluctuated in those vigorous trees, especially at low altitudes, have a high relationship with climatic factors.



Fig. 10. The loquat is harvested earlier in higher altitudes.

Alleviation of Supra-optimum Temperature Stress of High-chilling Pears in Taiwan's Lowland by Adoption of Apical Dominance

High-chilling pears can not be cultivated successfully in Taiwan's lowland due to supra-optimum temperature stress including abnormal leaves dropping and buds opening in autumn, as well as insufficient chilling in winter which resulted in the abnormal buds opening in the following spring. This experiment was conducted to study the alleviation effect of supraoptimum temperature stress by apical dominance and try to develop a new cultural model. Niauxi scions were top-grafted on one-year old high-chilling pears (*Pyrus serotina* Rehd.) cv. Shinko, Kosui and Hosui plants on the trunk 180 cm in height above ground. The other treatment was side-grafting Hosui scions on the Niauxi's trunk. A continuous observation of growth habits was undertaken for 3 years. Top-grafting Niauxi on Shinko pear increased the trunk cross section area. The shoot number of the 2nd and the 3rd flush decreased. The cessation of shoot terminal growth and the maturation of shoots delayed. The percentage of leaves dropping varied with the year. In autumn, the abnormal leaf dropping decreased, the bud opening percentage did not affect significantly, and the percentage of flower bud decreased; Top-grafting Niauxi on Kosui pear decreased the trunk cross

section area. This treatment did not affect the shoots number, but delayed the cessation of shoot terminal growth and enhanced the shoot maturation. In autumn, the percentage of leaves dropped and abnormal bud opening decreased. Besides, the percentage of bud opening and flower buds were not affected significantly; Top-grafting Niauxi on Hosui pear did not affect the trunk cross section area, but increased the shoots number of the 1st and the 3rd flush. The treatment enhanced the cessation of shoot termination, but did not affect shoot maturation. The leaves dropping varied with the years, and the abnormal bud opening increased in autumn. In addition, the percentage of bud opening decreased, and the percentage of flower bud was not affected; The trunk cross section area of Niauxi, which was side-grafted with Hosui scion significantly increased than that of Hosui (control). Comparing the habits of Hosui side-grafted on the Niauxi to the Hosui (control), it was found that the shoots number of the 2nd and the 3rd flush decreased, the cessation of shoot terminal growth delayed, and the maturation of shoots did not affect indefinitely. In autumn, the percentage of leaf dropping varied with the year, the percentage of abnormal bud opening decreased, the percentage of bud opening increased, but the percentage of flower bud did not affect. These results suggested that Niauxi's apical dominance has

the possibility to help Hosui to alleviate the stress of supra-optimum temperature in summer time.

Study on Main Vine Pruning and Topping of Stake Culture of Jelly-fig (*Ficus awkeotsang* Makino)

Ficus awkeotsang Makino is a perennial vine plant, it wild habitat distributed at the wet broad-leaf forest, which is 800 - 1800 M above sea level. Recently, due to the deforestation and operation change of forest phase at middle and low level of mountainous areas, the wild habitat of *Ficus awkeotsang* Makino that climbed on the trees have been seriously destroyed. The yield of natural *Ficus awkeotsang* Makino fruit, is decreased, so the commercial production is needed. *Ficus awkeotsang* Makino have strong side branching tendency, vigorous main stem and the vines and branches are overlapping resulted in shortage of sunlight, weak branches. This random'y natural growth habit often have less flower buds and poor fruit-setting. In order to increase the fruit yield of *Ficus awkeotsang* Makino, the side branching pruning and secondary vein topping were applied on stake cultural techniques. The three-year-old plants was selected for tested. The treatments included pruning between 30cm and 60cm interval at main vein as one cycle, each cycle save 3 and 5 branches separately. The primary result showed that the pruning treatment have advanced 5 - 10 days of

blomming and fruit-setting stages than non-pruning plots. The fruit yield, fresh and dry fruit weight of pruning plot is increased compared of those of non-pruning plot. The 60cm pruning interval have better performarce than that of 30cm's. There is no significant difference between topping at 8 leaves and 12 leaves stage.

PLANT PROTECTION

Study on Integrated Diseases and Insect Pests Control in Paddy Rice

This experiment is aim to evaluate the proper timing for control of diseased and insect pests in paddy rice. The broad-spectrum insecticides and fungicides are selected in order to control the diseased and insect pests in paddy rice that occurred at the same period. It is hope to reduce the application times and production cost as well as establish the control model for releasing to farmers. Result indicated that one or two chemical applications could reaching the economical control effect in the 1st crop. The suitable control stage for one chemical application is at 3 - 5 days before booting stage, the chemical included 75% Tricyclazole W.P. 0.4kg/ha, 25% Monceren W.P. 0.6kg/ha and 75% Acephate S.P. 0.8 kg/ha. It mainly control rice blast, sheath blight, rice leaf folder and leaf hopper and could increase the net-income of NT 28,122/ha. The suitable control stage for two chemical applications is as follows: the first control is at

infertile tillering period, the chemicals included 25% Monceren W.P. 0.5kg/ha, it is to control sheath blight; the second control is at 3 - 5 days before botting stage, the chemicals included 53% Rabcide-V W.P. 1.2 kg/ha and 75% Acephate S.P. 0.8kg/ha, it mainly control rice blast, sheath blight, leaf folder and leaf hopper, and could increase the net-income of NT 26,172/ha. In the 2nd crop, the 1st application is at infertile tillering stage, 6.5% Neo asozin S. 1.0L/ha was used to control sheath blight, the 2nd application is at 3 - 5 days before booting stage, the chemicals included 10% streptomycin Tetracycline W.P. 1kg/ha, 25% Monceren W.P. 0.6kg/ha and 75% Acephate S.P. 0.8kg/ha, it could control bacterial leaf blight, sheath blight, leaf folder and brown planthopper, and increase the net-income of NT 6,559/ha.

Control of Bulb Mites *Gloadiolus* by Soil Treatment

Soil-dwelling bulb mites primarily damage the underground bulbs of crops and are difficult to control by chemicals. The present work was aimed at evaluating the control effect of these mites by soil treatment in order to improve existing field control measures. Dipping gladiolus bulbs in insecticides prior to planting is an effective way for the control of these mites. Otherwise, direct application of insecticides solution on to the bulbs and the ditches during planting is also feasible.

Subsequently, the insecticide solution should be applied to the soil 7 to 21 days after planting. Delayed treatment would result in reduced efficacy. For the control of bulb mites on gladiolus, the best measures include dipping bulbs in advance and applying insecticide solution twice onto the soils between 7 and 28 days after planting. The alters calls for applying the insecticides to the soils around the roots in >4500 liter of water per hectare, mixing fungicide Prochloraz with the recommended insecticide (such as Prothiofos), and adding adjuvant (such as AquaGro) to enhance the effectiveness. Spreading granular insecticides (Such as 10% terbufos G) in the planting ditches at 60 Kg/ha gives good control effect. Treating soil with granular insecticides instead of with insecticide solution is labor saving and more economical.



Fig. 11. Control of bulb mites on *gladiolus* by soil treatment.

Seasonal Occurrence of *Dacus cucurbitae* in Central Taiwan and Reaction Observation of Attractants

Investigation of seasonal occurrence of *Dacus cucurbitae* by attractants con-

tained Methyl eugenol and Cue-lure solution at Changhua, Taichung and Nantou counties from March 1994 to June 1995. At Changhua county, except on April 1994, that all investigated areas occurred one population peak, while August at Tatsuen, November at Taichung station, November to January at Chichou also occurred another population peak. At Nantou county, the population peak occurred at the following area and period: September, 1994 at Puli, November, 1994 and March, 1995 at Mincien. At Shinshe, Taichung county, on December, 1994 and March, 1995 one population peak occurred respectively. Five attractant treatments, that is Methyl eugenol, Cue-lure solution, mixed solution of 1 to 1, 5 to 1 and 10 to 1 of Methyl eugenol and Cue-lure solution have tested at Tatsuen, Yuanlin and Chichou areas. Every 15 days investigated melon fly number and every 30 days renewed the attractants. The results showed that the mixed solution of 1 to 1 and 5 to 1 of Methyl eugenol and Cue-lure solution attracted more melon flies than other treatments. Six colors of sticky cards, that is yellow, white, blue, green, red and black colors, placed at Tatsuen area, investigated the melon fly number and renew the sticky card every 14 days. The results indicated that white sticky cards attracted more female melon fly than other treatments, which is 3.24 per card. The blue, yellow and white sticky cards

attracted 5.24, 4.68 and 4.01 male melon fly per card, respectively. The yellow sticky cards plus Methyl eugenol or Cue-lure placed at vineyard of Taichung station and Tatsuen village, investigated melon fly number and renew the attractant every 14 days. The result showed that the yellow sticky card plus Cue-lure attracted 7.55 and 12.04 melon fly per card, more than other treatments. In general, *Dacus cucurbitae* occurred all - year - round in central Taiwan, the 1st population peak occurred on March - April, the 2nd population peak occurred on August - November. The presently using yellow sticky card by farmers recommended Cue-lure for attract male melon flies and the control technique need further improved.

Investigation the Insect Pests and Occurrence of Gerbera

Gerbera is one of the new flower crop in Taiwan. Field investigation indicated that there were 9 major insect pests occurred at gerbera growth stage. 1) *Liriomyza trifolii* occurred year-round under facility cultivation condition, it mainly attacked leaves surface resulted in gray to brown spot on leaf. 2) *Trialeurodes uaporariorum* occurred severely at October, young larva and adult moth gathered at underneath of leaf; 3) *Tetranychus urticae* mainly occurred at March and October-November. Young larva inhabited at leaf underneath areas, the affected leaves turned into gray spot, and even-

tually becomed yellow brown and dieback; 4) *Polyphagotarsonemus latus*, the major occurrence season is at Oct.-Nov. The larva infested unopened flower and leaf buds; 5) *Thrips palmi* has a population density peak stage at Oct.-Nov, the larva and adult infested young bud and young leaf; 6) *Frankliniella intonsa* occurred mainly on March and October, it attacked flower parts resulted in white or brown spot on flower; 7) The major occurrence season for *Aphis gossypii* is from November to December, it often gathered and damaged on young bud, young leaf and flower bud; 8) *Spodoptera exigua* is mainly occurred on September, its larva damaged leaf and flower bud; 9) *Planococcus citri* mainly occurred on October, it larva and adult gathered at the underneath of leaf. The exudate of *P. citri* will induce the mold disease and the black mold could affect the leaf photosynthesis, resulted in poor growth of plant.



Fig. 12. The leaves of gerbera damaged by American serpentine leaf miner.

Investigation of Occurrence and Control of Borer in Rice and Barley

The study is to understand the effect of transplanting time on the occurrence of borer in paddy rice. The rice variety is Taichung sen 10, which is susceptible to borer. Result showed that early transplanting rice have more serious occurrence of percentage of yellowing side leaf, percentage of die-heart and percentage of white spike than late transplanting rice, of which is caused by borer damage, whather in 1st crop or 2nd crop. The yellowing of side leaf during early growth stage is mainly caused by *Chilo suppressalis*. At the eillering stage of 1st crop, die-heart is mainly caused by *Chilo suppressalis* (96%) and only few caused by *sesamia inferens* (40%). *C. suppressalis* and *S. inferens* played equal role on the occurrence of white spike after booting stage. The lamp trap was set up at this station, Tatsuen to monitoring the annual population occurrence of borer. Result showed that *C. suppressalis* have 4 population peaks, which is on mid-Feb to mid-March, early May, late July and late October. *S. inferens* have two population peaks which is on late June and late November. Investigation of borer in barley field at Shoshui showed that yellowing side leaf is mainly caused by *S. inferens* (83.4%), and few caused by *C. suppressalis* (16.6%). Which spike is

mostly caused by *S. inferens*. The early barley have more occurrence of borer than late barley. Result of chemicals screening effect on borer. Field control by 35% Prosalone 1-3 times indicated that there is no significant difference between sprayed plot and non-sprayed plot. since this insecticide have on effect on control of *S. inferens* in barley field, it is recommended that delay the planting time of barley could reduce the occurrence of white spike.

Investigation on Occurrence and Control of Insect Pests in Temperate Trees

Each of pear and peach orchards at Lisan area and Wuling Farm in the Te-Kee Dam reservoir conservation areas have been selected from 1992 to 1995. Each location have set up one trial plot and farmer control plot, respectively. Investigation on trial plot according to designed control calendar and farmer plot according to routine custom have been carried out. The major insect pest of pear is leaf mite (June-July), rust mite (July-August), aphids (April-July), nocturnal moth and pear curculio (May-August), *Aphanostigma piri* (April-August), *Dacus dorsalis* (August-October), *Anoplophora maculata* (June-August) and *Pseudaulecaspis pentagona* (October-December). The major insect pests of peach is *Tetranychus urticae* (June-July), *Dacus dorsalis* (August-September), *Pseudaule-*

caspis pentagona (October-December) and *Grapholitha molesta* (April-June). At Te-Ke reservoir area, in calendar control plot, spraying of 48.34% Carbosulfan E.C. and 60% Diazinon E.C. to control leaf insect pests and *A. piri* during early April to mid-May. At early October, spraying of 40% methidathion E.C. and 95% summer oil to control *P. pentagona* of pear trees. The control calendar for insect pests of peach trees is as follows: during early April to mid-July, spraying of 2.8% Cyhalothrin E.C. to control leaf insect pests and mites; at mid-July, spraying of 33% Formothion to control *P. pentagona*; at mid-August, spraying of 2% Abametin E.C. to control mite. According to this application calendar, it will decrease the amount of chemical, reduce the chemical pollution to dam while control the insect pest effectively.

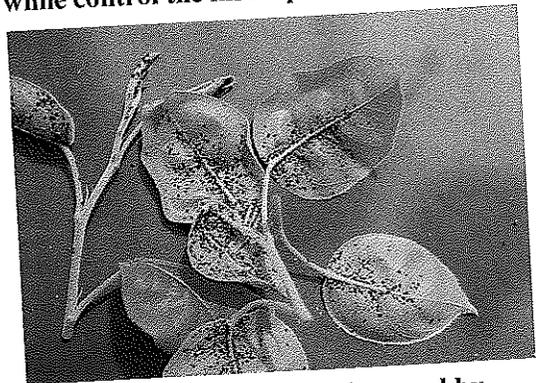


Fig. 13. The leaves of pear damaged by aphid.

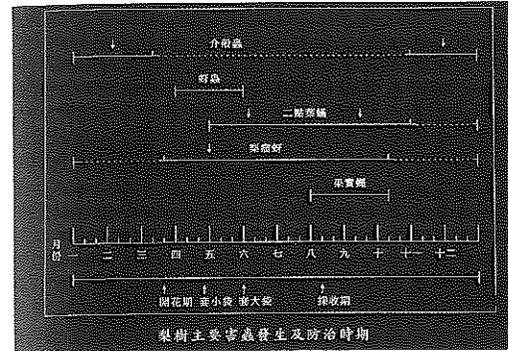


Fig. 14. The control calendar of pear's pest.

Population Occurrence and Ecological Investigation of *Nezara viridula* (Linne)

Nezara viridula belongs to genus *Hemipter* and family *Coreidae*. Result of field investigation indicated that *N. viridula* except infested paddy rice and also infested leguminous crops, such as asparagus bean and green bean, high population often occurred during pod-setting stage. It also attacked soybean, corn, eggplant, melon, radish and Pa-tsai. Lab feeding by green pods of asparagus bean and green bean found that it needed 36.5 days to complete a generation, average survival rate is 84.7%. Each female laid 215.3 eggs. Results of lab feeding by soybean pod, rice spike and corn ear showed that the days required to complete a generation is 42.6, 37.8 and 43.4 days, respectively, while the survival rate is 51.8, 45.3 and 22.6%, respectively, the average eggs laying is 102, 75 and 102. The survival rate of *N. viridula* is very low or died before 1st instar stage when

feeding by leaves of leguminous crop, rice, corn, eggplant and melons. Field investigation on rice, asparagus bean, green bean, soybean, peanut, corn and eggplant indicated that the population peak is varied by crop species. The population peak of green bean is occurred on late April-mid May and late October-early November; for asparagus bean is on mid July-late July and early September; for rice is on early June-mid June and late September- early October; for soybean is on early June-mid June; while in peanut, corn and eggplant, the population density is very low.

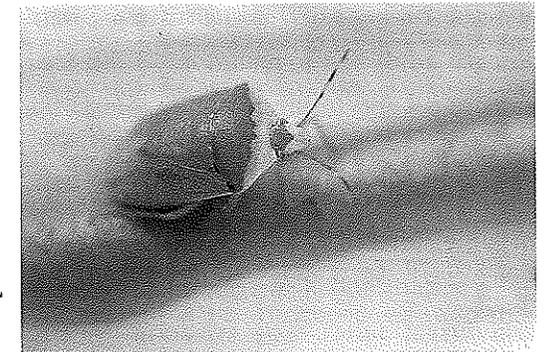


Fig. 15. The green bean damaged by green bug.

Effect of Non-Pesticidal Substances against Two-Spotted Spider Mites on Roses

A laboratory test was performed to measure the effect of five non-pesticidal substances, i.e., Yu-li 2 organic fertilizer, Dahm 1 organic fertilizer, sugar-vinegar solution, wood vinegar solution and vinegar solution, on the two-spotted spider mites on rose plants. Water and a miticide, 50%

dienochlor, were used as references. In terms of 24 and 72-hr mortality toward female adult mites, Yu-li 2 organic fertilizer (250-fold dilution) was the most effective giving 73.9 and 75.6% mortality, better than the effect of 50% dienochlor, 3.9% and 52.8% mortality. The other substances were much less effective with mortality lower than 43.6%. Four of these substances were also tested in the field for their efficacy against the two-spotted spider mite. With one application, Yu-li 2 organic fertilizer (200-fold dilution) and vinegar solution (200-fold dilution) were more effective than the other two substances, with 86.7 and 88.6% mortality, respectively, toward adult and nymphal mites. All four substances performed well against the larvae with mortality higher than 82.3%. With two consecutive applications, Yu-li 2 organic fertilizer and vinegar solution gave better control of eggs, adult, nymphal and larval mites. The effect of Yu-li 2 organic fertilizer lasted for 21 days, longer than that of the others. The residual effect of vinegar solution lasted for 14-21 days and that of wood vinegar solution and sugar-vinegar solution persisted for only 7 days. No phytotoxicity or other adverse effect was observed with these substances. Therefore, they are recommended to be used alternatively with miticides for the control of the two-spotted spider mite on roses. The mechanism of their action against this mite remains to be studied.

Monitoring and Forecasting of Insect Pests of Upland Crops by Sex Pheromone

Spodoptera litura Fabricius, *S. exigua* Hubner and *Agrotis segetum* are the major insect pests of nocturnal moths in upland crops. Those insect pests often caused yield loss of upland crops. This station have used the sex pheromone to attract the male moth, in order to monitor the occurrence of insect pests and provide the reference for control. Results of Four years consecutively monitoring at Tatsuen and Tachen indicated that *S. litura* have the high population occurred, next is *S. exigua*, while there was very few *Agrotis segetum* occurred. The annual population fluctuation of *S. litura* is varied, but two population peaks have occurred on May and November. The population of *S. litura* at mixed crops are as of Tatsuen is higher than that of upland crops are as of Tachen. The annual population fluctuation of *S. exigua* is similar to *S. litura*, on May and November Two population peaks occurred. The population of *A. segetum* at Tatsun is higher than that of Tachen, only on February-March have are clear population peak. According to the ARIMA model to forecast the population of *S. litura* and *S. exigua*, the confidence level at Taichen is about 80%, at Tatsun the confidence level is 60%. This difference is due to the simplicity or complexity of crop phase.

Investigate and control of seedling disease of ornamental plant

Investigated seedling disease of ornamental plant in field. We found the plant of chrysanthemum, vinca, begonia, celosia, salvia, petunia, dianthus have many disease in the seedling time of plant. The disease of we found were soil rot (caused by *Rhizoctonia solani*), watery soft rot (caused by *Sclerotinia sclerotiorum*), damping off (caused by *Pythium* spp.) and Phytophthora blight. In summer, the climate were high temperature and humidity. So, the soil rot of seedling was very serious. It could caused 20-80% loss in the seedling bed. Sometimes could arrived at 100% loss. But, in winter, the most serious disease was watery soft rot. In selected useful fungicide, we found the DoRaDo could inhibited the mycelia growth ability of *S. sclerotiorum*. But no one had the effect on *R. solani*. In selected antagonist microorganism, we found some bacteria had the inhibited ability in these seedling's pathogens. Such as *Bacillus subtilis*, it's more effective than others. Maybe, this bacteria can be a biological control agent in seedling disease.



Fig. 16. The leaf blight symptom of periwinkle caused by *Phytophthora parasitica*.

Purification and Serology of the Nucleocapsid Proteins of Four Distinct Tospoviruses

The genus Tospovirus of the arthropod-borne family Bunyaviridae is unique in that it infects plants. A TSWV-like virus previously isolated from peanut was designated as Tospo-P in this investigation. In order to clarify the serological relationships of a Tospoviruslike virus isolate Tospo-PD2 from peanut with other tospoviruses, the nucleocapsid proteins of four tospoviruses including Tospo-PD2, a watermelon isolate of watermelon silver mottle virus (WSMV-W), an impatiens isolate of impatiens necrotic spot virus (INSV-M), a TSWV isolate from New York (TSWV-NY) were purified from leaf tissues of *Chenopodium quinoa* infected with each virus. The antisera against the purified nucleocapsid protein (NPs) were prepared, and used to analyze the serological relationships of the NPs by immunodiffusion test, indirect ELISA, and Western blotting method. The leaves

tissues of *C. quinoa* 4-6 days after inoculation with the four individual tospoviruses were extracted with TB buffer. The supernatant after centrifugation at 15300 g (10 min) was treated with Triton X-100 (1% final conc.) and followed by high-speed centrifugation (79700 g, 120 min) through 20% sucrose cushion. The pellets were resuspended in TB containing 10 mM glycine, and further separated by 35% cesium sulfate isopycnic centrifugation. The nucleocapsid zones were drawn and the NPs were purified by SDS-polyacrylamide gel electrophoresis. The yields of the purified NPs were 1-5 mg per 100 g tissue. Specific antisera were produced by injecting each antigen into individual New Zealand white rabbits. In the immunodiffusion, indirect ELISA and western blotting tests, the four antisera against NPs of Tospo-PD2, WSMV-W, INSV-M and TSWV-NY only reacted to their homologous purified antigens and crude antigens in plant extracts; and no cross reactions in the heterologous combinations were noticed. These results of homologous and heterologous assays with the four antisera against NPs of the different tospoviruses clearly indicated that the NPs of TSWV, INSV, WSMV and Tospo-P are serologically unrelated. Thus, Tospo-P is considered a new serotype and possible new member of the genus Tospovirus.

Isolation and Identification of Lisianthus Necrosis Virus in Taiwan

In May, 1995, several colors of unnamed cultivars of *Eustoma russellianum* showing severe necrotic spots on leaves in a plastic screenhouse in Yung-chin, Changhua county. The main symptoms including producing a lot of necrosis spots or ring spots on the leaves and stem, plant stunting and flower symptoms such as white streak, color break on petals and malformation of flowers. The virus used throughout this study was derived from a diseased *E. russellianum*. After three single lesion transfers, leaf extracts were used as virus source for various experimental purpose. Of a total of 32 plant species within 11 families were mechanically inoculated, 17 species were exhibited with symptoms on inoculated leaves only. Mechanically inoculated leaves of *Chenopodium quinoa* were extracts by phosphate buffer, after differential centrifugation and sucrose density gradient centrifugation, partial purified samples were obtained. The virus virions were spherical with diameters of 34-35 nm. Similar particles in irregular cluster or regular array in crystalline were also observed in the thin sections of diseased leaf tissue of host plants. The virus infectivity in crude leaf saps were still kept when heated for 10 min at 100°C and diluted 10^{10} . The virus showed serological relationship with lisianthus

necrosis virus reported in Japan by ELISA test, using antisera prepared by Iwaki et al. Based on the host plant reactions, virus particle and serological relationship, the virus in *E. russellianum* found in Taiwan was identified as LNV.



Fig. 17. Symptoms caused by Lisianthus necrotic virus on Lisianthus.

Effect of Cultural Constructions and Media on Orchid's Disease Development

Cultural practices, which include all manipulations necessary during crop cultivation, frequently can be modified to help suppress the rate of disease development. To test the effect of various cultural media and structured houses, Southern blight (caused by *Sclerotium rolfsii* Sacc.), Anthracnose (caused by *Colletotrichum gloeosporioides* Penzig), Phytophthora blight (caused by *Phytophthora pamivora* Bulter), and Erwinia soft rot (caused by *Erwinia carotovora*) of orchid were surveyed during cultivation period. The results indicated that there be not significantly different among various cultural sunlight-proof houses

including simple black net system, plastic house, H-shape steel house, and stainless net house, to disease severity of those diseases as described above. For cultural media, coconut shell, bark, seaweed, and artificial green soil are most common materials used for orchid cultivation. It was no difference among these media to orchid growth, such as height, and tillers. However, the disease severity of each disease development or orchid was significantly different among these media. The most severe disease severity of southern blight disease (56%) occurred on bark medium related to other media. The orchids cultured in artificial green soil medium were more sensitive to anthracnose disease (58.5%) and Erwinia soft rot disease (13.5%) than that in other media. In addition, adding completely fermented or incompletely fermented organic matters in the same medium also affected the disease severity of each disease. For example, the orchids planted in coconut shell medium and amended with completely fermented organic matters grew more vigorously and less disease severity when compared with that amended with incompletely fermented organic matters. The disease severity of anthracnose, Phytophthora blight, and Erwinia soft rot disease of orchids was respectively, 15.5%, 10.5%, and 4.5% under added completely fermented organic matters, and was respectively 35.5%, 38.5% and 20.5% under

amended incompletely fermented organic matters.



Fig. 18. The good cultural constructions of orchid garden.

Investigation and Control Experiment for Insect Pests and Diseases of Peach in Taiwan

The major diseases of peach trees is *Taphrina deformans* (Berk), *Xanthomonas campestris* pv. *pruni* (Smith) Dye, *Botryosphaeria dothidea* (Moug ex Fr), *Tranzschelia discolor* (Fuckel) and *Monilinia fructicola* (Wint). The major insect pests of peach trees is *Singaporea shinshana* (Matsumura), Diamond-back moth, *Grapholitha molesta* Busck, *Zeuzera coffeae* Nietner, *Hyalopterus arundinis* Fabricius, *Myzus perscae* (Sulzer), *Pseudaulacaspis pentagona* Targion, *Qudraspidotus persiciosus* Comstock, and *Dacus dorsalis* Handel *Botryosphaeria dothidea* (Moug ex Fr) is the most important and severe infested disease in peach tree. The most important insect pests in peach trees is *Singaporea shinshana* (Matsumura), *Pseudaulacaspis pentagona* Targion and *Dacus dorsalis* Handel. *X. campestris*

occurred at April-August, while the peak stage is on May-June. *Tranzschelia discolor* occurred at April-October. *B. dothidea* of April-August, resulted in dieback of branches and retarded growth. *Monilinia fructicola* occurred at April-July, it mainly infested fruits resulted in fruit rotting and dropping. *S. shinshana* occurred from May to November, on July-September it have high population density. The recommended chemicals after screening experiment according to the regulation of chemical examination committee is 2.8% Cyhalothrin E.C. 1000 X and 3% Alphacypermethrin E.C. 1000 X have the best control performance.



Fig. 19. The leaves of peach damaged by *Taphrina deformans*.

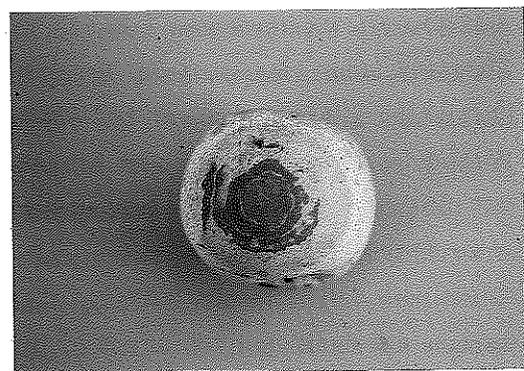


Fig. 20. The symptom of peach brown rot.

SOIL AND FERTILIZER

An Experiment on the Organic Farming of Broccoli

This experiment was conducted in the farm of Taichung District Agricultural Experiment Station at Datsuen in Changhua Hsien. The soil of the experiment plot is a slate alluvial neutral sandy loam. The whole experiment consisted of the four treatments as follows: 1. conventional farming, 2. half way organic farming with effective microorganisms (EM), 3. organic farming with hog manure compost and EM, 4. organic farming with chicken manure compost and EM.

The results of the experiment showed that the growth of broccoli plants in the organic treatments were better than that of the control. The size and weight of broccoli were significantly bigger and heavier in the organic treatments than those in the control, therefore the flower yields in organic treatments were significantly higher. Among them the yield of chicken manure compost treatment was the highest, 26.2% higher than that of the control, followed by hog manure compost treatment, 18.3% higher. This significant increases in yield seemed to be mainly coming from the better soil fertility factors such as lower salinity, higher organic matter, higher available phosphorus and microelements and the application of effective microorganisms (EM) in the

organic treatments.

However it was difficult to explain that why with the same soil fertility conditions as the organic treatments, the half way organic treatment only showed similar yield performance as the control. It was possible that combination of chemical fertilizers in the compost with EM in the half way treatment caused the antagonistic effect to affect the mineralization and uptake of soil nutrient elements. Because chemical analyses revealed that the nitrogen, Mn, and Zn in the broccoli plants in the half way treatment was significantly lower than those in the control and organic treatments showing the tendency of deficiency. In this experiment the very significantly lower Mn and Ni contents in the broccoli flower in the two organic treatments may have positive or negative effect to the quality of broccoli flower.

During this experiment sugar-wood-vinegar with *Bacillus thuringiensis* was sprayed at 1-2 weeks interval to control cabbage worm, and a mixture of citronella oil, peppermint oil and camphor oil was sprayed twice to control aphid in the early stage of growth.

Relation on Organic fertilizer and Necrosis of Gladiolus

Gladiolus is an important bulbs with high economic cost in Taiwan. It is sensitive to toxic rate of fluoride. It usually showed a typical symptom of necrosis from the

top of leaf especially to sensitive cultivar. It must be improved the technology of culture to enhance the quality of cut flower.

This study was undertaken to determine the necrosis of leaves on the Wig's Sensation in water culture using thomaskali, fish meal, bone meal, bark, peat and guano, and calcium superphosphate as control. The results showed that thomaskali was better than calcium superphosphate in reducing necrosis. Fish meal or bone meal (especially after fermentation) was the best phosphate source only caused 0.15 cm of necrosis in 56 days after cultivation. The toxicity from calcium superphosphate was reduced by adding bark compost mixed with calcium superphosphate. The above results offer the culture of reference.

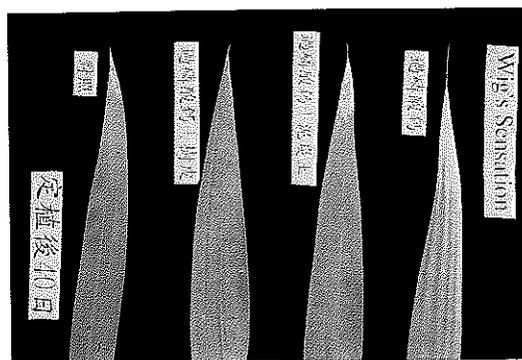


Fig. 21. Relation on organic fertilizer and leaf necrosis of Gladiolus.

Evaluation of the Potentially Available Nutrient of Compost

The most efficient way to understand availability of nutrient of organic fertilizers is to determine their PAN (potentially available nutrient) and manage their

mineralization rates to match the amounts of nutrients needed for the aim crops. The objectives of this research was to develop a chemical extracting method for estimating of the PAN value of composts. Pot experiments with different levels of composts added were conducted to evaluate four chemical extracts (0.1 M NaOH, 1 M NaCO, 1 M (NH) CO, 1 M Urea) for estimating the PAN value of composts. Results indicated that the best correlation was between the amount of net available N and organic N extracted by the ammonium carbonate which could significantly be described by $\ln Y = \ln a + b/X$ (X: potential available N of compost, Y: estimated net available N, $r=0.673$). It is concluded that the ammonium carbonate extraction method is effective on evaluating the PAN value of composts.

Study on Fertilizer Management of Lily

Two fertilizer experimental field for lily were set up at Wufeng (sand stone shale noncalcareous alluvial soil) and Waipu (red soil), Taichung count. Results indicated that under high nitrogen treatment (250 kg/ha) at sand stone shale alluvial soil, the plant height of lily is the tallest, which is 71.2 cm. At Waipu, the nitrogen amount of 150 kg/ha plot have the tallest plant height. Phosphorus and potassium fertilizer have no effect on plant height. Among three major elements, only in nitrogen amount of 200 kg/ha plot at two

places could increase the flower number of lily. There is not significant different in quality of cut-flower among each plots. The pH value in experimental soil of two places is increased as the amount of nitrogen application is increased. There is not soil accumulation occurred. High nitrogen amount could increase the EC value of soil.

Studies on the Application of Soil Leaf Diagnosis Techniques to the Orchard

The object of the study is on encouraging orchard farmers to do plant and soil analysis, and accept the recommended fertilization for their orchard sustainable production. Total of 4974 surface soils, 3969 subsoils and 4419 leaf shades were sampled and analyzed since 1995. The result showed that the initial higher ratio of pH value lower to 5.5 decreased to 66 and 71% of total surface and subsoils, respectively. Initial high ratio of organic matter content lower to 2% also decreased to 21 and 55% of surface and subsoils, respectively. There is also a tendency of lowering to the above mentioned ratio yearly. Initial higher ratio of samples that have nutrient level out of the range of recommended proper level also found to become lower yearly. Samples with high N level are more than those high in other nutrients. Depending on the kind of orchard, the Mg or B content of the samples is predominant

among the elements that lower to proper levels. Fertilization in the way of high amount of organic fertilizers and low amount of chemical fertilizers is more public. Thus, it deserves continuing the work of soil and leaf diagnosis if the budget is available.

AGRICULTURAL MACHINERY

Development and Improvement of Automatic Medium Filling Machinery for Plug Production of Chrysanthemum

Chrysanthemum is a very important flower crop for about 1800 ha planted in ChungHwa area. Plug seedling of Chrysanthemum is better than traditional sand-bed seedling since plugs can grow and storage better with more anti-stress ability and higher quality, but needs higher cost and labor needs. This research was set up to develop and improve the medium filling machinery to decrease the plug production's labor needs and cost. The machinery include six parts as the medium agitator, the storage tank, the return conveyor, the automatic tray stacker, the integrated filler with puncher, and the manual-control conveyor. All the six parts are connected together and controlled by PLC to automatically process tray feeding then medium filling and leveling and hole punching. The highest operations speed of the system is 720 trays/hr, that is 6 times higher than the labor work. Also the medium is mixed better by the machinery

and can add water when in mixing. Even when in the lowest 60 trays/hr speed, labor and time were saved by the system. Now the chrysanthemum cuttings is still plugged in trays by labor. An automatic cutting setter is planing to develop for reaching further automation and for further use on other similar flower's production like gypsophia, carnation, gerbera and even on forest seedling production.

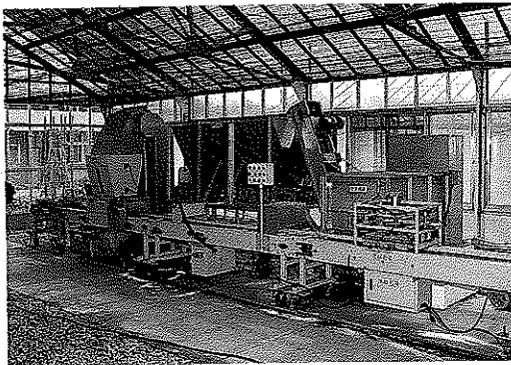


Fig. 22. Automatic medium filling machinery for plug production of chrysanthemum.

Development on Bulbs Flower Corm Elevating Digger

For the purpose to decrease the product cost of bulbs flower, there were two type of elevating digger developed. The machine performs are following the operation in sequence: (1) digging blade (2) soil separation system. The blade delivers the corms and surrounding soil onto a rod-chain type of elevating conveyor. Soil and other materials were separated through the rod-chain, and corms deposited on the top of row. The corms are then picked up by hand and placed in containers.

The first type elevating digger is mounted by power-tiller with 8 to 18 hp diesel engine (depend on the elevating conveyor), digger is 60 to 80 cm in width and 75 cm in length. Its max. field capacity is 0.1 ha/hr. The second type elevating digger is mounted by 40 to 50 hp tractor, digger is 110 cm in width and 100 cm in length. Its max. field capacity is about 0.3 ha/hr.

Development of Hang-boom Type Auto-spraying Equipment

Protected culture are more and more popular in Taiwan for higher products quality, most of them are using for vegetable, flower and seedling production. Though there are automatic pipe type watering system which can be use for management in these protected facilities, but the pipe system got problems such as dead angle and overlapping etc. The purpose of this research is to develop a better watering equipment for raising production quality and reducing environmental affection and labor needs. The structure of this equipment include a hanging pipe as a rail, a wide boom frame hanging on the rail by two U wheels, several vertical telescopic spraying rods mounting on the boom frame. The whole boom with rods can be moved back and fro and driven by a 1/4 or 3/4 hp DC wormgear motor and a looped wire. Dual switchable spraying nozzles include a imported U.S. Delavan flat nozzle and a

local-wade flat nozzle. This system can be use as watering, liquid fertilizing and chemical spraying equipment. The testing results shows the boom's moving speed can be adjusted from 0.25 to 12.5 m/min for different requirements. It's spraying difference on a 1.67m wide testing plate in 30 samples gets 19% (C.V value). These results shows the equipment are highly efficient, easy to operate, adjustable and much more uniform than labor spraying.



Fig. 23. The hang-boom type of auto-spraying equipment.

Study on Mono-rail Spraying Equipment and Its Control System

Mono-rail spraying equipments was developed for both spraying water droplets in nursery and chemical pesticide application in floral protected culture. It could carry droplets to target by moving spray carrier, that is driven by a wire loop and a winch set. The basic principle to simplify farming work is mechanization first and then extend to automation. There are three levels of electrical sequence control method : manual operation, semi-automation and full-automation. The experience equip-

ment has both manual operation and semi-automation control modes, and 1.2 ha floral protected field have 17 sets greenhouse spraying equipment. The equipment had been worked 67 times for chemical pesticide and fertilize application from Jan. to Sep. in 1995. The speed of spraying carrier was between 0.7km/hr and 4.3km/hr, and spraying volume was changed from 179 lt/10a to 29.4 lt/10a depending on the speed of spraying carrier. The operating time is about 2 hrs when carrier speed is 2 km/hr, spraying volume is about 1.2 tons water and the operating cost is about NT\$3942, that is effective and cheaper than manual application.



Fig. 24. Automatic mono-rail spraying system used in rose greenhouse.

AGRICULTURAL MANAGEMENT

The Adoption and Adjustment of Cabbage Growers as Affected by the GATT Impacts

Result of questionnaire study among cabbage growers in central Taiwan indicated that most of the samplers learn the

news that government is actively planning to attend the GATT is obtained from TV, which is 24.5%. The percentage of answer for there is positive effect on agricultural industry after government joint the GATT is about 25%, the answer for no effect is 73.2%, while 1.8% of the sampler didn't know the new. The main reason for answer of having positive effect are 1) enhancing competition by product exchange, 2) adjusting development trend for industry, 3) extending the marketing channel. 75% of samplers answered that the negative effect in short term when government joint GATT is serious or very serious, while in long term 58.9% of samplers have the same answer. The main reason for answer of have negative effect are 1) product price decrease due to supply increase, 2) high production cost of local product, can't compete with foreign produce. The study also found that the percentage of answer for that GATT have serious or very serious effect on industry in short term for member and non-member of production and marketing group are 66.6% and 86.9%, respectively. While the percentage of answer for that GATT have not serious effect on industry for member and non-member of production and marketing group is 15.2% and 13.1%, respectively. It is clear that non-member of production and marketing group possessed more serious attitude on GATT issue than those of member's.

Study of Adjustment and Solution of Cabbage Industry after Joining in GATT

This research is focused on 56 cabbage growers in central Taiwan during 1995. The results indicated the negative impact will be occurred after joining in GATT. The management problems mainly is shortage of labor, high production cost, shortage of capital and lack of marketing channel. The improvement of above problem would summarized as follows: 1) Organization of production and marketing team for mutual assistance in labor; 2) Joint purchase and enlargement of farm scale to reduce production cost; 3) Reduction of cabbage import quota during June to Feb. the following year; 4) Offer agricultural loan and improvement of grading and packing method; 5) Strengthen farmer training, subsidy agricultural material.

Studies on the Enhancement of Agricultural Extension Regulation

The "Agricultural Extension Regulation" is still in the legislation process after the first reading dated on 10th October, 1991. There are 24 articles in this Agricultural Extension Regulation. It is owing to the big changes in agricultural situation in the past 5 years in Taiwan, some of articles are out of date. The objective of this study is to evaluate its islandwidely through questionnaire process among 504

representatives from agricultural school, government sectors, and farmers' organization. The results found that 15 articles of it was suggested to be improved. The suggestions were summarized as follows:

1. Township office should involve in this new agricultural extension network.
2. The roles of agricultural extension agents in the county government level and that in district agricultural improvement station is confused in this new agricultural extension framework.
3. Instead of making agricultural policy annually, it had better evaluate the effort of agricultural measures year by year.
4. Both public and private agricultural school should be assigned to mission of agricultural education.
5. The agricultural service should contributed not only on agricultural producer but also on consumers.
6. The agricultural extension agents from districtal farmers' association had better under supervision by the new basic unit- agricultural extension station.
7. It is better to set up a subject matter specialist system in the new agricultural extension framework.
8. The recent manpower of agricultural extension center in each district agricultural improvement station can not afford to conduct all kinds of agricultural extension activities in its district.
9. The roles of extension agents in district

agricultural improvement station were not clearly classified.

10. There were no legal agreement to support the cooperation among the Farmers' association, district agricultural improvement station and country government.

Study on the Attending Factor of Flower Farm Women in Agricultural Management in Taiwan

The data was collected from the 265 questionnaires for the flower farm women belong to cut-flower production and marketing team in Taiwan. It is to understand the attending factors of flower farm women in agricultural management in Taiwan. The results is as following. 1) The mechanization degree in flower farm for farm management is not high, the assistance of farm women is very important, especially in the nursery job. The labor shortage problem will occur without the involvement of farm women. 2) Most of the flower farm women actually is involved in field work, but they hope they can joint the management job. 3) In communication activity for agricultural information, the frequency in human contact is higher than that of group contact and mass communication media contact. 4) Most of the farm women are willing to continue the farm management job for their own farm and have the support of family member.

They want to be a co-manager with

equal and independent status in family, but they feel they lack of production technique and agricultural information. The major bothering in living is the over-burden of agricultural activity and lack of leisure time. The reason that farm women are not joint the farm management job is lack of management ability, bad income and no time. 5) The present major problem for folwer production and management farm is shortage of farm labor, low and unstable price for farm produce, lack of capital. They hope the individual farm management will toward the direction of industrialized production and development, and earn the same net-income as other business.

A Case Study on Management for Cheng's Mushroom Farm

The edible musbroom industry in Taiwan was quite developed in the year of 70's, which was one of the major exported agricultural products. The production of edible mushroom was a by-product of rural farm family. The raw materials then were processed by food manufactory for exporting. Due to the high competition of mushroom product in the world market from mainland China and other Asian countries, the mushroom industry in Taiwan has declined rapidly. Some professional mushroom producing farms had been established. Cheng's Mushroom Farm is one of this kind of farm.

The purpose of this study were to

analyze the characteristics of farm management and financial status in order to be used as a reference for guiding other similar mushroom producing farms. The results indicated that Feng-Nan Mushroom Farm was a industrialijed management farm. The major products of the farm were mushroom plastic bags. Recently, the fresh mushroom market was also exploited. The analysis also indicated that the farm in 1994 has a debt of NT\$ 2222221 due to both net farm income and return to operator's capital were minus. The farm operation was under structure transformation stage. The farm productivity and construction were not fully operated, which reduced the farm revenue. In consideration of the farm financial structure, the ratio of operator's owned capital and benefit efficacy were 93.6% and 1,454.9%, respectively. The rate of security on equipment investment was 98.4% and the rate of fixed assets was 104.8%. All these showed that the farm's financial sturcture was very healthy. It has excellent solvency for both long-term and short-term debt. The major problem of this farm was over investment on fixed assets and can not fully utilize the resources that affect the stability of investment and mobility of finance.

In the long-term development, Cheng's Farm possesses many Superior conditions, it will have great potential in the future if the unfavorable factors have been improved.

In order to maintain the steady growth of farm operation, the following recommendation have proposed: 1) The labor in Feng-Nan Farm is the limiting factor of production in stead of cultivation techniques and marketing. The introduction of foreign labor is one of the priority to solve this problem. 2) The expansion of exporting market is very important in the future for establish the multiple marketing channels. 3) Establishing the financial management and benefit orientation system will in favor of farm operation.

Utilization and Planning of Agricultural Waste for Compost in Farm Community of Taichung Areas

This study was adopted the ideal of rural development planning and community development and meet the requirement of different executive unit in rural areas, farm community and farm family. It also considered the development planning at different levels in each executive society in term of economic, ecology and system level. We developed the composting model for organic waste in different executive unit. The preliminary result of planning to use the farm family or farm community as the utilization model of executive unit. The compost accumulation method could adopt natural method, tank method, bag method or pail method according the actual situation. If the rural area is the executive unit, the large-scale open or seal accumulation method could be used for

composting procedure, according the different kind of organic waste. Further researches and extension on organic waste composting treatment should be strengthened to utilize the farm organic waste for composting into organic fertilizer, and to reach the function of resource recycling and environmental protection.

Analysis of Rural Youth in Joining the Agricultural Professional Training Program

The research is to study the motive of the young farmers in joining the "Agricultural Professional Training Program". A total of 150 sampled trainees were selected for questionnaire, the analysis of the result of their answers was described as follows. The trainees are mostly at the age from 31 to 35, and then followed by the group from the age of 26 to 30. The 84.6% of the trainees are high school or professional high school graduates and above. The satisfactory degree in term of overall training related items, the trainees in "Fruit tree class" have the highest percentage of trainees showing satisfaction, which is 71.8%; then followed by "Protected vegetable class", which is 57.0%. For the individual training item, the training environment received the highest percentage of satisfactory degree, which is 74.6%, followed by training subject arrangement, which is 45%, followed by instructor level, which is 59.5%. The training materials received the lowest satisfactory degree in

term of percentage of trainees, which is 45.0%.

Integration and Supervision of Agricultural Production and Marketing Team in Nantou County

The integration and supervision of agricultural production and marketing team is focused on the following seven agricultural industry: fruit trees, vegetable crop, flower crop, hog, fishery, broiler and layer. Until July, 1994, there are totaled 400 teams and 9185 members have been organized, in which flower crops have 83 teams, 1027 members; vegetable crops have 122 teams, 2622 members; fruit trees have 183 teams, 5265 members, the other 4 categories have 12 teams, 271 members. The main task is to supervise the team operation, training team staff, increase produce competitiveness and establish team brand name. Nation-wide team evaluation result showed that there are 7 teams have been judged as outstanding teams in Nantou county.

Service Statistics of Farmer Service Center

Statistics of tour arrangement for local visitors by Farmer Service Center is as follows: 135 groups and 9178 people in 1993; 131 groups and 8960 people in 1994; 103 groups and 7141 people in 1995, for foreign visitors is 51 groups and 741

people in 1993; 59 groups and 762 people in 1994; 45 groups and 1082 people in 1995. Lecture or training arrangement is as follows: 254 times and 1969 lecturers in 1993; 224 times and 817 lectures in 1994; 206 times and 436 lecturers in 1995. Case service of farmer problems totaled is 656 cases and 1872 people in 1993; 574 cases and 1461 people in 1994; 575 cases and 916 people in 1995.

Integration and Supervision of Agricultural Production and Marketing Team in Taichung County

There are totaled 322 agricultural production and marketing teams have been registered and organized in 1995 at Taichung county. In which, vegetable crops have 86 teams; flower crops have 34 teams; fruit trees have 184 teams; layers chicken have 11 team; broiler chicken have 8 teams; hog raising have 9 teams. The activities related to agricultural production and marketing team is as follows: joint team meeting 32 times, technique consultant meeting 8 times, workshop 33 times, field day 18 times, subject-matter interview 51 times, produce exhibition 11 times. Team evaluation result in Taichung county showed that 44 teams belong to first-grade team, which is reached 14.2%; 99 teams belong to 2nd-grade team, which is reached 32%.

ACTIVITIES OF AGRICULTURAL EXTENSION IN 1995

Training and Education

A total of four subject matter training courses were held for young farmers in 1995, with 156 trainees attended. A total of four on-the-job training classes were held for agricultural extension workers, with 175 persons attended. A total of three foreign training classes were held for the agricultural technicians of friendly nations, with 73 participants attended. And a total of 1570 persons attended related training programs at this station (Table 1).

Improvement of Rural Living

To improve the rural living environment and quality, a series of improvement programs for the rural inhabitants were executed by some basic-level Farmers' Associations and guided by this station in 1995. A total of 52 training classes were organized for the aged people in farming villages. A total of 16 training classes were held to strengthen the sanitation and health services, and 3 training classes were conducted to teach the knowledge of family environment protection. A total of 3 villages were selected for conducting the environment improvement activities (Table 2).

Table 1. Training activities of agricultural training center in 1995

Training activities	Class	Trainee
Special subjects training	5	156
On the subjects training	6	175
Foreign training	4	73
P & M team training	57	1570
Total	72	1974

Table 2. Improvement of rural living environment and quality in 1995

County & City	Guidance of aging life (class)	Sanitation & health (class)	Family education (class)	Improvement of living environment (village)
Taichung city	1	1	1	—
Taichung county	17	7	0	1
Nantou county	12	3	0	1
Changhua county	22	5	2	1
Total	52	16	3	3

Development of Rural Culture

Under the development program of rural culture, an integrated activities of rural culture were held at the two demonstration villages at Ta-chia and Wu-chi. A total of five township's activities of rural culture were held to promote the traditional rural culture. And a total of 21 villages were selected to set up farmer's culture classroom (Table 3).

Table 3. Activities of rural culture in Taichung areas in 1995

County & city	Cultural demonstration activities (village)	Cultural show room (village)	Cultural practice classroom (village)
Taichung county	1	1	9
Nantou county	1	1	5
Changhua county	1	1	6
Taichung city	1	0	1
Total	4	3	21

Table 4. Activities of farmer's services of this station in 1995

Services item	Frequency	Person
Local visitors	119	7,609
Foreign guests	67	840
Consulting services	712	1,217
Trainers support	242	315

Farmer's Services

The farmers' service work rendered by the staff of this station was very productive and fruitful in 1995. A total of 7,609 local visitors and 840 foreign guests visited this station. A total of 1,217 farmer's letters or consulting problems have been answered. And local Farmers' Associations and agricultural cooperatives as well as agricultural production and marketing groups were guided to conduct 242 training classes of which the trainers were invited from the staff experts of this station (Table 4).

Guiding the Investigation of Production Cost for Farm Products

Guiding the farmers' associations to investigate the production cost of farm products. The informations obtained were then used for publishing the Report of Production Cost of Farm Products in Taiwan by the Department of Agriculture and Forestry. A total of 51 farmers' associations were guided and 134 crops were investigated in 1995 (Table 5).

Table 5. Status of investigation of production cost for farm products in 1995

County	No. of crop	No. of village	No. of farmer
Taichung	35	16	240
Changhua	45	22	300
Nantou	54	13	315
Total	134	51	855

Table 6. Kinds of farm enterprise managed by young farmers in 1995

County/City	Flower	Vegetable	Fruit	Tea	Mushroom	Fishery	Other agric.	Livestocks	Total
Taichung City	4	0	0	0	0	0	0	0	4
Taichung County	18	3	9	1	9	0	1	0	31
Changhua County	21	3	12	0	4	1	0	22	60
Nantou County	35	3	6	27	4	1	0	2	73
Total	78	9	27	28	16	2	1	24	168

Project for Guiding the Rural Youth to Establish Business Career

The purpose of this project is to assist young farmers establishing new modernized farms. A total of 168 rural youths were qualified to receive the low-interest loans from the government to start their new farms in 1995. The loan was used for establishing the farm of ornamental plants, tea tree, fruit tree, vegetables and livestock etc.. (Table 6).



Fig. 25. Foreign participants attending a group discussion.

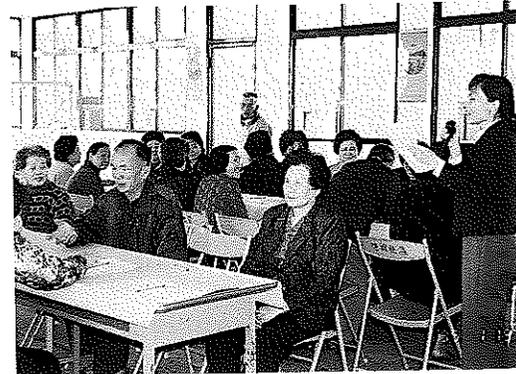


Fig. 28. The rural activities of aged farmers' group in Shiamn-Shi.



Fig. 26. Young farmers trainees attending a field study tour.



Fig. 29. Farmroad improvement of rural village in Pu-Li.



Fig. 27. The rural culture activities running in Taichung.



Fig. 30. The regular meeting of grape production and marketing group in Jyi-Jyi.

PUBLICATIONS

A. Published on Bulletins of Taichung D.A.I.S. in Nos. 46~49:

1. Hsieh C. F. and K. N. Hsu. Effect of Continuous Use of Organic Manures on the Growth and Yield of Vegetable Soybean and Cabbage. 46:1-10.
2. Guu J. W. Development of Rust Resistant and Stringless Bean Lines. 46:11-18.
3. Lin T. C. and Y. F. Tsai. The Fertilization Technique for *Cymbidium sinense* Wild under Soil Culture. 46:19-26.
4. Hung S. C. and s. Song. The Purification and Evaluation of Local Peanut Cultivars in Taichung District. 46:27-35.
5. Lin Y. J. A Case Study on Farm Management for a Joint Farming group. 46:37-46.
6. Ho J. H. and J. M. Chen. Studies on Chrysanthemum Cut Flower Storage Quality. 46:47-57.
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8. Tseng S. H. and T. C. Kao. The Development of A New Job's-Tear Cultivar Taichung No. 1. 47:11-22.
9. Song S. and M. C. Hong. Studies on the Identification of Wet Rice Quality (1). 47:23-31.
10. Chiu C. C., D. T. Day, H. Y. Lee and Y. S. Chen. Study on the Management of Local Farmers' Association in Taichung Area. 47:33-47.
11. Chen L. H. The Test of Operating Performance of Graitank Rice Combine. 47:49-58.
12. Liu T. D. The Occurrence of *Pestalotiopsis eriobotryicola* in Loquat and Effects on Yield and Quality of Fruits. 47:59-66.
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14. Lin T. C. and S. T. Hong. Varietal Improvement and Regional Yield Trial of FMTT Tomato Lines. 48:11-16.
15. Lin T. F. The Relationship among Grain Size, Yield Components and Grain Chalkiness in Indica Rice. 48:17-24.
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17. Wang C. T. and T. M. Huang. One of the Series Studies of Sustainable Agriculture Techniques II. The Effect of Magnetic Force on the Crop Cultivation. 48:37-45.
18. Tseng S. H. The Improvement of Cultural Practices of Job's-tears (*Coix lachryma-jobi*L.). 48:47-54.

- 19.Lin H. S. and J. H. Lin. Alleviation of Supra-optimum Temperature Stress of High-chilling Pears in Taiwan's Lowland by Adoption of Apical dominance. 48: 55-68.
- 20.Research Note: Tung M. S. BA Serves as a Stimulant for Improving Rice Seedling Growth. 48:69-74.
- 21.Liu H. L., C. Y. Chien and L. C. Chen. A Baiting Technique for Detection of *Rhizoctonia solani* by Anglespinach Seed. 49:1-7.
- 22.Chang C. S. and S. C. Huang. Studies on Growth Efficiency of Chrysanthemum Cutting in Difference Storage conditions before Rooting. 49:9-18.
- 23.Lin C. Y. and S. H. Huang. Mechanism of Solarization for Controlling Soilborne Disease. 49:19-31.
- 24.Liu T. S. Control of Bulb Mites on Gladiolus by Soil Treatment. 49:33-40.
- 25.Guu J. W., C. Y. Tai and Y. F. Tsai. Effects of Organic Manure on the Growth and Yield of Common Bean at Fall Season. 49:41-48.
- 26.Lin T. F. The F₁ Fertility, Characteristics of Grain Shattering, Appearance of Milled Rice, and Selection Rate of Elite Lines from Improved Taiwanese Rice Cultivars Indica and Japonica Types Crossed, Especially on Comparison of F₂ Population and Backcross of F₂ Population. 49:49-56.
- 27.Research Note: Tung M. S. Dihydrozeatin, a Powerful Chemical for Promoting Shoot Growth of Rice (*Oryza sativa* L., cv. Tai-keng 3) Seedling. 49:57-61.

一、研究成果摘要

稻作及米質研究

濕谷狀態之糯稻與非糯稻之鑑定

洪梅珠

為解決以濕谷形式收購糯稻時，能快速檢定糯稻純度之問題，在台中區農業改良場進行試驗，探討區分糯稻與非糯稻之方法，期做為農會收購糯稻時，檢定純度之參考。其試驗結果為，濕谷狀態下，糯稻之未糯化粒與非糯稻無法由糙米外觀加以區分，雖可由胚乳之碘液反應分辨糯稻(呈褐色)與非糯稻(呈深紫黑色)，但需用小刀將穀粒橫切，操作不方便故較費工費時，不適合在收購現場使用。而用45°C恆溫乾燥到水分含量為14%時，糯稻之糙米呈不透明狀，非糯稻之糙米則較清晰透明，兩者極易辨別，但乾燥需較長之時間(17 hr以上)。濕谷若以微波爐乾燥只須5分鐘，水分含量即可降到14%，然其糯稻之糙米，大部分未糯化，仍呈透明狀，無法與非糯稻區分，而濕谷乾燥到水分含量18%時，即可順利脫殼。故建議以濕谷收購時，先用微波爐快速乾燥3分鐘，讓水分含量降到18%以下，再以小型脫殼機去殼，並以小型碾白機碾成白米，再進行碘液反應，則糯稻呈褐色，非糯稻呈深紫黑色，即可清楚區分糯稻與非糯稻。

預估米飯食味迴歸模式之建立

許愛娜、朱德民、白鑑、謝順景、吳永培

以117個不同直鏈澱粉含量稻品種為材料，利用各米質理化性狀與米飯食味總

評進行一般迴歸分析，以建立米飯食味總評之迴歸模式。預估米飯食味總評之較佳迴歸模式，在以白米粉末黏度特性為依據時，為 $Y = -0.000562(Sb) + 0.22037(RBd) - 0.68627(C/H) + 1.03301$ ，其中Sb為回升黏度、RBd為相對破裂率、C/H為總回升率。以萃取澱粉黏度特性為依據時，為 $Y = -0.017647(GTI) - 0.000188(P^*) + 0.16332(RBd^*) - 0.32714(C/P^*) + 1.06069$ ，其中GTI為糊化始溫、P*為尖峰黏度、RBd*為相對破裂率、C/P*為回升率。若僅以一般常用米質理化性狀進行探討時，為 $Y = 3.69783(Ba) - 0.010924(AC) - 0.016333(SA) + 0.20298(TS) - 0.21049(Lip) - 0.04273(Pro) + 0.13234$ ，其中Ba為米飯均衡性、AC為直鏈澱粉含量、SA為水溶性直鏈澱粉含量、TS為總糖含量、Lip為脂質含量、Pro為蛋白質含量。但綜合所有理化性狀分析結果，當一般常用米質理化性狀配合白米粉末黏度特性時，為 $Y = 3.04484(Ba) - 0.00037(Sb) + 0.23907(RBd) - 0.6118(C/H) + 0.69057$ ，其中Ba為米飯均衡性、Sb為回升黏度、RBd為相對破裂率、C/H為總回升率。然一般常用米質理化性狀配合萃取澱粉之黏度特性時，為 $Y = 2.57177(Ba) - 0.0156(SA) + 0.11692(TS) - 0.05073(Pro) - 0.01218(GTI) - 0.000244(Sb^*) + 0.54597$ ，其中Ba為米飯均衡性、SA為水溶性直鏈澱粉含量、TS為總糖含量、Pro為蛋白質含量、GTI為糊化始溫、Sb*為回升黏度。

氣溫與日射量對稻米品質之影響

李健擇

日射量與氣溫是影響作物生長的兩大重要因子，且無法容易以人為方式予以調節，使作物達到最適當的生長程度。此二因子不僅決定了作物依遺傳性所能達到的生產潛能，也常干擾了許多試驗的結果。因此若能確實瞭解作物在歷經日射與溫度環境下的生產潛能，將有助於判斷各生產管理措施的效率，並可發掘限制生長潛藏因子。本試驗研究即利用不同遮蔭程度及種植時期，以探討氣溫及日射量對稻米品質之影響。試驗於1994年在台中區農業改良場進行，使用台農67號、台中私10號及台中189號等三個水稻品種，以比較品種間對日射量與氣溫之反應。每年3月~9月各種植一次，4~6本植，處理分為遮蔭80%、50%及不遮蔭(對照組)，處理時間從齊穗後開始至收穫止。試驗結果顯示，心腹白含量分別與直鏈性澱粉及粗蛋白質含量有顯著負相關；稻穀容重量分別與心腹白及千粒重有顯著正相關；直鏈澱粉含量與穀粒充實期間之日夜溫差有顯著正相關，但與平均日射量及平均溫度有顯著負相關；心腹白含量分別與穀粒充實期間之平均日射量及平均溫度有顯著正相關，但與日夜溫差則有顯著負相關。

秈稈稻雜交早期世代之稔實性米之腹白及系統之選拔率研究

林再發

以台中私10號及台私育1774號為母本與台稈6, 8, 9, 10號等品種為父本，在1993年進行秈稈稻雜交共8組合，觀察雜

種F₁及回交之稔實特性及其後代F₂脫粒率及不同組合間的變異，F₃之腹白等級出現頻度及優良系統的選拔率。結果除台中私10號×台稈9號組合有較少腹白外，脫粒率各組合均較親本為高，但仍以台中私10號×台稈9號組合較佳，選拔率達到2.4%，經回交秈稻品種(系)一代後，選拔率提高到4.2%。

水稻白葉枯病抗病性之全互交分析

張素貞、李成章、曾德賜

水稻白葉枯病已知多發生於氣候溫暖、土壤肥沃之水田。水稻植株上若有傷口存在尤其容易受到感染，因而每當颶風來襲過後，其發病情況也愈為嚴重，目前全世界主要水稻栽培國家無不將本病列為稻作栽培上首要病害之一。就水稻白葉枯病之防治而言，抗病性品種的選育應用，較之栽培管理或藥劑施用效果顯著；為解決水稻栽培上此一病害之嚴重威脅，選育抗病品種以供推廣栽培應用，多年來在世界各主要稻米生產國家，一直是備受重視的課題。本試驗利用已知抗、感性互異的育種種源秈型稻與稈型稻品種或品系，分別進行全互交後，分析其F₁後裔抗感病性表現，來探討供試品種或材料對白葉枯病抗病性之遺傳行為，以五個秈型稻(包括感病品種TN1、TCS10，抗病品系TCSW1、TSWY7及TSWY1157)與四個稈型稻(感病品種TC189，中感品種TNG67、TN5，抗病品系TKY6287)為試驗材料各別進行全互交之雜交，所得F₁後裔在不同環境下(溫室與田間)栽種，於分蘗期以剪葉法接種白葉枯病菌XM42。由病斑長度資料經由Hayman氏之全互交遺傳分析，結果顯

示不論在溫室或田間試驗秈型稻與稈型稻兩組互交F₁組合之母性效應的現象並不存在，抗病品系TSWY7、TSWY1157及TKY6287之抗病基因均屬於顯性基因，且以抗病性對感病性為部份顯性，但在秈型稻的抗病性屬於微效基因，對稈型稻而言則係由兩對以上基因控制此抗病性。就基因作用之表現，基因之加性及顯性作用均參與此抗病性，但以加性作用大於顯性作用，且狹義遺傳率均在80%左右或以上。經全上述互交分析水稻白葉枯病抗病性之遺傳特質，推測若以本試驗材料進行此病抗病育種時宜採用譜系法，並於早期世代篩選抗病後裔。

台中地區水稻自生苗栽培技術之探討

楊嘉凌、張素貞、許志聖

近年來本省稻米生產所面臨主要問題是生產成本過高，如何降低成本已成為稻作試驗研究的課題之一。目前已知省工栽培方法有直播稻與再生稻兩種，最近幾年在嘉南地區與台中地區部分農民開始採用前期作聯合收穫機收割時落入田間稻粒，直接發芽生長出之實生苗，予以適當栽培進行第二期稻作的生產，此方法暫稱之為“水稻自生苗栽培”。此方法目前有兩種方式在被農民使用，一為不整地，另為整地的方式。兩種栽培方法均面臨的困難是雜草防除與稻苗不均的問題，本試驗初步在探討此兩種方法稻苗均勻與密度之差異。

由整地與不整地兩個處理田，分別設置6-9個調查點，於割稻後兩週後記錄每平方公尺內之實生苗數，並每隔一週調查各取樣點的水稻分蘗數，而於割稻後第三週調查株高，在收穫後記錄產量及比較米

質之差異。由試驗初步結果顯示苗數約在發芽後35天逐漸減少，而分蘗數則在45天開始減少，表示單位面積內稻株有互相競爭與自我調適的能力，至生殖生長期時每平方公尺分蘗數約為100~110支，為機械插秧的三分之一。整地之稻苗均勻與密度均較不整地為佳，但生產成本較高，至於米質亦以前者為佳。

糯稻新品系台稈育9480號之育成

許志聖、張素貞、宋勳

稈型糯稻(圓糯)為我國傳統米食點心類不可或缺的材料，可用以製做麻糬、肉粽、糕餅、湯圓等米食，對提升米食多樣化具有重要性。本省每年糯稻生產面積約為一萬一仟餘公頃，目前栽培面積較廣的品種為臺糯1號及臺中糯70號，這兩個品種雖均具高產等優良特性，但臺中糯70號之耐寒性較差，生殖長期間如遇低溫，常發生抽穗不整齊或成熟期延後等現象；臺稈糯1號有穗上易發芽及易脫粒等缺點，在收穫期遇雨常因穗上發芽使糯米品質低落，並影響產量；此外，臺稈糯1號對環境的適應性較窄，在北部地區二期作可能發生抽穗延遲現象，因此曾被限制地區栽培。針對上述現行糯稻品種的缺點，進行雜交選育工作，期以得到早熟、後期耐寒性較佳、不易穗上發芽及脫粒性中等之糯稻優良品種。

綜合本場79年第二期作至83年第二期作之觀察、初級、高級與區域產量比較試驗的結果，臺稈育9480號具高產特性，在高級產量比較試驗中第一期作稻穀產量比對照品種臺中糯70號高34.1%，二期作則略低0.8%。根據全省七處區域試驗為期兩

年的結果，臺稈育9480號品系在第一期作比臺中糯70號增產9.0%，第二期作增產15.6%。經產量穩定性測驗，其一般穩定性及特殊穩定性均優於對照品種，適於在全省各地栽培。除此之外，本品系尚具早熟性，且耐寒性較佳，米質優良等特性。擬於11月上旬由農林廳聘請專家舉行命名初審，中旬再於本場舉行複審。

雜糧研究

落花生地方種之純化與產量評估

張隆仁、顏榮輝、黃勝忠

本試驗採用台中地區栽培的落花生地方品種立枝仔、立枝仔返及油豆返等，經80年春作及秋作於大村本場試驗田及彰化縣農家進行純化選拔。純化後之優良植株後裔，於81年春作、秋作及82年春作、秋作進行株行試驗。83年春作、秋作進行第一年品系試驗，84年春作及秋作進行第二年品系試驗。本(84)年春作10個優良品系於大村本場及彰化縣芳苑兩地之品系試驗結果其平均產量介於1,575公斤/公頃之間，對照品種立枝仔為1,630公斤/公頃，其中8個品系增產2~61%，二個品系減產2~3%。本試驗待84年秋作試驗資料完成後進行二年四期作之評估，再選拔最優的兩品系進行區域試驗。

薏苡台中1號之育成

曾勝雄、高德錚

為提高台灣薏苡單位面積產量，於民國71年自日本引進6個品系進行觀察試驗，發現尾花澤在來具有高產潛能，但株高較高，分蘗數較少，因此用混合選種法進

行品系選拔，選出74-T5優良品系參加新品系高級產量比較試驗，由於農藝性狀及產量表現優異，乃以台中選育5號名稱參加新品系區域試驗及地方試作，並進行抗葉枯病及品質檢定，因具有強稈、耐倒伏、耐旱、高產及適應性廣等特性，於84年1月獲准登記命名為台中1號及推廣。

脂質過氧化作用與過氧化物清除酶對自然老化毛豆種子的生理作用

宋濟民、邱建中

許多作物種子之老化常會降低種子的發芽能力，此一現象部份導因於老化所引起的脂質過氧化作用，破壞種子組織之各種胞膜，本研究探討二種不同品種毛豆種子，在不同生產季節自然老化現象對種子發芽率及與過氧化作用等有關生理作用之影響，毛豆種子密封儲存於5°C及25°C，自然老化的種子都會降低種子的發芽率及促進種子內部的過氧化作用，但是高溫儲存較低溫儲存明顯的易於產生老化作用，種子老化亦發現有抑制peroxidase, catalase, ascorbate peroxidase, superoxide dismutase和lipoygenase等之活性，春作栽培收穫的毛豆種子，較秋作收穫的種子易於產生老化現象，此一情況，在二種不同供試的毛豆品種種子之表現均相當一致。

不同殺草劑對落花生除草效應之比較

沈勳、陳彩蓮、邱萍菁

為探討殺草劑西殺草12.5% E.C在落花生田禾本科雜草殺草效果，本研究利用三種殺草劑配合人工除草與不除草來實施。處理方法為(1) 12.5% Sethoxydim E.C 2.0公升/公頃(2) 12.5% Sethoxydim E.C 3.0公升/

公頃(3)施得圖34% E.C 5.0公升/公頃(4)伏寄普17.5% E.C 1.0公升/公頃(5)人工及機械除草(6)不除草(對照區)。試驗結果顯示12.5% Sethoxydim E.C 2.0公升/公頃及3.0公升/公頃，無論在落花生田秋作或春作對禾本科雜草之殺草效果皆良好，但對莎草科雜草及闊葉性雜草並無效果。而施得圖34% E.C 1.0公升/公頃及伏寄普17.5% E.C 1.0公升/公頃，效果亦不錯。在落花生產量上，在秋作以人工除草區最高，其次施得圖34% E.C 5.0公升/公頃，第三為12.5% Sethoxydim E.C 3.0公升/公頃；在春作仍以人工除草區最高，其次施得圖34% E.C 5.0公升/公頃，第三為Sethoxydim E.C 2.0公升/公頃。

蔬菜研究

氣象因子對台中地區小白菜生育之影響

郭孚耀、戴振洋

本研究以小白菜(*Brassica chinensis*)為材料，採用鳳山白菜及地方品系三鳳兩品種比較，於5~10月於台中場內在相同環境下，每月播種種植一次，探討不同時期氣候條件對小白菜生育之影響。在經連續兩年調查之後，發現其生育及產量與雨量及溫度具顯著之相關，而9~10月氣溫較低時期其產量及生育最佳，而5~7月高溫期生育最差，經迴歸分析發現小白菜生育及產量與雨量及氣溫等氣象因子有密切之關係。

噴施鹽水對自交不親和性甘藍結實力之影響

郭俊毅

為探討利用鹽水處理謀求打破甘藍自交不親和性之障礙，以20個甘藍自交系試驗之結果發現，甘藍開花當日之花朵，於授粉前或後10~15分鐘噴施2%及4%濃度之食鹽水，均可有效打破自交不親和性，而獲得自交種子。其平均結實力則因處理之不同而有差異，約為蕾期自交之29.5~62.0%。由於4%之處理易造成鹽害，致其結實力較2%之處理者為低；而授粉前處理者，其結實力則有較授粉後處理者略高之趨勢。

不同自交系對食鹽水之反應不盡相同，反應較佳者，其結實力約為蕾期自交之16.8~82.5%；而反應較差者，其結實力僅為蕾期自交之5.7~18.1%。

茭白筍早生品系比較試驗

洪瀛堂、林天枝

針對本省茭白筍最大產區—(埔里、魚池地區)目前栽培品種提出檢討，進行比較，期能篩選出早生、豐產、抗病、品質好的茭白品種，以改善目前品種紊亂局面，增加農民收益為目的。本試驗蒐集白殼早生、白河早生、敢當早生等三品系，以本地栽培青殼種為對照，茭白母莖於12月下旬播種，2月上旬移植，春作試驗結果：敢當早生種不但產期早，筍長、筍徑、單筍重表現均比對照青殼早生種為佳，每十公畝平均產量1,053公斤，比對照種增產24%，其餘兩品種產量均比對照區減產

21~30%。秋作試驗成果亦有略似趨勢，敢當早生種每十公畝產量934公斤，比對照品種增產8.2%，其他兩品種亦呈減產現象，以敢當早生種較具發展潛力，擬辦理區域試驗及地方試作評估後準備提出登記與命名。

肥料對不同品種甘藍穴盤苗生育之影響

戴振洋、蔡宜峰、郭孚耀

本試驗目的在於探討不同甘藍品種(初秋、夏峰、春秋1號)，以及應用不同肥料處理(F1：對照組不施肥料；F2：N-P₂O₅-K₂O，20-20-20；F3：N-P₂O₅-K₂O，31-10-10)對夏作甘藍穴盤苗品質之影響。試驗結果顯示，以不同品種而言，綜合甘藍苗之生育性狀、壯苗指數及幼苗絕對生長速率G值等指標，均顯示春秋1號及夏峰較適於本省平地夏作育苗栽培。以不同肥料處理而言，F3處理之甘藍苗在株高、葉數、葉面積、地上部鮮重、葉長及葉寬等性狀均有顯著效果，惟F2處理之壯苗指數及幼苗絕對生長速率G值均能維持穩定增加趨勢，顯示其幼苗生長勢較均勻，因此應以施用F2處理之甘藍苗的品質較優。綜合本試驗結果亦顯示，利用壯苗指數及幼苗絕對生長速率G值等複合性指數，適用於甘藍穴盤苗品質評估指標。

鋅、鎳污染土對栽培不結球白菜 (*Brassica campestris* L. *Chinensis* group) 之影響

古錦文、林景和

本研究目的在於探討遭受鋅及鎳污染之現地土壤，混以未污染之土壤以稀釋其

污染程度後，對不結球白菜生長之改進效果。結果顯示，凡於遭受鋅及鎳污染分別達我國環保署暫訂之毒害標準高級土壤中播種不結球白菜，其發芽率僅達62%左右；而不結球白菜播種後第十八天，其子葉及葉片之長、寬和株高與對照組者有明顯差異，且植株在此期間已有陸續死亡現象。至收穫期之植株，其葉長、寬、株高和產量，僅分別為對照組之40、60、36和8%；但若以不同量之未污染土壤混合此污染土壤，稀釋其污染度後再予種植，發現其白菜之發芽率、子葉及葉片之長、寬、株高和產量之缺失有明顯改善，甚至優於對照組。然而由於不同處理，白菜葉片中之鋅與鎳的含量，則未隨受污染土壤添加量之增加而明顯減少。

花卉研究

遮陰栽培對多花型菊花切花品質之影響

張致盛

為改善台灣地區夏天菊花切花生產品質，以夏天主要多花型栽培品種小紅娘、金黃及阿萊粉等三品種，於40%、50%及60%三種遮光網下栽培，並以露地無遮陰栽培作對照比較。由定植摘心後至開花期之間每隔15天調查不同處理植株之株高、葉數及節數之變化，採收期調查切花之各種園藝性狀、品質及採後瓶插壽命。

由結果發現，遮陰栽培下植株生長速率較快，生育期調查株高均較露地栽培為高。採收期調查遮陰栽培之切花長度增加，節數及葉數較多，葉面積增加，葉片中葉綠素含量提高，每一單枝切花鮮重及乾

重較高，但乾重百分比降低，莖中段直徑變細，花序上第二至第五小花梗長度增加，花朵直徑較小，但舌狀花數目並無顯著差異。採後瓶插壽命觀察顯示遮陰栽培葉片黃化較緩，可以延長瓶插壽命。由本試驗之結果顯示利用遮陰栽培可改善多花型菊花花序分佈形態，提高切花品質並延長瓶插壽命，但為避免切花過於柔細，影響商品價值，遮陰程度以50%左右較為適當。

不同遮陰處理對亞洲型百合植株性狀及瓶插壽命之影響

易美秀、黃勝忠

本試驗係亞洲型百合倫敦品種於簡易遮雨棚中，分別採70%、60%、50%遮光網覆蓋及不覆蓋遮光網(對照)四種處理，測試對本品種植株性狀及瓶插壽命之影響。全部遮光網於露蕾期拆除。

由實驗中可發現四種處理對切花採收日數及花朵數並無影響，然而隨遮陰率增加株高、鮮重、葉數、花苞長、花梗長均隨之增加，莖徑以60%遮陰最大。因此遮光網於露蕾期拆除的方式，對於倫敦品種切花品質之提高有明顯的改善。

另一方面遮陰對本品種瓶插壽命之影響為增進切花之蒸散率及吸水率，對於切花鮮重變化率及水份平衡(吸水率/蒸散率)差異不大，上述四種處理皆於瓶插6天時花瓣掉落，因此瓶插壽命均為6日並無差異。瓶插1~4日時，每日可觀賞花朵數以遮陰60%、70%較多，瓶插5、6日時則以CK、50%較多。

玫瑰設施栽培基部擦枝對不同品種間切花產量與品質影響

林天枝、莊杉行

探討設施內玫瑰以岩綿為介質，實施養液滴灌，配合基部擦枝方式之栽培法對玫瑰品種間切花產量與品質之影響，特舉辦本試驗。玫瑰種苗於83年6月6日定植，定植後35天從基部第一節開始擦枝管理，擦下枝條約3~4條做為營養系統，往後從基部培養基部芽成切花枝並從基部切花，調查其實用性。供試品種為Eskimo、Samatha、Super Star和Toy Clown等四品種，初步結果顯示，其生長勢與切花產量及瓶插壽命以Toy Clown表現最佳，Eskimo次佳，Samatha再次之，以Super Star較差，目前切花批發行情以Toy Clown平均每支5.03~10.18元，Eskimo平均6.19~4.29元，Samatha平均4.40~3.92元，Super Star平均5.12~3.80元間，由此觀之，為追求栽培最高利潤，達到產量與品質好及售價高，業者對品種選擇宜特別慎重。

苗期低溫處理對百合生育及切花品質之影響

黃勝忠、易美秀

為克服土耕栽培百合之病蟲害及連作障礙，利用箱植於苗期低溫處理與不同處理時間之調控，藉由早期的低溫處理，促進上層根的生成，提高生長勢與切花品質，本試驗材料為香水百合(Casablanca)及葵百合(Star Gazer)，於箱植後，以不同溫度(8、10、12°C)分別做2、3、4週之低溫暗處理後，利用台中場與埔里分場不同溫

度之栽培環境，探討低溫育苗對百合生育之影響。

結果發現葵百合與香水百合兩品種於苗期經低溫處理後，株高均顯著的增高，而且表現為 $12^{\circ}\text{C} > 10^{\circ}\text{C} > 8^{\circ}\text{C}$ ，但節數無顯著性差異，所有低溫處理的綠葉數皆有增加，所有經低溫處理的葉面積皆顯著的高於對照組。Star Gazer葉面積以 10°C 最大，Casablanca以 12°C 二週葉面積最大，二品種之莖徑有處理者大於對照組，綜合生育調查結果，建議以 12°C 或 10°C 處理二週，對提高東方型百合之切花品質較佳。

玫瑰"沙蔓莎"偃枝栽培之研究

陳彥睿

玫瑰偃枝栽培法係由日本引進之玫瑰切花生產新技術，為了解本項新技術之生產情形，在埔里分場進行玫瑰偃枝栽培試驗，以"沙蔓莎"為試驗品種，探討營養枝及切花枝之比例對切花品質及收量之影響。本試驗分九種處理即不同營養枝與切花枝比例(1)2:2(2)2:3(3)3:2(4)3:3(5)3:4(6)4:3(7)4:4(8)4:5(9)4:6等九種，定植日為1994年6月6日，進行調查至1995年9月6日。試驗結果發現，(一)在產量方面以營養枝:切花枝比例2:3之收量最高，2:2次之，留2枝營養枝之產量高於留3枝營養枝，再高於留4枝營養枝。(二)切花採收日則以留2枝營養枝最快採收到切花。(三)在品質方面(1)枝條長度各處理間差異不顯著，平均長度達86公分以上，一級品(66公分以上)佔91%以上。(2)莖徑以2:3之比例稍寬外其餘差異不顯著。(3)第五展開葉長以4:3之比例稍差外其餘差異不顯著。(4)花瓣數以4:4及4:5較少外其餘差

異不顯著。(5)花蕾長度各處理間差異不顯著。

果樹研究

東方梨在低海拔地區一年二收可行性研究

廖萬正

在低海拔地區是以高接方式生產高品質東方梨，但因每年需購買接穗及重複嫁接工作，耗費大量之人力及物力。為降低生產成本，本場已完成試驗在低海拔地區東方梨之豐水、新興及幸水等三品種，以2%氰胺(cyanamide)在2月間噴施植株，能有效促進萌芽、開花，而能在7~8月間收穫果實。

為進一步提高生產效率，擬於9月間以0.5%氰胺噴施植株，以觀察東方梨在低海拔地區一年雙收之可行性。本年度分別於9月2日、9月8日及9月15日以0.5%氰胺處理植株，其自處理至萌芽所需日數約為8~9日，萌芽率豐水品種分別為76.8%、61.5%、56.7%，新興品種為72.1%、64.9%、55.2%，幸水品種為56.0%、61.8%、55.3%，有漸降低之趨勢，開花率分別豐水品種為27.2%、24.0%、18.4%，新興品種為26.0%、24.8%、18.3%，幸水品種為13.2%、18.1%、10.8%，經人工授粉及疏果後，進行田間管理，於85年1月15日收穫豐水梨及幸水梨果實，果重分別為141.5公克及126.4公克，新興梨則於2月16日收穫，果重為207.5公克。

省產高接梨接穗開花特性之研究

林嘉興、張林仁、賴餘玉

高接梨是目前本省中低海拔地區重要產業之一，高接品種以新興、幸水、豐水、新世紀梨等為主。除新興梨及新世紀梨可在梨山地區生產接穗外，幸水及豐水兩品種在本省因受氣候環境及果園管理之影響，高接之成活率與著果率參差不齊，而自日本進口幸水及豐水接穗之著果率高，果粒大小均勻，果農因而偏好進口接穗，故每年需自日本進口幸水及豐水接穗高達3萬公斤以上，不但增加高接生產成本，且接穗來源常因氣候因素影響供穗不穩定。因此，有必要探討省產接穗之開花特性及尋求改善方法，以達到提高省產接穗供穗比例或高接品種多樣化之目標。

本試驗於民國82年12月自梨山優良接穗繁殖園(黃慶源及許典信梨園)之新興、新世紀、豐水、新雪、新高等5品種剪取接穗，於83年1月24日嫁接在本場梨樹上，調查目前省產接穗品種之開花特性。另外在卓蘭、東勢及本場採取橫山梨及烏梨之花芽與梨山各品種比較花粉發芽率，供做授粉品種的參考。由試驗結果顯示，嫁接穗之萌芽率以豐水及新世紀梨兩品種高達100%，其他品種依次為新興86.7%、新高61.5%、新雪11.6%最低；嫁接後至始花期日數以新興梨之29天最早，花期較集中而整齊，其他品種約晚3天；開花率與萌芽率有相同趨勢。梨栽培品種多數具有自花受粉不親和特性，必須藉異品種之授粉以提高著果率，本試驗在開花期調查省產接穗品種在不同溫度之花粉發芽率之外，在不同產地採取不同授粉品種之腋花芽，

以高接、瓶插及冷藏等不同處理，調查在培養基中之花粉發芽率。花粉撒在培養基後置於 12°C 至 30°C 之間6種不同溫度中培養，其花粉發芽率以豐水及新世紀梨兩品種最高；溫度在 20°C 以上各處理均超過60%以上；新雪梨之發芽率隨溫度上升而下降；各品種間對溫度反應有很大差異。不同授粉品種之花粉發芽率比較，培養1小時之發芽率以烏梨及新興達38%，橫山及幸水只有25.4及22.0%最低；培養4小時後，以幸水之60.6%及烏梨60.0%最高，各品種間之發芽率有不同的變化曲線；貯藏枝之發芽率則隨冷藏時間急速下降。

不同海拔枇杷之花芽形成觀察及比較

張林仁、林嘉興

本省枇杷產區分佈於海拔100公尺至900公尺之坡地，各產地因地形及氣候各有其特性，植株之枝梢等營養生長形態不同，且花芽形成期亦各異，所生產之枇杷果實及品質略有差異。本試驗在探討不同海拔高度及修剪方式對枇杷之結果枝生育、形質、花芽分化、開花及著果等之影響，俾便改進修剪及培養新梢生育管理之方法，以期提高產量及品質，或達省工栽培之目標。

在台中縣新社鄉之大南、頭櫃、二櫃及南投縣國姓鄉之乾溝、南港等不同海拔之枇杷園，選設調查園。於枇杷採收後一至二個月內(五至六月)，在果痕枝長出新梢進行疏枝完畢後，標定植株及枝條，做為固定調查株。定期調查各種結果母枝在全生長期之枝長、葉片數、葉片大小對花芽分化、抽穗、開花、著果等之影響。

1994年秋季多次颱風使中部各枇杷產

區之植株受到嚴重損害，尤其高冷地之頭櫃、二櫃地區，枇杷花芽受損後須摘除以重新培養枝條及花芽，以致花期均有延後情形。1994年底至1995年初春之低溫寒害亦使已在成長中之果實發育受害，果實產量呈現大幅減產且果實品質普遍低下。1995年夏季至秋末為止，各地區之花芽形成情形，以去年受災較嚴重之頭櫃為最早，8~9月即可見到花芽，其餘地區依其修剪方式、生長勢及營養調整之不同而互異。

利用頂端優勢舒解台灣平地溫帶梨之高溫逆境

林信山、林嘉興

在台灣平地栽培溫帶梨，夏季高溫逆境導致異常落葉與萌芽，及冬季低溫不足導致翌春萌芽不正常等，為不能經濟栽培之原因。本試驗嘗試藉頂端優勢舒解高溫逆境，進而發展出新而有效的栽培模式。乃於一年生新興梨、豐水梨或幸水梨 (*Pyrus serotina* Rehd. cv. Shinko, Kosui, Hosui) 植株樹幹1.8 m處高接烏梨，及將幸水梨穗側接在烏梨樹幹四週後，連續三年調查強勢生長之頂端樹冠對供試品種生長及舒解高溫逆境之效果。新興梨頂端高接烏梨者與對照比較，高接者樹幹之截面積增加、第二波及第三波枝梢較少、新梢停止生長之日期較晚、枝條之成熟亦較慢、秋季之落葉率因年份而不同、異常萌芽率減少、秋季萌芽未受影響及花芽率減少等；豐水梨頂端高接烏梨者與對照比較，高接者樹幹之截面積減少、各波枝梢數未受影響、新梢停止生長之日期較晚、枝條之成熟較早、秋季之落葉率較少、異常萌芽率亦減少、秋季萌芽及花芽率未受影響；幸水梨頂

端高接烏梨者與對照比較，高接者樹幹截面積之增加量未受影響、第一波及第三波枝梢較多、新梢停止生長之日期較早、枝條之成熟無明顯影響、秋季之落葉率因年份而表現不一、異常萌芽率增加、秋季萌芽率減少，及花芽率未受影響等；烏梨植株側接幸水梨後，烏梨本身之樹幹截面積增加量，顯著的大於幸水梨高接或無高接者，與對照幸水梨株比較，側接後之幸水梨枝梢第二波及第三波之枝梢數較少，新梢停止生長之日期較晚但整齊，枝條成熟之影響不明確，秋季之落葉率因年份影響不同，異常萌芽率減少，秋季萌芽率增加，花芽率未受影響。這些結果顯示側接幸水梨於烏梨樹幹，利用烏梨樹冠之頂端優勢舒解幸水梨之高溫逆境及維持正常生長之可行性。

立柱栽培愛玉母蔓側枝修剪與摘心研究

莊杉行、林天枝

愛玉子是多年生的藤本植物，其野生分佈在海拔800~1800公尺多雨潤濕的闊葉樹林內，藉氣根槓生在樹幹或岩石上。多年來由於中、低海拔山區闊葉樹林陸續砍伐及進行林相變更作業，致使原槓附於林木生長之愛玉子藤株遭破壞砍除，使得天然生愛玉果日趨減少，故有人工栽培之需要，立柱栽培即為其中之一種。因為愛玉子側枝分生力強，蔓葉生長量大，枝條容易交錯重疊，使日照不足，枝蔓變細小軟弱，若放任栽培，勢將影響隱花果苞形成及瘦果產量，為謀改善之道，擬從側枝整枝及子蔓摘心著手，探討其效應。試驗對象選三年生植株，母蔓側枝上下間隔距

離分30公分與60公分留一輪，每輪留側枝3支及5支，組成4處理，重複4次。初步結果顯示，整枝比不整枝其果苞形成期及開花期均提早5~10天，隱花果著生量、鮮果重或乾果重亦比對照不整枝區有增加趨勢。有整枝處理間比較以間隔60公分的處理表現較佳，子蔓摘心處理則留8葉或12葉效果差異不顯著。因本試驗為第一年結果，產量有偏低與不穩定現象，尚待繼續試驗與觀察。

作物蟲害研究

水稻病蟲害綜合防治試驗

林金樹

本試驗目的在探討如何把握水稻田病蟲害適當防治時機，採用廣效性殺蟲劑混合殺菌劑，期能一次施藥能防治同時發生之病蟲害問題，以減少防治次數並降低生產成本，並藉由試驗結果建立可行防治模式，期提供農民推廣應用之參考。試驗結果顯示第一期作以藥劑防治一次或二次即可達經濟有效之防治效果。防治一次者，其防治適期為抽穗前3~5天以75%三賽唑 W.P. 0.4kg+25%賓克隆 W.P. 0.6kg+75%歐殺松 S.P. 0.8kg/ha，主要防治穗稻熱病、紋枯病、縱捲葉蟲及浮塵子類，其結果可增收益28,122元/公頃。防治二次者，在無效分蘗期以25%賓克隆 W.P. 0.5kg/ha 防治紋枯病，再於抽穗前3~5天以53%維利熱必斯 1.2kg+75%歐殺松 S.P. 0.8kg/ha 混合防治穗稻熱病、紋枯病、縱捲葉蟲及浮塵子類，可增收益為26,172元/公頃。第二期作於無效分蘗期用6.5%鐵甲甲磺酸銨 S 1.0L/ha 防治紋枯病，再於抽穗前3~5天用10%鏈

四環黴素 W.P. 1kg+25%賓克隆 W.P. 0.6kg+75%歐殺松 S.P. 0.8kg/ha 混合防治白葉枯病、紋枯病、縱捲葉蟲及飛蝨類，可增加收益6,559元/公頃。

土壤施藥法對唐菖蒲根蟻之防治效果

劉達修

根蟻生活於土中，主要危害作物之根莖部位，故施藥防治頗為困難。本試驗之目的在改進田間防治之一些缺點，探討土壤施藥法對根蟻之防治效果。由試驗結果得知，防治唐菖蒲根蟻應在種植前將種球行浸藥處理，若不行浸種處理，可於種球種植時將藥液直接灌施在種球及植溝上，亦可得佳效。於唐菖蒲生育期，以液劑殺蟲劑行土壤灌藥時，其防治適期在種球種植後7~21天，若延期施藥效果將隨之降低。就防治唐菖蒲根蟻而言，最有效之藥劑防治措施為種球先行浸種，再於種植後7~28天內行土壤灌藥二次，將藥劑灌施於根際土壤，每公頃用水量不得少於4500公升。液劑施藥時，應選推薦之殺蟲劑(如普硫松)加殺菌劑撲克拉，必要時亦可添加展水(AquaGro)以增加效果。施用粒劑(10% Terbufos G.)時，於種植時將粒劑撒施於植溝內，每公頃用藥量宜提高至60公斤始有佳效。若從經濟觀點做考量，防治唐菖蒲根蟻，土壤施用粒劑比土壤灌施液劑較為經濟和省工。

台灣中部地區瓜蠅發生消長及對誘引劑之反應觀察

方敏男

1994年3月至1995年6月，以含毒甲基丁香油、克蠅溶液等誘引物，於彰化縣、

台中縣及南投縣等地區調查瓜蠅發生消長結果，彰化縣於1994年4月出現第一次族群高峰，並於8~11月出現第二次族群高峰。南投縣埔里及名間地區分別於1994年9月及11月出現一次族群高峰。台中縣新社地區於1994年12月及翌年3月各出現一次族群高峰。以含毒甲基丁香油、克蠅溶液及不同比例之甲基丁香油與克蠅混合液等5種不同誘引劑，於大村、員林及溪州地區，每15天調查誘殺蟲數，每30天更新誘引劑一次結果，以1比1及5比1之甲基丁香油與克蠅混合液之誘殺蟲數較多。以黃、白、藍、綠、紅及黑色等6種不同顏色粘蟲紙，在大村地區，每14天調查誘殺蟲數並更新粘蟲紙一次結果，對於瓜蠅雌蟲，以白色粘蟲紙誘殺3.24隻/片較多；對於雄蟲，以藍、黃及白色分別為5.24、4.68及4.01隻/片較多。以黃色粘蟲紙加甲基丁香油或克蠅，於台中場及大村葡萄園，每14天調查誘殺蟲數並更新誘引物一次結果，均以黃色粘蟲紙加克蠅之誘殺蟲數分別為7.55及12.04隻/片較多。綜合上述結果，瓜蠅在台灣中部地區整年皆可發現，每年3~4月出現第一次族群高峰，第二次高峰於8~11月出現，依地區而異。目前推廣克蠅誘殺瓜蠅雄蟲及農民使用黃色粘蟲紙誘殺瓜蠅之防治技術，有待進一步探討改進。

非洲菊害蟲種類及為害調查

黃金助

非洲菊(Gerbera)，為中部地區新興花卉之一。田間調查其生育期間發生之主要害蟲計有九種。(一)非洲菊斑潛蠅：在溫室設施內一年中普遍均有發現被害葉片，

佈滿幼蟲食痕，食痕蜿蜒曲折，初變灰白色繼之轉為黃褐色，嚴重影響外觀及生長，(二)溫室粉蝨：以10月份發生密度較高，若蟲、成蟲聚集於葉下危害，(三)二點葉蟎：主要發生時期以3月及10月~11月間成蟎、若蟎棲息於非洲菊背面葉部，使葉片呈現灰白色斑點，葉片因被吸食變黃褐色後乾枯，(四)茶細蟎：主要發生時期為10月~11月間，蟲體在尚未展開的花芽與葉芽危害，(五)南黃薊馬以10月~11月發生密度較高，以幼蟲及成蟲為害葉部影響新芽、幼葉的生長，(六)台灣花薊馬亦以3月及10月間發生密度較高，主要為害花部，並在花瓣上留下白色或褐色的斑點，(七)棉蚜：主要發生時期為11月~12月，常聚集危害嫩芽、幼葉、花苞，(八)甜菜夜蛾主要在九月份發生，其幼蟲為害葉片、花苞，(九)粉介殼蟲：10月份發生密度較高，其成蟲及若蟲在葉背群集為害，因分泌之蜜露會誘發煤病，受害葉被上黑色物影響光合作用致生長不良。

稻作及小麥螟蟲發生調查與防治

陳啓吉

水稻插秧期之早晚對螟蟲之發生有明顯之影響，以感蟲品種台中私10號，在本場農場進行不同插秧期對螟蟲發生之影響試驗結果顯示，不論第一期作或第二期作，早植稻受螟蟲危害後引起之側黃葉率、枯心率、白穗率都較晚植稻嚴重。生育初期引起側黃葉全數皆由二化螟為害所致；第一期作(大村)分蘗盛期之枯心率也以二化螟為主(96%)僅少數為大螟(4%)。抽穗後之白穗二化螟及大螟所佔約各半。利用彰化縣在大村鄉本場設置之蟲害預測燈調

查螟蛾週年發生消長結果，二化螟成蟲在2月中旬~3月中旬、5月上旬、7月下旬、10月下旬等出現4個高峰期；大螟成蟲在6月下旬及11月下旬分別兩個高峰期。二期裡作秀水小麥螟蟲發生種類調查，側黃葉及枯心以大螟(83.4%)佔多數二化螟蟲(16.6%)僅少數發生，白穗則全數因大螟為害所引起。至於小麥螟蟲之發生仍以早植田發生較晚植田嚴重。經由室內篩選對大螟殺蟲效果較佳之35%裕必松乳劑在田間不同時期分別防治1~3次，其效果與不施藥區差異不顯著，顯然此殺蟲藥劑防治小麥田之大螟發生效果並不理想，仍建議延後播種可減少白穗之發生。

溫帶果樹害蟲調查及防治曆之建立

林正賢、劉達修、王文哲

1992~1995年連續三年，在德基水庫集水區內之梨山松茂地區及武陵農場選定梨及水蜜桃果園各一處，每處各設試驗區及果農自行防治區，依預定之病蟲害防治曆與該農民習慣之用藥法定期調查施藥。梨樹重要蟲害，葉蟎類(6~7月)、銹蟎(7~8月)、蚜蟲類(4~7月)、夜蛾類、象鼻蟲(5~8月)、梨瘤蚜(4~8月)、東方果實蠅(8~10月)、星天牛(6~8月)、桑白介殼蟲(10~12月)。水蜜桃重要蟲害則以二點葉蟎(6~7月)、東方果實蠅(8~9月)、介殼蟲類(10~12月)、桃折心蟲(4~6月)等為主。德基集水區內果樹防治曆，梨樹在2月上~中旬，以95%夏油E.C.或40%滅大松E.C.防治介殼蟲、梨瘤蚜。4月上旬~5月中旬，以48.34%丁基加保扶E.C.或60%大利農E.C.防治葉部害蟲及梨瘤蚜。6月中旬~8月中旬以2.8%賽洛寧E.C.或48.34%丁基加

保扶E.C.防治葉部害蟲。10月上旬以40%滅大松E.C.防治介殼蟲。桃樹自4月上旬~7月中旬以2.8%賽洛寧E.C.防治葉部害蟲、害蟎、7月中旬以33%福木松E.C.防治介殼蟲。8月中旬以防治葉蟎為主。依此防治曆施藥，可減少藥劑的使用量，降低農藥對水庫的污染，有效抑制蟲害發生。

綠椿象族群消長及生態調查

張德前

綠椿象 *Nezara viridula* (Linne) 屬半翅目(Hemipter)椿象科(Coreidae)。據田間調查本蟲除危害水稻外，在豇豆、菜豆等豆類蔬菜的結莢期亦常見高密度發生。此外大豆、落花生、玉米、茄子、瓜類、蘿蔔、白菜等作物亦見其活動蹤跡。在室內以豇豆、菜豆之嫩莢飼養結果，其完成一世代約36.5天，活存率平均84.7%，產卵數平均215.3粒/數。以大豆嫩莢，水稻之孕穗乳期之稻穗或玉米果穗等飼養其完成一世代所需日數分別為42.6、37.8及43.4天，活存率分別為51.8、45.3及22.6%，產卵數平均分別為102、75、102粒/隻，若以豆類、水稻、玉米、茄子、瓜類等作物葉片飼養時，活存率更低，甚至無法完成一齡期即死亡。田間調查水稻、豇豆、菜豆、毛豆、落花生、玉米、茄子等作物之結果，其族群高峰期因作物種類而有差異，在菜豆上於4月下旬~5月中旬及10月下旬~11月上旬分別出現高峰期；豇豆上於7月中、下旬及9月上旬(結莢期)出現；水稻上於6月上、中旬及9月下旬~10月上旬(孕穗至乳期)出現；毛豆上於6月上、中旬(結莢期)出現，其他作物如落花生、玉米、茄子則族群密度甚低。

非農藥物質對玫瑰二點葉蟎之影響

王文哲、劉達修

本試驗分室內及田間試驗兩部份，室內測試係選用優利二號有機肥、糖醋液、木醋液、工研醋及達姆一號有機肥等五種非農藥物質，並以水及殺蟎劑50%得氣蟎可濕性粉劑為對照，測試該等物質對玫瑰二點葉蟎之毒性。測試結果，處理後24及72小時對玫瑰二點葉蟎雌成蟎之致死率以優利二號有機肥250倍效果最佳，致死率分別達73.9%及75.6%，比殺蟎劑50%得氣蟎可濕性粉劑1600倍之致死率3.9%及52.8%為佳；其他供試物質之致死率偏低，均在43.6%以下。田間防治試驗則以優利二號有機肥等四種非農藥物質供試，連續施用二次，試驗結果供試之四種物質對玫瑰二點葉蟎之後代族群均有抑制效果。僅施用一次時，對二點葉蟎成若蟎之防治率以優利二號有機肥200倍及工研醋200倍兩處理區較高，達86.7%及88.6%；對幼蟎之防治效果則四種供試物質皆有佳效，防治率均達82.3%以上；經連續施用二次之防治效果，不論對成若蟎、幼蟎及卵均以優利二號有機肥及工研醋兩處理區較佳。殘效性則以優利二號有機肥施用區較長，可維持到21天。次為工研醋施用區之殘效性亦達14~21天，而木醋液及糖醋液之殘效較短，僅達7天左右。供試之四種非農藥物質對玫瑰並未發現有藥害和其他不良現象，可推薦供為玫瑰二點葉蟎防治時與殺蟎劑輪用。至於該等物質對二點葉蟎之作用機制為何，則有待進一步探討。

應用昆蟲性費洛蒙對雜糧害蟲之監測與預測

柯忠德、劉達修

斜紋夜盜、甜菜夜蛾及蕪菁夜蛾為雜糧重要夜蛾類害蟲，該等害蟲之危害常導致雜糧作物之損失。為減少其危害，本場應用昆蟲性費洛蒙長期誘殺雄蛾，藉以監測該等害蟲之發生消長，提供防治時期之依據。在大村與大城兩地連續四年之監測結果，三種夜蛾類以斜紋夜盜之發生量最高，次為甜菜夜蛾，而蕪菁夜蛾之發生量則甚低。斜紋夜盜之族群消長年中略有變化，5月及11月有二次發生高峰期，混作區之大村該蟲之族群則比雜作區之大城為高。甜菜夜蛾之族群年中消長與斜紋夜盜類似，以5月及11月有二次高峰期，而以11月之發生量較高。蕪菁夜蛾大村之族群高於大城，僅於2~3月間有一明顯之高峰期。依ARIMA模式預測斜紋夜盜及甜菜夜蛾，其可信賴度大城約在80%左右，而大村則低於60%，此現象乃與作物相之單純與複雜有關。

作物病害研究

環境綠美化植物苗期病害之調查及防治

陳俊位

於田間苗圃調查草花苗苗期病害，在菊花、日日春、四季海棠、雞冠花、一串紅、矮牽牛、五彩石竹...等常見綠美化植物上發現的病害有，由Rhizoctonia solani引起之立枯病，由Sclerotinia sclerotiorum

引起之菌核病，由Pythium spp.所引起之猝倒病及由Phytophthora spp.引起之疫病為主要病害。其中由R. solani所引起的幼苗立枯病，在夏季高溫多濕的環境下，為害嚴重，常造成20~80%之損害，嚴重時幾近百分之百的罹病率。而在冬計季則以菌核病為主。藥劑篩選上初步選得Do RaDo對菌核病菌有強抑制作用，而針對立枯病菌則所篩選之藥劑尚無有效抑制作用。在拮抗微生物篩選上，目前所篩選到之枯草桿菌(Bacillus subtilis)菌株對R. solani、S. sclerotiorum等病原菌具拮抗作用，可供進一步防治試驗用。

四種不同番茄斑萎病毒群病毒核鞘蛋白之純化及其血清學特性之研究

趙佳鴻

Tospovirus是Bunyaviridae科內唯一可感染植物的一病毒屬，目前Tospovirus有三個主要血清型，分別為TSWV、INSV及WSMV型。一種從花生上分離類似番茄斑萎病毒(TSWV)於本研究中被稱為Tospo-P。由於tospovirus為一套膜包被的病毒粒子，在生體外極不穩定，且在純化過程中難以去除寄主成份，因此製備高專一性血清頗為困難。為了解Tospo-P與其它Tospoviruses之血清關係，本實驗發展一簡易迅速純化核鞘方法，並進一步分離其核鞘蛋白，製備高專一性血清，利用免疫擴散分析，酵素聯結血清反應及西方漬染等主要血清方法，釐清本省花生分離株和不同tospoviruses間之血清學關係。四種不同之Tospoviruses，包括Tospo-P自花生分離的Tospo-PD2，西瓜銀斑病毒西瓜分離株，鳳仙花斑病毒鳳仙花分離株，及番茄斑

萎病毒紐約分離株接種至奎藜後，4~6天採集其葉片以TB緩衝液萃取，利用低速離心，及1% Triton X-100淨化處理後，再經蔗糖墊底沉降濃縮及35%硫酸鈉等密度離心純化所得之病毒核鞘以SDS解離後，經一次膠體電泳，可得到純化之四種不同分子量核鞘蛋白，分別為31、32、29及30 kDa，其每100克植物組織可得純化蛋白量約為1~5 mg。此四種蛋白分別免疫紐西蘭白兔，而得其相對之四種抗血清。由血清學方法之免疫擴散法及間接酵素聯結血清反應得知此四種核鞘蛋白之血清，均只與其本身同源性抗原起反應，彼此間不互相反應，且不與健康植株起非專一性反應。Tospo-P是最近在本省中部花生栽培區所發現類似TSWV的病毒病害，由其純化之核鞘蛋白所製備之抗血清，利用免疫擴散反應，間接酵素聯結血清反應及西方漬染分析，結果清楚顯示Tospo-P與WSMV、INSV、TSWV多個病毒分離株之純化核鞘蛋白及感病粗汁液中之抗原皆無血清關係，故Tospo-P為Tospovirus屬之一新血清型並可能為該屬之一新種。

洋桔梗壞疽病毒之分離及鑑定

陳慶忠、柯文華、黃婉玲

1995年5月彰化縣永靖鄉江姓花農塑膠布溫室栽培之洋桔梗植株葉片發生嚴重之壞疽性斑點，面積約0.4公頃。主要病徵為葉片產生許多壞疽性斑點或輪斑，有時融合成大斑塊。罹病植株明顯矮化、葉片變小、花形變小或畸形並有明顯之白痕。罹病葉片病斑經於奎藜行三次單斑分離供為試驗病毒源。以機械方法接種11科32種植物，結果8科17種植物產生非系統性之

壞疽斑點，另15種為非寄主。機械接種奎藜之病葉粗汁液經高、低速離心及蔗糖梯度離心，純化所得懸浮液經陰染後，在電顯下可觀察到直徑約34~35 nm之球形病毒顆粒。超薄切片在電顯下可觀察到大量類似前述之球形病毒顆粒，呈不規則聚集或呈規則狀結晶排列於葉肉細胞內。罹病葉片粗汁液稀釋 10^{-10} 或於95°C加熱10分鐘，仍然保有感染性。利用Iwaki, M. et al. (1987) 製備之 *lisianthus necrosis virus* (LNV) 抗血清以 ELISA 法偵測本報告分離自洋桔梗之病毒，顯示二者具血清類緣關係。另以本實驗所純化之病毒製備抗血清，與同源病毒粗汁液進行 ELISA 分析，血清力價可達 10^4 。根據寄主植物反應、病毒形態及血清學關係顯示自台灣洋桔梗上新分離之球形病毒應為LNV，此為LNV在台灣發生之首次報導。

蘭花栽培環境對病害發生之影響

黃秀華

環境因子在病害發生上是為一重要因素，為了解目前蘭花栽培環境、栽培介質及施肥情形，對蘭花病害發生之影響，故進行本試驗。本省蘭園的栽培設施種類繁多，主要有簡易黑網遮陰、簡易溫室、H型輕鋼架及不鏽鋼網室等，為了解這些設施環境對病害發生之影響，經試驗結果顯示不同的設施對病害發生之種類及罹病率，並無顯著性之差異。蘭花栽培的介質常見有蛇木屑、樹皮、椰殼、水草及人造保綠土等，這些栽培介質對蘭花生長皆無影響，但不同的栽培介質對病害之發生有很大之影響，以人造保綠土作為介質之蘭園炭疽病發生嚴重可達 58.5%，軟腐病為

13.5%，疫病為12.5%，白絹病為1.5%；樹皮介質者白絹病發生嚴重為56.0%，軟腐病為7.0%，炭疽病為4.5%，疫病為10.5%；蛇木屑介質者白絹病為1.5%，炭疽病為11.0%，疫病為19.5%，軟腐病為8.5%。肥料的施用會影響病害之發生，施用有機質對蘭花生育良好，但施用未發酵完全之有機質則會促進病害的產生，在以椰殼為介質之蘭園中，施用未腐熟之有機質則炭疽病罹病率為35.5%、疫病38.5%及軟腐病20.5%之發生較施用腐熟之有機質蘭園(炭疽病罹病率為15.5%、疫病10.5%及軟腐病4.5%)發生嚴重。

中部地區桃樹病蟲害調查及防治試驗

劉添丁

中部地區桃樹主要病害有縮葉病、穿孔病、流膠病、銹病、褐腐病。害蟲則有一點葉蟬、小白紋毒蛾、折心蟲、咖啡木蠹蛾、粉蚜、桃蚜、桑介殼蟲、梨圓盾介殼蟲及果實蠅等。病害中以流膠病發生最普遍危害最嚴重。害蟲則以葉蟬、介殼蟲、果實蠅危害較嚴重。穿孔病發生時期為4~8月，而以5~6月為發生盛期，銹病4~10月發生，流膠病則終年發生，尤以4~8月降雨期間最為嚴重，主要造成枯枝，影響生育。褐腐病於4~7月發生，主要危害果實，造成腐爛、落果。折心蟲通常於3~11月間發生，5~8月被害率可達40~60%，危害後成枯芽，葉蟬於5月至11月間發生危害，以7~9月間密度最高，依照農藥技審會規定辦理防治藥劑篩選，結果以2.8%賽洛寧 E.C. 1000 倍及3%亞滅寧 E.C. 1000倍防治效果較佳。

土壤肥料研究

有機青花菜栽培試驗

謝慶芳、徐國男

本試驗是在彰化縣大村鄉台中區農業改良場本場農場舉行。土壤屬於粘板岩沖積中性砂質壤土。全部試驗計有四個處理，即1.慣行農法區(全部化肥)，2.折中農法區(化肥與豬糞堆肥各半)，3.有機農法A區(豬糞堆肥)，4.有機農法B區(雞糞堆肥)。

試驗結果，發現有機區青花菜植株生長都較對照區好，花果顯著大而重，因而產量也顯著高於對照區，其中以雞糞堆肥區較慣行區增加26.2%最高，其次為豬糞堆肥區，增加18.3%，主要原因可能是慣行區的土壤肥力較差，特別是土壤呈強酸性反應，鹽分含量太高，而有機區的土壤肥力都較好，土壤呈中性反應，鹽分含量正常，有機質、有效磷，以及錳、鋅、銅等微量元素含量都較高並施用EM有益微生物等因素可能都有關係。

至於折中區土壤肥力化驗結果雖與豬糞堆肥區和雞糞堆肥區相近，但其青花菜產量卻未增加而與對照區相似，可能是化學肥料與添加微生物之有機肥一起使用後產生拮抗作用而抑制了有機質之礦化作用及養分之吸收，因為青花菜植株化驗結果，折中區之氮、錳、鋅含量都顯著低於有機區和慣行區而有缺乏現象。此外有機區青花菜錳鎳含量都極顯著減少對其食品質可能有負面或正面影響。

本試驗初期曾經發生蚜蟲為害主要噴射香茅油、薄荷油、樟腦油混合液二次加以防治，另有紋白蝶幼蟲為害，約每1~2

星期噴射一次糖木醋液添加蘇力菌即達到防治效果。

有機質肥料與唐菖蒲葉尖壞疽之關係

蔡素慧

唐菖蒲是本省重要的球根花卉，經濟價值頗高，對於氟之毒害非常敏感，在栽培過程中從葉尖往下逐漸壞死而形成危害之情形非常普遍。這種現象到處發生，敏感的品種幾乎每葉罹病，影響切花品質很大，有待從改良栽培技術著手，本試驗在水耕的條件下比較狀元肥、魚粉、骨粉、樹皮、泥炭土及鳥糞等有機肥，並以過磷酸鈣為對照，引發葉片壞疽的嚴重性，以本省栽培最多之Wing's sensation當試驗品種，結果顯示狀元肥之危害性遠低於過磷酸鈣，魚粉及骨粉(尤其是醱酵過的)做為磷肥來源可減輕葉片壞疽之程度至極為輕微，種植56日後長度只有0.15cm，及過磷酸鈣混用樹皮堆肥可減輕危害程度。上述結果可供農民栽培時參考。

堆肥有效養分潛能估測之研究

蔡宜峰

如能適當的估算堆肥的有效養分潛能(PAN, potentially available nutrient)，並巧妙地配合作物生育特性，將使堆肥的效益發揮至最恰當。本研究目的在於評估利用化學萃取法，估算堆肥有效養分潛能之可行性。供試之化學萃取劑包括1M (NH)₄CO₃、0.1M NaOH、1M NaCO₃及1M (NH)₄CO₃等四種，經由多種有機材質製成的不同堆肥之玉米盆栽試驗結果顯示，利用碳酸銨萃取堆肥所得之可利用性有機氮量與施用相同種類堆肥之淨有效氮量可用 $\ln Y = \ln a +$

b/X (X: 碳酸銨萃取堆肥之有效性氮潛力, Y: 堆肥淨有效氮量) 迴歸程式描述碳酸銨萃取堆肥所得可利用性有機氮量與施用相同種類堆肥的淨有效氮量之關係, 其相關性($r=0.673^{**}$)可達極顯著水準, 因此碳酸銨萃取法以估測堆肥之有效養分潛力頗具可行性。

百合肥培管理之研究

陳鴻堂、林景和

在台中縣霧峰(砂頁岩非石灰性沖積土)及外埔(紅壤)設置百合肥培管理試驗, 結果顯示百合株高在砂頁岩沖積土施 250 公斤/公頃高氮區百合株高可達71.2公分較長, 而外埔則以施 150 公斤/公頃區株高 73.1 公分較長, 磷鉀肥對百合株高均無影響, 三要素中僅有施氮素 200 公斤區在兩種土壤均可增加百合之花苞數, 對於百合其他切花品質的效果則沒有明顯的差異。肥料對百合土壤 pH 值的影響, 兩地均隨氮素肥料的用量增加需降低表土土壤 pH 值, 雖然土壤尚無鹽分累積現象, 但施用高量的氮素均有提高土壤 EC 值的趨勢。

果樹營養診斷技術應用之探討

王錦堂

為使果農瞭解如何依據土壤肥力及植物體營養分析, 作營養診斷而推薦合理施肥, 以維護土壤肥力及減少肥料浪費、降低生產成本, 使土壤能提供永續性的農業生產增進果實品質, 自 1988 年起辦理土壤與葉片營養診斷及果園施肥改進之技術應用工作, 據土壤表土 4,974 件、底土 3,969 及植物體 4,419 件測定分析顯示, 土壤表底土在 pH 5.5 以下者分別佔 66 及 71%, 有機

質在 2% 以下者佔 21 及 55%, 有效磷, 交換鉀、鈣、鎂及微量元素含量亦均有改善。葉片要素含量高於適宜值者以氮較多, 低者為鎂、硼等較多, 依果樹種類之不同而異。施肥量中化肥用量有減少而有有機肥有增加趨勢。本營養診斷服務工作有其技術應用價值, 在人力及經費允許下有繼續辦理價值。

農機研究

菊花穴盤苗自動化介質裝填機械之研製與改良

龍國維、田雲生

本省菊花栽培面積有 1800 餘公頃, 為重要花卉作物之一, 主要集中於彰化縣生產。傳統菊花苗採砂床育苗與手拔裸根方式, 有許多缺點; 穴盤菊花苗則有成活率高, 抗逆境力強, 可耐儲藏與品質較高等優點, 但相對的成本較高, 需要機械化以省工而降低成本以達推廣穴盤苗並提升菊花生產品質的目的。本計畫即規劃研製並改良自動化介質裝填與打孔機械以解決前述問題。此套機械系統包括介質攪拌機, 暫存大斗、介質回收機, 排箱機、一貫化裝填介質並打孔機與腳踏控制輸送機六大部份機組, 全部串聯排列並以電氣控制箱經 PLC 順序控制各部份機械及氣壓機構, 達成自動進箱、自動送料填料、刷平並於最後做定位打孔等各動作以利後續之扦插作業。全系統作業效率最高可達每小時 720 箱, 較諸人工裝填介質作業之 120 箱/hr, 可快達 6 倍左右。機械攪拌亦遠較人工均勻, 並可於攪拌同時添加水份調整至所需濕潤程度。作業最慢可調為 60 箱/hr, 以配

合後續之人工扦插作業速度, 此最慢模式亦因自動化而可節省裝填介質之勞力與工時。全套機械系統之作業模式與效果已為田尾地區菊花農友所認同接受並尋求補助購置中。未來仍需仍努力突破人工扦插作業之瓶頸, 目前已計劃研發自動化扦插裝置以期達成完全自動化, 並進一步應用於多種扦插花卉苗如滿天星、康乃馨以及非洲菊等之栽培, 甚至於樹苗之生產上。

球根花卉種球挖掘機研製

何榮祥

近年來由於工商業的蓬勃發展, 經濟的突飛猛進, 各種花卉景物的需求逐年增加, 其中球根花卉發展更為迅速, 主要經濟栽培種類包括唐菖蒲、百合、夜來香、金花石蒜及海芋等, 1993 年總栽培面積約 1300ha, 產量近 27,000 萬支, 總產值達新台幣 24 億元, 其中又以唐菖蒲與百合為大宗, 但所需種球主要來自進口, 僅唐菖蒲與百合兩項合計即達 6 億 6,000 萬元, 約佔進口金額之 95%。唐菖蒲每一分地需 20,000 個種球, 種球費用約為其生產成本之 56%, 百合每一分地約需 30,000~40,000 個種球, 種球費用約為其生產成本之 80%, 故農民於切花收穫後再行回收種球, 或進口公斤球並自行培育開花球, 根據統計 1993 年唐菖蒲與百合種球進口量分別為一億球與 2 仟 1 佰萬球, 同一時期產量為 1 億 9 仟萬支與 4 仟 8 佰萬支, 換算結果其中約有 50% 種球屬自行繁殖者, 但目前種球收穫作業均賴人工逐一挖掘, 人力需求龐大, 致使種植面積無法擴大, 雖然台糖公司業已引進全套種球生產設備, 並進行百合與唐菖蒲種球之生產, 但在尚未能充分供應市場

價廉物美之種球並取代進口種球前, 農民為降低生產成本而個別回收部份種球仍屬必要, 此因發展利用機械挖掘方式, 將種球迅速掘起, 並與土壤分離, 以減輕種球採收作業對人工之需求, 為解決目前農民經營困境有效方法之一。

本研究即在開發種球挖掘機, 利用機械挖掘方式, 將種球迅速掘起, 並與土壤分離, 以減輕種球採收作業對人工之需求。目前共開發完成種球挖掘機兩型, 一為小型中耕機或耕耘機承載型, 以 8~18Hp 柴油引擎中耕機或耕耘承載, 挖掘部寬 60~80cm, 並以螺桿調整挖掘深度及犁尖對地高度, 蒼苔蒲植株挖起後與土壤分離, 再拋擲於畦面上, 每次收穫一畦, 作業速度 1.2Km/hr, 適用於一畦兩行與小區塊之栽培方式。第二型為曳引機承載型, 以 40~50Hp 曳引機承載, 挖掘部寬 110cm, 挖掘深度則由曳引機液壓系統直接控制, 操作原理與前者相同, 作業速度 2.5~3.5 Km/hr, 適用於一畦多行且大區塊之栽培方式。

懸吊桿式自動噴灌設施之研製

龍國維、田雲生、何榮祥、陳令錫

近年來農業生產者為了提高產品品質, 並減少作物受自然環境影響, 逐漸採用設施溫網室作業, 其中以蔬菜栽培及種苗生產者最為普遍。但目前諸多管理工作如灑水等尚多賴人工為之, 部份雖有定置式噴灌設備可資應用, 但卻有噴灑死角及散佈不均勻等問題。本研究即針對上述缺失與需求, 設計開發一組溫網室用懸吊桿式自動噴灌設施, 可提供給蔬菜、花卉穴盤苗及盆栽等噴灌保濕之用。其作業方式與

基本架構是利用圓形鉅管為懸吊軌道，行走架以兩個呈45°斜角之U字型掛輪懸吊於單軌鉅管上，並由1/4或3/4Hp減速直流馬達藉鋼索牽引做前後往復運動，下方則承載概略與溫室同寬的方管橫桿，且組合若干支可伸縮之垂直桿成為整組噴桿。噴頭固定於垂直桿最下端，採用雙噴頭可切換方式，分別為美製 Delavan 牌與國產扇形噴頭兩種，除灑水功能外，葉面施肥及噴藥作業等亦可應用。控制箱目前模組化設計，可切換為手動或自動方式，並同時供三棟溫室共用且輪流操作。經初步測試：噴桿行進速度可於0.25~12.5m/min之間任意調整，以供不同作物需求做選擇；而在寬1.67m植床上，連續橫向排列30個容器量測四組噴頭灑水均勻度，其平均偏差值約為19%。可知本噴灑設施不僅作業效率高、噴桿調整富彈性，且噴灑均勻性亦較人工為理想，將儘速技術轉移給廠商，並推廣予農民應用。

單軌自走噴霧系統及控制方法研究

陳令錫

設施內自走式自動噴霧裝置之單懸軌硬體機械結構已開發完成，能有效地牽動噴霧架在設施內縱深方向移動，霧粒均勻地噴灑在作物上，達到育苗噴灌或病蟲害防治噴水噴藥的預防及治療效果。農耕作業取代勞力的基本要件首須機械化，完成機械化之後視勞力配置和評估投資成本，朝自動化方向邁進；設施內自走噴霧裝置之控制系統已經可以進一步簡化操作程序節省人工，並提高整體工作效率。依投資成本不同，控制方法可分成人工手動、半自動和全自動等三種方式，目前本實驗裝

置具有人工手動和半自動二組操控設備，用於1.2公頃17棟玫瑰溫室病蟲害防治作業，噴架行走速率在0.7至4.3km/hr之間無段變速，符合育苗噴灌及病蟲害防制需求，幫浦壓力25kg/cm²定壓下，每棟20只扇型噴頭，採調整噴架速率控制單位面積施噴量方式，施噴量在179 lt/10a至29.4 lt/10a之間變化，當噴架速率2km/hr時，約2小時可完成一次噴藥作業，從84年元月啓用迄九月底止計使用67次，每次人工作業時間為機械作業時間的8倍，噴霧用水量為2.5倍，每次操作成本機械作業為3942元，人工作業成本為5830元，人工費用為機械費用的1.48倍。

農業推廣研究

甘藍生產者對未來加入 GATT 後認知之研究

卓思齊

84年度之研究指出，台中區農業改良場轄區內種植甘藍之業者，得知政府正積極籌劃加入GATT之管道，以電視之比例為最高佔24.5%。其中認為加入GATT後其經營的產業會有正面影響者佔25%，答沒有正面影響者佔73.2%，不知道者佔1.8%；「產品交換可促進競爭」、「調整產業發展方向」及「拓展銷售管道」是答有正面影響之原因。加入GATT後短期內對經營產業之負面影響，持嚴重或很嚴重的比例高達75%，長期仍有58.9%之受訪者持此看法。主要原因是「國內產品供給量增加，致使價格下降」與「國內產品成本高無法與國外競爭」。而研究中同時發現，短期內產銷班班員持很嚴重或嚴重之看法

佔66.6%，認為不嚴重的比例15.2%，非產銷班受訪者持很嚴重或嚴重之看法佔86.9%，認為不嚴重之比例為13.1%，由此可知產銷班受訪者對加入GATT後之影響持嚴重或很嚴重看法之比例低於非產銷班受訪者；持不嚴重之看法以產銷班班員之比例高於非產銷班受訪者。採取的因應對策中，以提升品質比例為最高。

未來加入 GATT 後甘藍產業調適與因應之研究

戴登燦、卓思齊、高德鈺

本研究於民國八十四年在台中地區調查56戶甘藍栽培農戶，調查結果顯示大部份之農戶對加入GATT後多持負面影響的看法，在經營上目前有勞力不足、成本過高、資金不夠、銷售管道單一等問題。其改善方向應以（一）加入產銷班以提供勞力之相互支援；（二）以共同採購及擴大農場經營規模以降低成本；（三）在六至翌年二月間減少進口以減少與目前生產季之衝擊；（四）提供農業貸款及改進分級包裝方式以拓展運銷管道；（五）加強成年農民訓練並提供產銷資材補助，以增強其因應能力。

增補農業推廣條例之研究

高德鈺

自「農業推廣條例草案」於民國80年10月21日，經立法院經濟、教育委員會聯合審查通過後，至今尚未完成二讀及立法程序。唯，近年來國內農業環境變遷，諸條例中部分條文已不合時宜。因之，本研究係針對一讀通過之24條文，設計問卷調查表，並函請全省之各級政府農業機關、

學校試驗場所、農漁會之五百位代表表示意見，藉以彙整作為立法院二讀時研訂「農業推廣條例」之參考。

一讀通過之農業推廣條例草案共有24條文，草案第一條開宗明義指出為建立農業推廣制度和體系特制定本條例，並於第二條明定主管機關，於第三條對條例之用辭下定義，於第四條規定每年應訂定農業推廣政策規劃實施，於第五條至第九條明定各級主管機關應辦事項，其中，第五條明定中央應成立農業推廣委員會為審議及聯繫農業推廣計劃及有關諮詢事項，於第九條明定建立以區域性農業改良場為中心之農業推廣教育及服務體系，於第十條規定中央或省（市）得設農業推廣傳播中心，統籌審查各類農業推廣教材與視聽資料之策劃及諮詢事項，於第十一條至十三條明定農業推廣經費之來源及補助對象，於第十四條規定農業推廣機構，於第十五條明定農業推廣之教育及服務工作對象，於第十六條明定農業推廣業務合計十項，於第十七條、第十八條、第二十條明定各區域農業改良場、公立農業學校、農會漁會及農業合作社辦理農業推廣業務方式或其實施辦法，於第二十一條則對農業推廣法人及農企業團體加以規定，其中，第十七條規定各區農改場設農業推廣中心並視需要於縣（市）或鄉（鎮、市）設推廣站，且規定定期召開農業推廣聯繫會議及協調解決有關業務之分工合作事宜。於第二十二條規定主管機關對推廣機構及推廣業務之考核、獎懲。於第二十三條明定實施細則由中央主管機關另定。於第二十四條明定施行日期。

1. 由回收之有效問卷調查分析顯示，來自政府行政機關的意見：(1)鄉鎮（市）公

所農業課，並未納入此條例之規劃中。

- (2)縣市政府與區農業改良場在未來推廣體制下之角色混淆，技術推廣與行政推廣無法劃分。(3)農業推廣政策不應每年制定，但需逐年進行督導、考核政策之執行成效。
- 2.來自各級農業學校之意見：(1)凡設有農科之學校均應負有農業推廣教育之責。(2)農業推廣服務之對象應包括農業教育者、農業學習者。(3)應規劃以區農業改良場為主軸，而由地區性農漁會協辦之推廣體制。
- 3.來自各級農會之意見：(1)本條例官方味道太濃，一旦立法完成後，對區農業改良場是否有能力獨撐轄區內之農業推廣活動尚有疑慮。(2)應研擬如何將農會現有推廣人員納入未來之地區推廣站之編制內。(3)區域性農業改良場應編列專業性推廣人員，以協助地方推廣業務之執行。
- 4.來自區域性農改場之意見：(1)以區農改場推廣中心現有人力無法負擔轄區內農林漁牧等之各項推廣業務。(2)條例中有關技術推廣與行政推廣間之界定不明。(3)條例中有關區農業改良場與縣市政府及農會間之合作協定，缺乏法源依據。
- 5.來自專業性農改場及試驗所之意見：區農業改良場應自行遴選專業性技術推廣人員，而不宜由專業性農改場派駐區農改場。

影響台灣地區花卉農家婦女農業經營參與因素之研究

張嘉真

本研究是以台灣地區花卉產銷班切花

類農戶之妻子為調查對象，進行調查訪問，共回收 265 份問卷。藉以瞭解影響台灣地區花卉農家婦女農業經營參與因素。經分析後有以下幾點發現。

- 1.目前花卉農家大部份無自己育苗，而且在自家農場經營的每項作業工作機械化程度並不是很高。若婦女不參與自家農業經營工作時，則多數農家可能會產生勞力不足之現象。
- 2.花卉農家婦女實際上參與農業經營工作以「田間作業」最多，但是期望參與則是「經營管理」項目居多。
- 3.農業訊息接觸活動，花卉農家婦女在「人員接觸」方面之頻度高於「團體接觸」及「大眾傳播媒介接觸」。
- 4.多數的婦女表示願意繼續從事自家之農業經營工作，而且受家人支持，同時希望自己成為家庭中具有平等獨立的共同經營者，但是她們若要成為一位獨立的農業經營管理者時，感到自己生產技術、農訊情報收集等能力不足。而農業勞動負擔過重，工作又沒有固定休閒日成為婦女目前生活上的困擾。能力不足、收益不好及沒有時間是使她們不能更加投入農業經營工作之原因。如能加強婦女營農決策及管理能力，減輕勞動負擔，將更能促進農家之經營效率。
- 5.農家勞力不足、產品售價偏低不穩定、資金不足是婦女認為目前花卉農家經營工作所遭遇的困難，因此她們期望自家農業經營能朝企業化生產方向發展，並期望能獲得與其他產業相等的所得。

鄭姓農家農場經營診斷

林月金、邱建中、黃秀華

民國60年代台灣食用菇類產業蓬勃發展，而早期菌種多為家庭式副業生產，爾後為提高產能，逐漸轉變為企業化專業經營，鄭姓農家即是相當具代表性的菌種場。本研究之目的在於分析農場經營管理特性，並對經營良窳作診斷，期供農場經營改善之參考依據，並作為其它農場經營者自我診斷或從事農業經營推廣工作者之參考。分析結果顯示，本個案農場採企業化專業經營，以生產各種菇類太空包為主，近年來亦逐漸拓展鮮菇生產業務。83年度農場虧損2,222,221元，淨所得與資本報酬均為負值，主要係因農場正處於轉型期，設備未充分利用，致收益未能達到預期目標。就財務結構而言，農場自有資本比率高達93.6%，權益比率1,454.9%，投資設備安全率98.4%，固定比率104.8%，流動比率451.8%，速動比率189.3%，應收帳款週轉率24.7次。以上顯示，該農場財務健全，長期或短期償債能力均很強，唯因固定資產投資略多，影響投資的穩定性與財務的流動性。至於總資產週轉率、固定資產週轉率以及自有資本週轉率均屬偏低(0.1)，而土地及勞動生產力均高，唯資本生產力則偏低。就長期發展而言，由於該農場具備許多優勢條件，因此，經營主倘能掌握優勢並積極改進弱點，未來仍具發展潛力。為期使農場能持續穩健發展，提出如下幾點建議：(1)由於本個案農場之技術與市場均不成問題，唯勞力供應不足，建請政府開放外勞加入農業生產行列，以解決農村長期勞力不足的問題；(2)開拓國外市

場，建立多元化銷售管道；(3)建立健全的財務管理與利潤中心制度，以利農場經營管理。

台中地區農村社區農產廢棄物堆肥化利用與規劃之研究

鄭健雄、蔡宜峰

本研究參考鄉村發展規劃及社區發展的理念，針對鄉村地區、農村社區及農家等不同實施單元的需求，並兼顧各個實施單元社會、經濟、生態、制度等不同層面的發展規劃，分別規劃不同實施單元之有機廢棄物堆肥化處理之利用模式，根據初步規劃結果以農家或農村社區為實施單位之利用模式，可針對實際需要採用自然、槽式、袋式或桶式堆積法；若以鄉村地區為實施單元，則可針對所要處理廢棄物種類及實施場所之不同，採用大型開放式或密閉式堆積法，從事有機廢棄物堆肥化工作。今後若能加強有機廢棄物堆肥化處理之研發及推廣工作，應可有效將農村有機廢棄物製作成有機質肥料使用，達到資源回收及環保的功能。

八十四年度農村青年農業專業訓練之分析研究

鍾維榮、黃家興、邱金滿

本研究係針對本場辦理84年度農村青年農業專業五個訓練班，即花卉生產及作物管理班、農業企業化經營班、永續農業栽培班、設施蔬菜班及溫帶果樹栽培班，以參加之150名學員為研究對象，經問卷調查及資料分析，結果如下。參訓學員性別分析，男性有137人，佔91.3%；女性有13名，佔8.7%。參訓學員年齡以31~35歲

為最多，佔全部參訓學員之38.8%；學員年齡介於26~30歲者次之，佔26.7%。學員之教育程度，大多數為高中、高職以上，佔84.6%。調查參訓學員分佈於各改良場轄區情形，發現學員大多數來自台中場轄區有84人，佔全部參訓學員之56.0%；桃園場轄區學員次之，計有25人，佔16.7%。參訓學員對所接受的農業專業訓練很滿意程度之學員比率，比較五個班別，以果樹班最高，達71.8%；其次為蔬菜班，達57.0%；而以花卉班之最滿意程度最低，為39.2%。在訓練項目方面，五個班別平均，以訓練環境之最滿意程度最高，佔參訓學員之74.6%；其次為師資陣容方面，達59.5%；而以訓練教材之最滿意程度最低，為45.0%。

南投縣農業產銷班之整合與輔導成果

李惠元

本場與南投縣政府已於民國82年4月起，對南投縣之蔬菜、花卉兩項產業輔導整合組織產銷班，民國83年7月起陸續對果樹、毛豬、水產養殖、肉雞、蛋雞等進行輔導成立產銷班合計400班，班員9,185人，其中花卉83班，1,027人，蔬菜122班，2,622人果樹183班5,265人其他（包括毛豬、水產養殖、肉雞、蛋雞）12班271人，可見在南投縣以花卉、蔬菜、果樹的產業為大宗。除產銷輔導外，並加強幹部領導統御能力之提升及班員產銷技能，並以建立品牌為宗旨。

83年辦理統御領導等之講習計有班長200人參加，83年11月底辦理現代化農民組織講習會，參加幹部377人，84年4月28日召開「加入GATT農業座談會」參加班

長及工作人員150人。84年度辦理全面考評結果，南投縣有七班列入優良班，再度參加全省評鑑結果，水里郡坑青梅班榮獲特優班，其他六班為優良班。

台中區農業改良場八十二年至八十四年農民服務中心服務項目統計

陳武揚

引導國內團體參觀：82年135件、9,178人，83年131件、8,960人，84年103件、7,141人（1~10月）。安排國內團體講習：82年254件、1,969人，83年224件、817人，84年206件436人（1~10月）。接待國外團體參觀：82年51件、741人，83年59件、762人，84年45件、1,082人（1~10月）。接待外賓個案：82年37件、94人，83年23件、76人，84年7件、60人（1~10月）。服務農友個案：82年656件、1,872人，83年574件、1,461人，84年575件、916人（1~10月）。傳真信函：82年傳出750件、傳入993件，83年傳出1,160件、傳入1,063，84年傳出677件、傳入1,287件（1~10月）。

台中縣市農業產銷班整合組訓考評輔導現況

陳清文

為預應我國入世界貿易組織後對農業之衝擊，政府在農業綜合調整方案及台灣省農業建設方案及台灣省農業建設方案揭鑒：1.調整產量結構、健全產銷體系。2.建設富麗農漁村、增進農漁民福祉。3.善用農業資源，加強生態保育。為省政農業建設新方向。

據此，農業生產除主要糧食應確保供

應外，將蔬菜、花卉、果樹、毛豬、肉雞、蛋雞、養殖水產等列為七項重點產業。依廳頒「農業產銷班整合組訓考核輔導作業手冊」辦理農業產銷班之整合輔導措施。本場于民國81年12月開始輔導地區農民團體，宣導農業產銷班整合登記，82年度起由蔬菜、花卉開始，次年擴大至七大產業，累計至84年度止，本場轄區計整合1,108班。就台中縣市七大農業產銷班之整合，截至84年度止共累計322班，其中蔬菜86班，佔本轄區之24%；花卉34班佔18.7%；果樹184班佔36.9%；蛋雞一班佔7.7%；肉雞八班佔61.5%；毛豬9班佔20%。

84年度台中縣市在本場各業務課同仁配合下，計參與產銷班班會32人次、技術諮詢8場次、講習會33場次、觀摩會18場次、專題採訪攝影51人次、加入GATT宣導座談會1次、辦理果品評鑑11鄉鎮、展售促銷活動則按農時不定期辦理..等各項活動之輔導。接受產銷班考評計有318班次；初評結果評定為特優級、優級有44班，佔14.2%；良級99班佔32%；可級117班

佔37.8%；差級49班佔16%。農林廳複評結果，計有蔬菜三班、花卉三班、果樹三班名列為績優良產銷班，將接受農林廳獎勵。

綜上農業產銷班之輔導成果已逐漸顯現，在此提出下列各點尚待加強：

1. 農業產銷班整合初期之作業程序輔導措施未能純熟運作，輔導單位應加強溝通，以落實農業產銷組織。
2. 輔導措施中經費之支援為不可或缺之動力，改良場掌握資源有限，尚須仰賴輔導體系之支持與通力合作，較能發揮輔導之功能。
3. 持續透過教育訓練，引導產銷班做好團隊溝通、領導統御、組織運作及企業化經營，以改變傳統的思考模式，以提高農業經營效率。
4. 產銷班須提升自立自主的能力。發展地區農業、建立產品品牌、開拓行銷網路，以增強產銷之競爭力，是今後努力發展之方向。

二、農業推廣教育成果

教育訓練工作

本場為增進青年農民之農業新知技術，八十四年度辦理花卉、設施蔬菜、溫帶果樹、永續農業及農產企業化經營等五班農村青年專業訓練班，結訓學員 156 人。為提升農業推廣人員的工作技能，本場辦理幻燈片教材製作、永續農業經營管理、四健人員輔導能力、都市農業理念與實務、山地農業研習各一班及四健義務工作人員研習二班，受訓學員 175 人。同時辦理農業產銷幹部訓練班 57 班 1,570 人。本場亦

接受海外會及海合會委託代訓 3 班別之友邦農技人員專業訓練班，共計 73 人。（表一）。

農村生活改善

本場為提高農民生活素質，積極推動農村生活環境改善工作，重點工作包括輔導 52 村里辦理高齡者生活改善班、16 村里組班辦理預防保健工作、3 村里組班辦理農村生活環境改善、3 村里辦理農村社區實質環境改善工作（表二）。

表一、農業推廣中心之訓練業務

訓練班別	班數(班)	人數(人)
農村青年專業訓練班	5	156
推廣人員在職訓練班	6	175
友邦農技人員訓練班	4	73
產銷班幹部訓練班	57	1570
合計	72	1974

表二、台中區農漁村生活環境改善情形

縣市別	高齡者生活改善	預防保健工作	農村生活環境改善	社區實質環境改善
台中市	1	1	1	—
台中縣	17	7	0	1
南投縣	12	3	0	1
彰化縣	22	5	2	1
合計	52	16	3	3

農漁村文化發展

本場為塑造具有鄉土性之社區文化，建立具有文化氣息之現代化鄉村社會，八十四年度共輔導 21 鄉鎮農會設置農漁村產業文化研習，3 鄉鎮辦理產業文化館，4 鄉鎮辦理鄉土文化系列活動（表三）。

農民服務工作

本場為推展各項農民服務工作，八十四年度接待來訪貴賓及農民 7609 人、外賓 840 人，提供諮詢服務及推廣教材 1217 人，派員擔任基層農會講習會講師 242 次，315 人。

表三、八十四年度台中區辦理鄉村文化活動情形

縣市別	產業文化研習(鄉鎮)	產業文化館(鄉鎮)	鄉土文化系列活動(鄉鎮)
台中縣	9	1	1
南投縣	5	1	1
彰化縣	6	1	1
台中市	1	-	1
合計	21	3	4

表四、八十四年度農民服務情形

服務項目	次數	人數
引導國內團體參觀	119	7,609
引導外賓參觀	67	840
農民諮詢服務及教材	712	1,217
安排講師	242	315

農產品生產成本調查輔導

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

輔導農漁村青年創業計畫

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

三、出版刊物

A·發表文章(臺中場研究彙報第46~49期)

- 1.謝慶芳、徐國男 長期使用有機質肥料對毛豆與甘藍之效應試驗 46:1~10。
- 2.古錦文 無縫絲抗銹病菜豆新品系之育成 46:11~18。
- 3.林天枝、蔡宜峰 利用土耕法栽培報歲蘭之肥培技術研究 46:19~26。
- 4.黃勝忠、宋勳 臺中地區落花生地方品種之純化與生產力評估 46:27~35。
- 5.林月金 花卉共同經營班農場經營之個案研究 46:36~46。
- 6.何榮祥、陳俊明 菊切花儲存品質之探討 46:47~57。
- 7.林天枝、莊杉行 茭白筍栽培技術改進研究 47:1~9。
- 8.曾勝雄、高德錚 蕙苡臺中一號之育成 47:11~22。
- 9.宋勳、洪梅珠 水稻濕谷品質檢驗技術之研究(I) 47:23~31。
- 10.邱建中、戴登燦、李惠元、陳炎星 臺中區基層農會營運現況之調查報告 47:33~47。
- 11.陳令錫 水稻散裝聯合收穫機作業性能測試 47:49~58。
- 12.劉添丁 枇杷灰斑病的發生與其對果實損失的評估 47:59~66。
- 13.洪梅珠 糯稻品質之研究 I 濕谷狀態之糯稻與非糯稻之鑑定 48:1~9。
- 14.林天枝、洪滋堂 FMTT新品系番茄品種改良及區域試驗 48:11~16。
- 15.林再發 秈稻穀粒大小與產量構成要素及白堊質之相關 48:17~24。
- 16.戴登燦 臺中區花卉蔬菜產銷班調查研究 48:25~35。
- 17.王錦堂、黃志明 永續農法相關技術之研究 II 磁力對作物栽培之效應 48:37~45。
- 18.曾勝雄 蕙苡栽培技術改進試驗 48:47~54。
- 19.林信山、林嘉興 利用頂端優勢舒解臺灣平地溫帶梨之高溫逆境 48:55~68。
- 20.董敏生 簡報:BA為栽培稻幼苗生長的有效促進劑 48:69~74。
- 21.劉興隆、林俊義、陳隆鐘 角粒菠菜種子誘鈎立枯絲核菌之偵測技術 49:1~7。
- 22.張致盛、黃勝忠 不同溫度及日數之儲藏處理對菊花插穗發根之影響 49:9~18。
- 23.林俊義、黃秀華 太陽能防治土壤傳播性病害之機制 49:19~31。
- 24.劉達修 土壤施藥法對唐菖蒲根蟻之防治效果 49:33~40。
- 25.古錦文、戴振洋、蔡宜峰 有機質肥料對秋作菜豆生育及產量之影響 49:41~48。
- 26.林再發 台灣改良的秈稈稻品種雜交F₁結實率、F₂脫粒性、F₃腹白率、特別比較F₃族群和回交F₃族群的優良品系選拔率 49:49~56。
- 27.董敏生 簡報:Dihydrozeatin,一種誘導栽培稻(台梗3號)幼苗生長的強促進劑 49:57~61。

B · 台中區農推專訊(月刊)

- 142期 就醫常識
143期 台灣市民農園的發展經驗
144期 農村家庭廢棄物堆肥化處理與利用
145期 農村廢棄物肥化處理與利用
146期 稻穀乾燥技術與米質

C · 台中區農業專訊(季刊)

- 第十期 (84.3)
第十一期 (84.6)
第十二期 (84.9)
第十三期 (84.12)

D · 台中區農業改良場特刊

- 第36號 永續農業研究與推廣之進展研討會專集 林俊義、洪梅珠 主編(84.6)
第37號 台灣蔬菜產業改進研討會專集 郭俊毅 主編(84.12)

四、八十四年度國內外來賓訪問及參觀本場統計表

Local Visitors

國內部份

- 84.01.07 北山國中共40人來場參觀水耕、花卉。
84.01.16 台中縣和平鄉農會共45人來場參觀營養葉片診斷及自然農法。
84.01.20 中興大學農學院共30人來場參觀。
84.02.07 彰化糧管處共100人來場參觀水稻栽培。
84.02.09 員林高級中學共120人來場參觀。
84.02.11 農民節籌備委員會共150人來場參觀。
84.02.14 彰化糧管處共120人來場參觀農作物。
84.02.18 青溪國小師生共40人來場參觀水耕栽培。
84.02.21 鹿谷鄉農會共45人來場參觀有機農業。
84.02.24 台中縣和平鄉農會共45人來場參觀梨栽培及病虫害防治方法。
84.02.24 中正農業工業基金會共12人來場參觀。
84.03.03 花蓮高農共37人來場參觀花卉、水耕。
84.03.06 草屯鎮農會共50人來場參觀果樹栽培。
84.03.08 新竹私立損傷庇護中心共5人來場參觀花升、水耕。
84.03.10 南投縣政府共40人來場參觀花卉栽培。
84.03.14 草屯鎮公所共45人來場參觀水稻栽培。
84.03.24 大湖高級農工共115人來場參觀花卉栽培。
84.03.27 台大植物系共45人來場參觀花卉、水耕栽培。
84.03.27 后里鄉公所共90人來場參觀永續農業。
84.03.30 名間鄉農會共90人來場參觀良質米栽培。
84.03.30 宜蘭壯圍鄉農會共45人來場參觀花卉、水耕栽培。
84.04.06 台中時代獅子會共45人來場參觀花卉、簡介。
84.04.07 八德鄉農會共90人來場參觀水耕、花卉栽培。
84.04.12 竹崎鄉公所共47人來場參觀農作物有機栽培。
84.04.13 彰化市民生國小師生共45人來場參觀水耕栽培。
84.04.20 三星鄉農會共80人來場參觀梨栽培及病虫害防治。
84.04.20 學甲鎮農會共45人來場參觀蔬菜栽培。
84.04.25 苗栗縣三灣鄉農會共45人來場參觀梨新品種。
84.04.26 和美鎮農會共90人來場參觀水耕栽培。

84.04.26 高雄縣民雄鄉農會共150人來場參觀良質米栽培。
84.04.27 竹崎鄉農會共45人來場參觀梨栽培。
84.04.27 橋頭鄉農會共40人來場參觀有機農業。
84.04.27 三峽鎮農會共90人來場參觀花卉、蔬菜。
84.05.02 台北中和地區農會共95人來場參觀有機堆肥。
84.05.02 社頭鄉農會共48人來場參觀有機農業及蔬菜病蟲害。
84.05.03 花壇鄉農會共50人來場參觀水稻原種田。
84.05.03 宜蘭縣政府共45人來場參觀有機農業。
84.05.03 士林區農會共135人來場參觀有機農業。
84.05.05 后綜國中四健會共30人來場參觀水耕栽培。
84.05.09 嘉義農專共47人來場參觀。
84.05.10 新港鄉農會共90人來場參觀花卉栽培。
84.05.11 外埔國中共47人來場參觀水耕、花卉。
84.05.11 大埤鄉農會共90人來場參觀水耕栽培。
84.05.15 新埔鄉農會共52人來場參觀梨栽培。
84.05.16 二崙鄉農會共45人來場參觀番茄栽培。
84.05.16 南投市農會共45人來場參觀水耕栽培。
84.05.18 草屯鎮農會共50人來場參觀水稻栽培。
84.05.18 芬園鄉農會共50人來場參觀水稻栽培。
84.05.21 后里鄉仁里村觀音山區段共同經營產銷班共46人來場參觀。
84.05.22 田尾鄉農會共90人來場參觀花卉。
84.05.25 水土保持局第二工程所共45人來場參觀有機農業。
84.05.25 五結鄉農會共45人來場參觀簡介、有機班織組。
84.05.27 嘉義農專共45人來場參觀水耕、有機農業及簡介。
84.05.27 中興大學共8人來場參觀有機農業、米質、水耕。
84.05.27 員林靜修國小及台北民校國小共95人來場參觀簡介、水耕。
84.05.29 田尾鄉公所共50人來場參觀花卉栽培。
84.05.29 草屯鎮公所共40人來場參觀水稻新品種。
84.05.29 善化鎮農會共90人來場參觀家政。
84.05.30 雲林二崙國中四健會共40人來場參觀花卉。
84.05.30 龍潭農會共250人來場參觀有機農業。
84.05.31 鹿港鎮農會共150人來場參觀蔬菜產銷班。
84.05.31 農委會大專研究生共41人來場參觀簡介、水耕、有機農業。
84.06.03 宜蘭縣五結鄉農會共90人來場參觀水稻栽培。

84.06.06 中興大學共8人來場參觀。
84.06.07 嘉義農專共53人來場參觀設施園藝。
84.06.08 嘉義市農會共40人來場參觀良質米栽培。
84.06.12 彰化縣埤頭鄉農會共45人來場參觀垃圾堆肥。
84.06.12 彰化縣溪州鄉農會共45人來場參觀農業機械自動化。
84.06.17 卓蘭鎮農會共40人來場參觀梨栽培。
84.06.22 南投縣埔里鎮農會共100人來場參觀。
84.06.22 南投縣埔里鎮農會共60人來場參觀。
84.06.30 高綠有限公司中央化工廠共5人來場參觀水稻栽培。
84.07.03 外交部記者共14人來場參觀。
84.07.05 亞森觀光果園共45人來場參觀設施園藝。
84.07.05 桃園家扶中心共160人來場參觀水耕。
84.07.10 中華花卉園藝文教基金會共45人來場參觀水耕、花卉。
84.07.13 中華花卉園藝文教基金會共45人來場參觀水耕、花卉。
84.07.14 台大植物系共40人來場參觀水耕、花卉。
84.07.17 中興大學韓國振興廳官員共9人來場參觀。
84.07.18 彰化糧管處共100人來場參觀農作物。
84.07.19 中華花卉園藝文教基金會共90人來場參觀水耕、花卉。
84.07.19 三星地區農會共45人來場參觀高接梨栽培管理。
84.07.24 台灣手工業推廣中心共15人來場參觀。
84.07.24 高雄縣大社鄉農會共132人來場參觀水耕、有機農業。
84.07.25 彰化糧管處共100人來場參觀農作物。
84.07.31 台灣手工業推廣中心共15人來場參觀。
84.08.01 台灣手工業推廣中心共15人來場參觀。
84.08.04 台北縣農會共45人來場參觀花卉。
84.08.08 彰化糧管處共100人來場參觀農作物。
84.08.11 中興大學農產運銷科共42人來場參觀。
84.08.12 中國廣播公司農業局共30人來場參觀。
84.08.23 大溪鎮農會共45人來場參觀自動化噴灑灌溉。
84.08.24 二林鎮農會共45人來場參觀蕙苡栽培。
84.08.28 高雄縣仁武鄉農會共150人來場參觀有機業。
84.08.31 和美鎮老人會共150人來場參觀家政。
84.09.03 草屯鎮農會共30人來場參觀產銷班運作。
84.09.15 台南永康市農會共45人來場參觀有機栽培。

- 84.09.15 鹿港鎮公所共14人來場參觀花卉。
- 84.09.20 溪州鄉農會共90人來場參觀水耕。
- 84.09.25 嘉義水上鄉農會共45人來場參觀水耕。
- 84.09.26 南投縣水稻育苗協進會共40人來場參觀育苗、機械維修。
- 84.09.26 宜蘭市農會共130人來場參觀有機農業。
- 84.10.02 青果合作社新竹分社共45人來場參觀梨病蟲害。
- 84.10.06 蘆竹鄉公所共45人來場參觀米質檢驗及新品種栽培。
- 84.10.12 台北縣瑞芳地區農會共45人來場參觀有機農業。
- 84.10.13 龍潭鄉農會共40人來場參觀水耕栽培。
- 84.10.13 外文部官員共25人來場參觀。
- 84.10.17 新市鄉農會共90人來場參觀花卉、水耕。
- 84.10.18 卓蘭鎮農會共45人來場參觀果樹栽培。
- 84.10.18 彰化湖東國小教師共45人來場參觀花卉、水耕。
- 84.10.19 豐崙國小教師共12人來場參觀花卉、水耕。
- 84.10.21 永安鄉農會共90人來場參觀花卉、蔬菜。
- 84.10.21 虎尾鎮農會共90人來場參觀有機農業。
- 84.10.21 竹塘鎮農會共90人來場參觀蔬菜用藥常識。
- 84.10.23 草屯鎮農會共45人來場參觀。
- 84.11.03 枋寮鄉農會共45人來場參觀水稻育苗經營管理技術。
- 84.11.09 農試所共90人來場參觀。
- 84.11.14 水里鄉天山梅產銷班共80人來場參觀有機農業及微生物。
- 84.11.14 外埔鄉鐵山農地利用綜合規劃共同班共45人來場參觀。
- 84.11.14 金山農會共40人來場參觀花卉。
- 84.11.21 龍井鄉農會共45人來場參觀。
- 84.11.22 大寮鄉農會共45人來場參觀水稻病蟲害防治。
- 84.12.04 中興大學共30人來場參觀。
- 84.12.06 荊桐鄉農會共45人來場參觀家政。
- 84.12.18 玉井鄉農會共45人來場參觀梨栽培。
- 84.12.29 新竹新埔農會共90人來場參觀果樹。

Foreign Visitors

國外部份

- 84.01.16 日本農業協同組合共14人來場參觀。
- 84.01.18 中日農業上難防治昆蟲之管理對策共6人來場參觀。
- 84.02.21 韓國金善謙共3人來場參觀。
- 84.02.22 土地改革訓練所(外籍學員)14人來場參觀。
- 84.02.23 韓國農地改良組合共31人來場參觀。
- 84.02.24 日本村松久雄共2人來場參觀。
- 84.03.07 中國農業交流協會(大陸農部)共7人來場參觀。
- 84.03.09 越南考察團共10人來場參觀。
- 84.03.21 亞洲農業技術服務中心(大陸農業專家)共3人來場參觀。
- 84.03.24 東勢鎮農會(日本國愛知縣地區梨產業幹部)共15人來場參觀。
- 84.03.30 馬尼拉文化經濟辦公室(菲律賓代表團)30人來場參觀。
- 84.04.20 中興工程顧問社(菲律賓、越南、印尼等學)共10人來場參觀。
- 84.04.28 美國、日本、德國農業專家共6人來場參觀。
- 84.04.28 土地改革訓練所(外籍學員)共18人來場參觀。
- 84.05.05 農林廳(日本學者)共5人來場參觀。
- 84.05.09 土地改革訓練所(外籍學員)共26人來場參觀。
- 84.05.23 農委會(南非電力公司)共3人來場參觀。
- 84.06.12 土地改革所訓練所(外籍學員)共18人來場參觀。
- 84.06.14 亞東關係協會(日本鹿兒島縣農業專家)共47人來場參觀。
- 84.06.17 農委會(亞太經濟合作會議)共70人來場參觀。
- 84.06.23 土地改革訓練所(外籍學員)共25人來場參觀。
- 84.07.05 韓國農協中央會共45人來場參觀。
- 84.07.11 韓國農協中央會共66人來場參觀。
- 84.07.19 韓國農協中央會共44人來場參觀。
- 84.07.25 亞洲蔬菜研究中心(泰國農業部)共17人來場參觀。
- 84.08.19 新聞局(馬來西亞報社助理)共3人來場參觀。
- 84.08.21 外交部(布吉納法索國議員)共15人來場參觀。
- 84.08.24 越南農業科學院長共3人來場參觀。
- 84.08.24 農委會(韓國農村經濟研究院副研究員)共2人來場參觀。
- 84.08.28 外交部(幾內亞比索共和國代表)共5人來場參觀。
- 84.08.29 韓國農協中央會共44人來場參觀。

- 84.08.30 大韓民國京畿道驪州郡開發委員會共35人來場參觀。
- 84.09.07 大陸學者共9人來場參觀。
- 84.09.18 日本小川修等20人來場參場。
- 84.09.19 韓國農協會共66人來場參場。
- 84.09.27 韓國農協中央會共68人來場參觀。
- 84.10.11 韓國農協會共60人來場參觀。
- 84.10.17 韓國農協會共32人來場參觀。
- 84.10.18 韓國農協會共25人來場參觀。
- 84.10.19 韓國農村振興廳共45人來場參觀。
- 84.11.02 日本中縣市農業協同組合共36人來場參觀。
- 84.11.07 日本鹿兒島縣日置郡町會會長共9人來場參觀。
- 84.11.07 泰國RIT學院共17人來場參觀。
- 84.12.01 日本吉川市農協青年部研修團共40人來場參觀。
- 84.12.13 韓國農協中央會共16人來場參觀。
- 84.12.14 美國夏威夷州農業廳長共3人來場參觀。

五、八十四年度出國人員統計表

姓名	前往國家	出國日期	目的及任務
林信山	紐西蘭、日本	3.02~3.15	研習紐西蘭、澳洲等地區水果產銷現況及其對我國水果產業之影響
許志聖	菲律賓、馬尼拉	3.19~4.15	參加雜交稻種生產研討會
陳彥睿	日本	5.13~5.27	赴日研習玫瑰切花生產技術
蔡宜峰	韓國	5.23~5.30	參加微生物肥料及堆肥國際訓練課程
鍾維榮	巴布亞紐幾內亞 索羅門、斐濟	5.29~6.11	赴巴布亞紐幾內亞、索羅門、斐濟等三國考察我農技團協助駐在國農業發展工作之實況與績效
高德錚	以色列、土耳其 西班牙	6.05~6.22	研習地中海區園藝作物設施生產技術
林俊義	日本	7.25~7.30	參加農業技術發展研習會並擔任講師
黃勝忠	斯里藍卡	6.04~6.11	參加永續農村體系發展研習會
黃勝忠	甘比亞	9.07~9.17	參加海外會「赴甘比亞農技合作考察團」，協助規劃中甘農技合作方向及設立甘比亞農技團事宜
許志聖	大陸	10.17~10.22	擬應青商會中華民國總會邀請參加一九九五年十傑大陸訪問團赴大陸交流訪問

六、八十四年專題討論

日期	主講人	題 目
84.01.13	林再發	水稻對褐飛蟲抵抗力研究
84.01.16	曾勝雄	薏苡水田栽培法
84.01.23	古錦文	淺談韭菜開花
84.02.06	郭俊毅	穴盤育苗技術簡介
84.02.13	邱建中	殺草劑的選擇性
84.02.27	渡邊英夫 山田岸雄 村上明	日本稻米產業政策及檢驗制度現況
84.02.27	劉興隆	作物細菌性軟腐病
84.03.06	張素貞	砂與作物抗病性
84.03.13	張林仁	葡萄之花芽分化
84.03.13	劉添丁	梨輪紋病之發生與防治
84.03.27	張隆仁	台灣食用甘藷品質之研究
84.03.27	蔡宜峰	堆肥化因子對堆肥中營養要素之影響
84.04.03	陳彥睿	玫瑰扦插繁殖之條件
84.04.10	易美秀	環境因子對百合生育之影響
84.04.10	林正賢	溫濕度及添加物對百合白絹病之影響
84.04.17	張致盛	光質對菊花生育之影響
84.04.24	黃秀華	十字花科根瘤病之生態與防治
84.05.08	陳啓吉	水稻紋枯病發生與防治
84.05.22	柯忠德	落花生小綠葉蟬發生與防治
84.06.05	王文哲	玫瑰害蟲之種類及其為害
84.06.19	方敏男	茄子二點小綠葉蟬發生消長與防治
84.07.17	沈 勳	田菁屬在耕作制度上之探討
84.07.17	蔡素蕙	唐昌蒲葉黃化及花品質與施肥關係之探討
84.07.17	王錦堂	果園施用磷肥對柑桔果實質量之影響研究
84.07.31	陳令錫	噴頭類別與應用
84.08.14	黃金助	黑角舞蛾生態與防治
84.08.21	張致盛	DIF 在花卉栽培之應用
84.08.21	張隆仁	澱粉合成機制
84.08.28	許志聖	雜種水稻的種子生產
84.08.28	陳彥睿	玫瑰之養液栽培
84.08.28	林金樹	菊花幼苗莖腐病之綜合防治
84.09.04	張素貞	單粒選拔法在抗病育種之應用

日期	主講人	題 目
84.09.04	易美秀	非洲菊採後處理技術
84.09.11	趙佳鴻	番茄斑萎病毒屬(<i>Tospovirus</i>)之薊馬傳播特性
84.09.25	田雲生	蔬菜種苗移植機械之介紹
84.10.02	廖萬正	柿之脫澀
84.10.02	洪梅珠	非破壞性之品質檢驗法
84.10.09	黃勝忠	彩色海芋生產技術改進
84.10.09	顏榮輝	玉米花絲生育與結實之探討
84.10.09	劉達修	基徵草蛉在葉端防治上之利用
84.10.23	張德前	褐飛蟲之捕食性天敵蜘蛛
84.10.16	李健鋒	土壤水分與氮素對水稻生育之影響
84.10.16	林再發	秈粳稻雜交發生問題之探討
84.11.16	許愛娜	種子活力與水分含量之關係
84.11.16	張林仁	葡萄修剪之新概念
84.11.20	吳榮銘	淺談十字花科蔬菜根瘤病
84.11.20	林嘉興	柑桔之樹形與樹體生產潛能
84.11.20	何榮祥	Internet網際網路資源簡介
84.12.04	郭俊毅	蕓苔屬複二元體育種之探討
84.12.04	曾勝雄	蕎麥生產技術改良
84.12.04	陳鴻堂	綠肥對土壤改良效果
84.12.18	戴振洋	酸降對蔬菜影響的探討
84.12.18	古錦文	菜豆抗銹病之探討
84.12.18	龍國維	花卉生產自動化之介紹
85.01.08	郭孚耀	蔬菜高溫障礙發生之機制

七、八十四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	利用頂端優勢舒解臺灣平地溫帶梨之高溫逆境
陳慶忠	甲種	冬瓜上類似番茄斑點萎凋病毒之鑑定及分類
張素貞	乙種	水稻抗白葉枯病生理及遺傳之研究
何榮祥	乙種	菊切花儲存品質與花苞黏特性研究
洪梅珠	乙種	包裝形式及貯存溫度對小包裝白米品質之影響
蔡宜峰	乙種	有機質肥料製作及肥效評估之研究
趙佳鴻	乙種	Purification and Serology of the Nucleocapsid Proteins of Four Distinct Tospoviruses

其他獲獎名冊

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洪梅珠	獲得同濟會第十九屆十大傑出農業專家
林信山	獲得國際傑人會中華民國總會第一屆傑人獎
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宋勳	獲得省府八十四年特殊貢獻人員

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附 錄 (APPENDIX)

民國八十四年台中地區每月最高、平均、最低溫度及總降雨量
 Monthly maximum, mean, minimum, temperature and rainfall of central Taiwan, 1995

月份 Month	最高溫度(°C) Max. Temp.	平均溫度(°C) Mean Temp.	最低溫度(°C) Min. Temp.	降雨量(mm) Rainfall
January	29.7	15.9	4.8	5.0
February	24.7	14.9	5.2	78.0
March	27.7	17.8	8.2	71.0
April	32.7	22.9	13.7	45.0
May	32.1	25.0	18.1	97.0
June	35.0	28.0	22.4	438.5
July	35.1	28.2	23.3	216.0
August	33.8	27.9	22.7	42.5
September	35.6	27.2	19.8	46.5
October	32.0	24.7	18.2	0.0
November	29.5	20.1	8.6	3.5
December	26.3	16.7	8.2	4.0