台 粳 九 號 育 成

親緣：
Parentage

台粳9號
Tak-Keng 9

北陸100號 (γ-ray 誘變選出)
Hokuriku 100 (selected from γ-ray induced plants)

越光
Koshihikari

農林22號
Norin 22

農林1號
Norin 1

台農秈育2414號 (63年由IRRI引進)
Tainung sen yu 2414 (introduced from IRRI in 1974)

IR-5470

IR-747B2-6

TKM-6

TKM-6

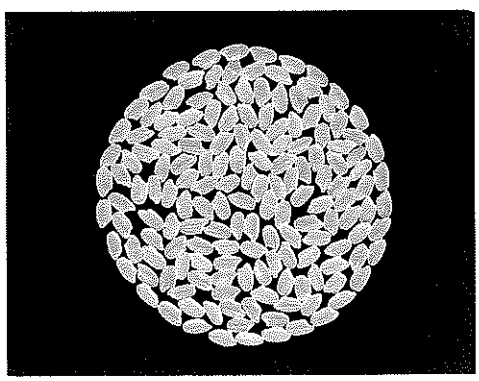
台中在來1號
Taichung native 1

K-71

產量穩定
Stable yield

株型良好
Good plant type

成熟時枝梗仍維持青綠
The branch is still green when matured



白米外觀良好
Good rice appearance

台 粳 九 號 之 育 成

台粳九號係台中區農業改良場為加強良質米品種的選育，以具有與越光相似的優良米質，但株高較矮的北陸100號為母本，另以具有良好株型的台農秈育2414號為父本，雜交選育而成的粳稻新品種，具有產量穩定、米質優良、食味佳、抗縞葉枯病、白背飛蝨、株型佳、不易倒伏及氮肥用量可較台農67號少等優點，於民國82年6月23日命名審查通過，納入推廣。

台粳九號其生育日數第一期作為123天，第二期作為114天，與台農67號相同；平均株高第一期作為102公分，第二期作為97公分，與台農67號相當；平均穗數第一期作為16支，第二期作為13支，亦與台農67號相近。雖然台粳九號在生育日數，株高與穗數上，與台農67號相近，但在一穗粒數、穗重與千粒重上則略遜於台農67號，因此在全省區域試驗平均產量上，台粳九號第一期作為6199公斤，第二期作為4747公斤，分別較台農67號減產3.1%和5.3%。由於台粳九號的生育日數與台農67號相同，株高又與台農67號相當，所以可適用於本省單期作及雙期作田栽培，其栽培管理方式可依照台農67號田間作業進度實施。依據肥料試驗結果顯示，台粳九號的肥料用量較台農67號於各地區栽培的肥料用量略少些，即可達到其高產潛力，但應注意早期施肥，且於插秧後第一期作35天，第二期作24天應行斷肥，同時配合曬田作業。如此方可增加有效分蘖、抑制無效分蘖、防止植株徒長，以發揮高產潛能。

台粳九號對縞葉枯病及白背飛蝨有較佳的抵抗性，但對白葉枯病、紋枯病、稻熱病及褐飛蝨等其他病蟲害的抗性較差，宜依田間實際狀況及病蟲害預測警報，按植物保護手冊推薦之方法予以防治。本品種米粒飽滿，心、腹白較台農67號少，食味有優於台中189號的趨勢，唯於收穫前不可早斷水，以免影響米質。

Development of New Rice Variety: Tai-Keng 9

Tai-Keng 9, a Japonica rice variety was developed by crossing Hokuriku 100 with Tainung sen yu 2414, has been named and released as a recommended variety from June, 1993. The agronomic characteristics of this variety are: 123 and 114 days of growth duration for 1st and 2nd cropping, respectively; approximately 102 cm plant height for 1st cropping and 97 cm for the 2nd; 16 spikes in the 1st cropping and 13 spikes in the 2nd. The average grain yield of Tai-Keng 9 is 6199 kg/ ha in 1st cropping and 4747 kg/ha in the 2nd, less than Tainung 67 due to less panicle weight, spikelets/per panicle and 1000-kernels wegiht.

Tai-Keng 9 is similar to Tainung 67 in growth duration, plant height and panicle number, it has been suggested to be suitable to grow in the single and double crop fields in Taiwan. The fertilizer is recommended to be applied as early as possible, and it needs to be applied on the 35th and 24th days after transplanting for the 1st and 2nd crops, respectively. In order to facilitate the high yield, the proper draining is required for inhibiting the ineffective tillers and the elongation of rice plant.

Tai-Keng 9 is resistant to stripe and white-back hopper, but less resistant to blast, bacterial leaf blight, sheath blight and plant hopper. For the rice of Tai-Keng 9, the rate of white belly is similar to that of Taichung 189 and the eating quality is better than that of Taichung 189 which is considered as a high quality rice variety. In order to maintain the high quality of rice, irrigation should not be cut off too early before harvest.

RESEARCH AND DEVELOPMENT

RICE RESEARCH

Observation on Resistance to Stem Borer (*Chilo Suppressalis*) of Newly Developed Indica Rice Lines

The characteristics of rice stem may affect the resistance to stem borer. In this study the silica content in stems and external diameter in culm of newly developed Indica rice lines which resistant to stem borer at cage and field feeding tests were analysed. The test lines had lower percentage of dead heart than that of Taichung Sen 10. Moreover, it had more number of survival pupae and lower larval survival rate of tested lines than that of Taichung Sen 10. It showed that tested lines were more resistant to stem borer than Taichung Sen 10. It were due to higher silica content at stem, larger external diameter of culm and larger length of the 3rd elongated internodes than Taichung Sen 10. All tested lines have good rice quality. The grain yield of Tai Sen 1354, 1744, 2154 and Tai Sen (waxy) 2143 were higher than that of Taichung Sen 10 and will test at provincial district yield trial from 1994 to 1995.

Rice Variety Resistance to Borers and Its Relationship to Fertilizers

Five varieties of rice, i.e., Taichung 190, Tainung 67, Hsinchu 64, Taichung Shian 10, and Taichung Shian 1, were tested for their resistance to rice borers in the experimental field of Taichung District Agricultural Improvement Station during the 1st and 2nd crop in 1992. In terms of the extents of lateral leaf yellowing, deadheart and white-head, Taichung Shian 10 was the most susceptible variety with a damage rate between 6.9-21.0%. It was followed by Taichung Shian 1, with 3.4-13.3% damage rate. Taichung 190 was more resistant to the borers with only 0.9-7.2% damage rate. A survey of the width and thickness of the rice stem during peak tillering stage showed that Taichung Shian 1 had the widest stem averaging at 11.03 mm and Taichung Shian 1 had 9.07 mm stem width while Taichung 190 and Hsinchu 64 had only 7.28-8.15 mm stem width. Similar trend in stem thickness but with smaller difference among varieties was observed. In addition, the strength of stems of Taichung Shian 1 was the least as measured at 1208 kg; that of Taichung Shian 10 at 1323 kg. The stems of Taichung 190 and Hsinchu 64 were the strongest, with the strength measured at 1385 and 1388 kg, respectively. These results suggested that the width, thickness and strength of the stem are closely related to the insect resistance of rice varieties. Susceptible rice varieties have

wider, thicker and weaker stems. Adding slag to standard amounts of ferlitizers could increase the strength of rice stem thus reducing the whitehead percentage induced by the borers. Application of high nitrogen and low potassium/ phosphorus would soften the stem and caused an increase of whitehead induced by the borers.

Inheritance of Resistance to Bacterial Leaf Blight in Rice

A set of diallel crosses, parents including three resistant rice lines and two susceptible varieties, were conducted in greenhouse. F_1 of the diallel crosses and 5 parent plants were inoculated with Taiwan's isolate XF13 and XM42 of *Xanthomonas campestris* pv. *oryzae* at booting stage. The diseased lesion length of inoculated leaves were recorded at 7 and 14 days after inoculation. The diallel analysis evaluated the resistance to *X. campestris* pv. *oryzae* in five parental lines or varieties showed that significant additive effect was more important than dominant effect. The resistance to BLB of line TSWY7 was controlled by partial dominant genes and the other line TSWY1157 by partial recessive genes. Narrow-sense heritability varied form 48 to 85%.

A Model Established on the Integrated Pest Management at Regional Rice Planting Area

Due to the rice pest wasn't occurring very severe along with the shortage of agriman power in rural villages during recent years. We had adopted the wide-spectrum fungicides mixed with insecticides to control rice target pests, and to meet with the realistic integrated pest management purpose also to reduce the frequency of the chemical use as well as to set up the rice pest control model for farmers.

The result of chemical test in Taichung area indicated that single or twice pesticide application could control the pests economically and effectively. Take an example for the first rice crop, we sprayed the pesticides one time at 3-5 days before early stage of panicle initiation would increase the benefit of NT$ 6026/ha for farmers. If sprayed twice, firstly we used 6.5% MAFA at ineffective tillering stage. Secondly, we used 75% Tricyclazole WP+25% Pencycuron WP+ 75% Acephate SP, could increase the average benefit by NT$ 5, 389 /ha. In Changhua area, we applied 6% Cartap G 30kg/ha to control striped rice borer at the maximum tillering stage, caused only 2.8% ratio of shealth blight, but increase the average benefit of NT$ 8,897/ha.

For the second rice crop, we applied 6.5% MAFA S 1L/ha at ineffective tillering stage, then mixed with 25% Pencycuron WP, Stereptomycin Tetracycline WP, and Acephate SP to control the pests would increase the average benefit of NT$ 2,373/ha.

We applied no chemical along the coastal area but for the second rice crop, only one chemical spray to control rice leaf folder and plant hopper at the booting stage when the pests reached at the economic threshold level.

Effects of Management for Soil Moisture Regime on Growth and Quality of Rice During Grain Filling Stage

The experiments were conducted in the first and second crops of 1992 to investigate the effect of soil moisture regime on the growth and quality of two rice cultivars, Taichung 189 and Taichung sen 10. Three levels of soil moisture tension were practiced by soil-drying to reach 0.00, 0.02, and 0.04 Mpa before next irrigation. The control (0.00Mpa) group was submerged continuously. Experimental results showed that the treatment plots needed 5 and 7 days without irrigation to reach 0.02 and 0.04 Mpa before next irrigation, respectively. The aim to save irrigation water was been proved. The results of yields in 0.02Mpa treatment was the highest. The milling quality, chemical properties, physical properties and eating quality of rice in 0.02 and 0.04Mpa treatments were the same as the control. According to polynomial regression analysis, soil-drying to reach a soil moisture tension of 0.018 Mpa in the first crop and 0.027 Mpa in the second crop, respectively are recommended for management of soil moisture regime during grain filling stage.

New Japonica Rice Tai-Keng 9

A newly developed japonica rice line derived form Hokuriku 100 and Tainung sen yu 2414 was selected in the first crop season of 1985. The grain yield and pest resistance were tested form 1988 to 1991 and registered and named as Tai-Keng 9. The resistance to lodging, stripe blight, small planthopper and white-backed planthopper of TK 9 were tested in pest nursery. The performance of yield stability as good as popular variety Tainung 67 during regional yield trials over seven locations. The eating qualility and stability of this elite variety are better than that of Taichung 189 which was best quality before.

Fig. 1. The rice grain of Tai-Keng 9

The International Rice Bacterial Blight Nursery in Taiwan

In order to find the rice variety resistant to bacterial blight disease (*Xanthomonas campestris* pv. *oryzae*) of which obtained from Taiwan Agricultural Research Institute, the International Rice Bacterial Blight Nursery was conducted at Taichung District Agricultural Improvement Station in Changhua. The nursery contains 366 entries which were offered by International Rice Research Institute from 1980 to 1992. The promising rice lines were selected as IR20, Cisadand, IR22082-41-2, IR54, C702015, IR35361-59-3-3-2, RP1057-187-5-3-2, and RP2151-192-1 in 1990. The testing results of 1992 showed that IR22682-41-2, IR25587-133-2-2-2, IR48787-54-1-1-1, and Ayung were resistant to this disease in greenhouse, and also in paddy field. There were 34 rice lines resistant to Taiwan's isolates of *X. camprstris* pv *oryzae* in 1992, such as IR25587-133-2-2. In conclusion, the most resistant rice lines detected were IR22082-41-2 and IR25587-133-2-2 which might be used as resistant source to bacterial blight in rice breeding program.

RICE QUALITY

Study of Rice Quality in Taiwan

The rice quality is mainly determined by the four important factors: milling rice quality, milled rice appearance, physicochemical properties and palatability of cooked rice. The major released japonica type rice varieties is belonged to short and round grain in shape, possessed high milling rate. The percentage of brown rice, milled rice and whole grain of those varieties is between 81%-83%, 70%-75% and 65-72%, respectively, and Hsinchu 56 have the highest milling rate. The transparency degree of japonica type of rice varieties mostly belong to 2nd or 3rd degree, the white center or white belly is ranged from 0 to 2 degree. The shape of indica type rice varieties is more variable than those of japonica's. Due to the effect of shape and chalkiness, it usually have low milling rate. The transparency degree and white belly degree of indica type of rice varieties is ranged from 1 to 5 degree and 0 to 4 degree, respectively. The physicochemical properties of indica type of rice variety is more complicated than that of japonica's, except waxy-rice, the amylose content is ranged from 10% to 30%, but in the case of japonica the variation is between 15% to 21%. Indica-type possessed all kind of gel-consistency, but japonica type all belong to soft gel-consistency. The average protein content of indica-type is 2% higher than that of japonica's. The analytic result of cooked rice quality measured by texturometer indicated that Tai-keng 9 have the highest balance index, which is 0.14, followed by Taichung 189, Tainung 70 and Taichung sen 10, which all are 0.12, and Tainung 67 have the low index of 0.06.

Ultra-structure of Rice Grain and Cooked Rice

The starchy endosperm of rice grains is composed by parenchyma cell. The arrangement of parenchyma cell is elongated from the central region radially on cross-section view of rice grain. From the cross-section view of brown rice grain, there is no correlation in palatability performance with the openings degree of starch granules and amylose content. Ten of starch granules is packed by spherical starch plastid. The chalkiness of nonwaxy rice shown to be due to the loose packing of starch granules. In the transparent apperance region, the angular starch granules is tightly arranged in starch plastid. There is no relationship between size of starch granules and amylose content, but the smaller and evenly distributed starch granules seem to be have better palatability perfromance. The opaque region in waxy rice apperance is correlated to the hollowness of starch granules. The ultra-structure of cross-section of cooked rice indicated that the retrogradation rate of amylose is faster in the high amylose content rice variety, the cooked rice recover quickly and become ridially as in the case of rice grain.

UPLAND CROPS

Improvement on the Cultural Practices of Job's-tears

In order to promote the unit yield of job's-tear in Taiwan, the planting time, planting density, nitrogen rates, and application methods were studied. The preliminary results were summarized as follows:

The suitable seeding time of job's-tear is from the late March to late April and the most suitable seeding time is in early April. The suitable planting density for job's-tear is 40x10 cm or 50x15 cm. The nitrogen rate for job's-tear should be adjusted from 180 kg/ha to 220 kg/ha. The suggested application method of nitrogen for job's-tear is 50% as basal and 50% as grain fertilizer. Three times of grain fertilizer was applied at panicle development stage, booting stage, and full bloom stage. The equal amount of nitrogen fertilizer was used in each application time.

The Influence of Cropping Season on the Growth and Yield of Inbred and Hybrid Sorghum [*Sorghum bicolor* (L.) Moench]

Eight sorghum inbred lines and eight F_1 hybrids were grown at two locations in the fall cropping season of 1991 and spring cropping season of 1992. Several important agronomic characters were

investigated and the grain yield was evaluated to compare the performance of inbreds and hybrids between different cropping seasons. Experimental results indicated that for all traits, significant difference was observed between two cropping seasons but not between the two locations. The investigation of growth duration showed that the days from emergence to flowering were less in the fall than in the spring season. On the contrary, the total growth period and the actual grain-filling period were longer in the fall crop season. In general, the hybrids grew faster than their respective parental inbred lines. For the comparison of the means of agronomic traits, significant differences were observed between the two cropping seasons for both the inbred lines and the hybrids for all traits with the only exception of 1000-eseed weight. The correlation between grain yield and growth duration was negative in the spring crop but positive in the fall crop.

VEGETABLE CROPS

Preliminary Studies on Artificial Hybridization in Asparagus Bean (*Vigna sesquipedalis*(L.) Fruw.)

This study was aimed to improve the technique of artificial hybridization for asparagus bean in order to raise the pod setting rate and obtain more hybrid seeds for screening.

Result of blooming observation showed that the flower opening of asparagus bean started at midnight and reached its peak at six to seven o'clock in the morning. The closure of flower began at about eight a.m. and most of flowers wilted after nine a.m.

Preliminary result of manual pollination indicated that the following methods should be taken if the greatest success is expected. Flowers that will open in one day should be selected for hybridization. Emasculation is taken place in the evening and pollination is done on the following morning. It is better to gather and apply pollen at six to seven a.m. Corolla must be kept well in the process of emasculation. Then put a wet cotton ball inside. The corolla is secured with adhesive tape afetr pollination to prevent desiccation. The female parent had better to be put in a growth chamber with a temperature of 21-24 ℃ and humidity 80-90% for about three days. A success rate of 22% was obtained in this study.

Chemical Weed Control in Cabbage Field

The weed control method of cabbage field is somewhat different from direct seeding vegetable field in term of timing of herbicide application. Pre- or post-emergence herbicides is applicable in transplanted vegetables, such as cabbage. The recommended herbicides for cabbage field is all belong to pre-emergence application. The purpose of this trial is to evaluate the effect of Butisan, Pendimethalin, Lasso, Trifluralin and Mesoranil when apply pre- and post-emergence on the weed control of cabbage field. Preliminary result indicated that all treatment didn't cause any damage on the growth of cabbage plant. On the pre-emergence plots, Butisan and Pendimethalin have the best weed control percentage, which is 97 and 95%, respectively. On the post-emergence plots, Mesoranil have the best weed control percentage, which is 98%.

Effect of Planting Density on Podding Habits of Snap Bean

This experiment was conducted for the purpose of obtaning the podding habits of snap bean by planting at different densities. Three local varieties, Grey seed, TC#1 and Kentucky Wonder were compared at Ta-Tsun village during the autumn of 1992. The results of the experiment are shown below:

1. The number of nodes at first flowering of Grey seed was the lowest set among the three varietes. The total pod number and yield were also higher than the other two varieties.
2. Kentucky Wonder was the largest in term of length, width and thickness of pod, but had the lowest yield.
3. Using the same variety, planted at diffrent densities indicated that the first day of flowering from sowing, the number of nodes at first flowering and the length, width and thickness of the pods were not significantly different.
4. The ratio of available pods to useless pods wasn't significantly different in relationship to planting space.

In conclusion the optimum planting density for three local varieties, Grey seed, TC#1 and Kentucky Wonder is 8 plants per hill, 6 plants per hill, 2 plants per hill, respectively.

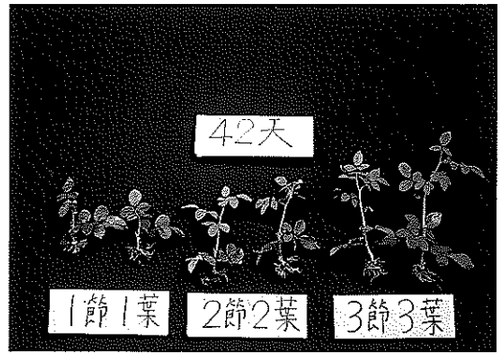


Fig. 2. The growth of common bean (*Phaseolus vaulgaris* L.), Taichung No.1.

Studies on the Improvement of Tomato Varieties and Regional Yield Trial

Fusarium wilt of tomato is very serious during hot and humid condition in summer season. The introduction of heat tolerance variety is the major goal of tomato breeding program. The DAIS have been testing the tomato new lines

developed by AVRDC since 1987. The selected lines of FMTT 22 and 3 have named and registered for Taichung Asveg 4 and Hualien Asveg 5. Both are medium resistant to Fusarium wit, high yielding and slightly cracking fruit. But the heat tolerance and Fusarium wilt tolerance properties is not yet satisfactory. We have introduced 7 Fusarium wilt resistant lines from 84 crosses of AVRDC breeding lines for regional yield trial. The check varieties is KY 301 and Taichung Asveg 4. The results indicated that the tested tomato lines have the same growth habit, heat tolerance and Fusarium wilt resistance as those of Taichung Asveg 4. Each flower cluster bearing 4-6 fruits and without fruit thinning. The fruit yield of tested lines is higher than that of KY 301, but only FMTT 277, 285 and 269 is higher than Taichung Asveg 4, the yield per 0.1 hectare is 6326kg, 6104kg and 6020kg, respectively. The increment of fruit yield is due to higher resistance to Fusarium wilt, larger fruit size, and less cracking fruit. But the fruit shoulder color of those three lines is light green to green, and have high tendency of fruit cracking, uneven distribution of fruit color that greatly affected the fruit apperance and needed to be further improved.

Effects of Shading Nets on the Growth and Development of Vegetable III. Variation of nitrate/nitrite content in the vegetable

The experiments were designed to evaluate the effects of shading nets on the growth and development of Chinese leafy vegetables. Six kinds of commercial PE shading nets such as 2SB35(silver/black, 35% shaded), R2650(black, 50% shaded), Al810(silver,60% shaded), LS(black, 50% shaded), GB1010(green, 60% shaded) and B1010(Black, 40% shaded) were respectively hung on the hyproponic greenhouses and three kinds of Chinese leafy vegetables such as Pai-stai, leafy lettuce, and edible amaranth were grown in the hydroponic culture. The results indicated that the nitrate nitrogen content of the vegetable was reduced with the enhancement of photosynthetic activity among the shading treatments in the summer season, but on significantly responsed on the nitrite nitrogen content. These significant reduction efforts were also found in treatments in LS50 on Pai-stai and edible amaranth and B1010 on Chinese leafy lettuce. Based the correlation analysis, the consumption amount of nitrate nitrogen in the nutrient was positively correlated with the increment of the yield and chlorophyll and nitrate content in the vegetable leaf. There were no significantly differences of nitrite content in tested vegetable among six shading treatments. The nitrite content of tested vegetable was remained in 1 to 2 ppm.

Change of the Composition of the Nutrient Solution as Affected by Zeolite through the Recycling Process of Hydroponic Culture — Preliminary Report

A series experiments were designed to evaluate the filtration effects of Zeolite on the composition variation of the nutrient solution through the recycling process of hydroponic culture. Based on this preliminary studies, 99.1% of NH_4-H ion was absorbed by zeolite powder under o.1% treatment. Four kind of ion such as NH_4-H, K, Mg, and Mn were more significantly absorbed by the zeolite granular with 0.5 cm D than 1.0 cm D in a ratio of 200gm : 1000ml. Moreover, this positive effort was enhanced with the increase of zeolite granular added up to 500gm. It also indicated that these ion absorption and releasing effects of zeolite were started in a ratio of 50gm : 1000ml and the efforts were improved with the increase of the reaction duration. Besides, seven kinds of ion found to be absorbed by zeolite were NO_3-H, PO_4-P, MH_4-N, K, Mg, Mn and Na and $S0_4$-S, Cl, and Ca were released from zeolite. However, no response with the ions of Fe, B, Cu, and Zn were detected in the experiments.

FLORAL CROPS

Effect of Light Shading on Summer Cut Chrysanthemum in Taiwan

Chrysanthemum (cv. Cheng-Hong, Shin-Chung-Huang, and Ah-Lai-Feng) were cultivated in 35, 45, and 55% light shading condition from May to July. Control treatment was in open field. Horticultural characteristics were investigated.

1. Plant height: Height of three shading treatments were longer than control. Cheng-Hong variety in shading was 7-8 cm longer than control, Shin-Chung-Huang, 10-12 cm, Ah-Lai-Feng, 15-20 cm, respectively.
2. Nodes: Control of Cheng-Hong had more 3 nodes than shading treatment. The other two varieties had no difference in four treatments.
3. Flower neck of control of var. Cheng-Hong was shorter and thicker than shading flower. And the stems of control were also thicker.
4. Leaf area: There had no difference in four treatments of Cheng-Hong. Shading of Shin-Chung-Huang had more 20-30 % leaf area than control. Ah-Lai-Feng in shading had more 30-35% leaf area.
5. Water absorption and transpiration of cut flowers harvested from shading condition were higher than control. Leaves chlorosis of cut flowers of control were investigated in 5～7 days.

Shading flowers had longer vase-life.

6.Chrolophyll content of leaves from shading had more 30 % than control.

Effect of Node Position and Number on the Cutting Propagation of Rose

Rose (Var. Samantha) cutting were harvested from one-year old plants, after immersed in fungicide, treated with powder rooting reagent, and then rooted in the mist system. The results indicated that the growth of adventitious roots and sprout shoots had no difference within cuttings from different node position. In experiment of cuttings with different number of nodes, triple-node cuttings grew faster than double-node, followed by single-node cutting. Harvest time of triple-node cuttings were 4 ~ 7 days earlier than double-node. Double-node cuttings could be harvested 16 days earlier than single-node cuttings. Ratio of rooted cutting was all above 85% in three treatments which had different numbers of node.

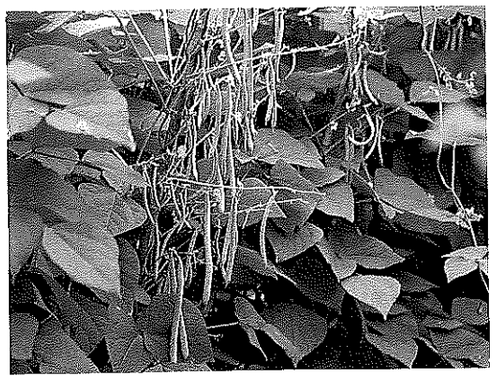


Fig. 3. Growth of rose cutting of 42-days old for the different No. of nodes.

FRUIT TREES

Effects of Apical Dominance on the Growth Habits of Temperate Pears

This experiment was aimed at evaluating the effects of apical dominance on the growth of pears and its application to the improvement of the management technique of pears. Cultivar Hsinseiki and Kosui (*Pyrus serotina* Rehd.) were the two varieties adopted as the experimental materials. Significant difference in the number of dropped leaves and partial opened buds were found among the 3 kinds of apical growth status of 1-year old Hsinseiki. The dropped leaves and partial opened buds were 5.7 and 1.9 in growing plants respectively; 7.8 and 3.3 in resumed growth plants; and 8.8 and 3.9 in ceased growth plants. Based on this results, three grafting treatments were designed for 2-years old Kosui pears: A, Kosui grafted on Niauli (stock); B, top-grafted Niauli on Kosui at the trunk of 180 cm high (Niauli was also the stock); C, Kosui grafted on 8 lateral twigs of Niauli. The ceasing of the apical growth of A was on August 30, 1993, and B and C was on September 13. In the period from July 31 to October 4, the net increment of trunk cross section of A, B, and C were 268 mm^2, 272 mm^2, and 482 mm^2; and the percents of the dropped leaves were 73.3%, 76.8%, and 79.9%, respectively. By application of cyanamide on October 6, the rate of budbreaking of A, B, and C were 58.1%, 50.8%, and 72.4%; and the percents of flower buds were 3.5%, 3.2%, and 4.2%, respectively. These results showed that C treatment possesed the advantages of higher growth rate, longer apical growth, and was helpful to the budbreaking of the 2nd crop of pear in the autumn.

Study and Investigation of Damage by Natural Disaster in Vineyard

The purpose of this study is to understand the effect of natural disaster, such as heavy rainfall, flooding and typhoon on the yield and quality of grape. The three typhoons occurred during October, 1991 to September 1992 have caused severe damage on growth and development of grape. The major damage is as follow: vineyard flooding, broken branches, fruit dropping, rotting and cracking of fruits. The flooding experiment of vineyard indicated that the degree of damage is depended on the location and different growth stages of grape tree. Flooding is affected the photosynthesis, leaf growth and fruit growth of grape tree.

Cultivation of Temperate Pear at Lowland Area

The major constrain of growing temperate pear at low elevation area in Taiwan is uneven bud emergence and dieback of flower bud. Experiment results indicated that 1 ~ 2% of Hydrogen Cyanamide have the best effect on the enhancement of budbreaking. Apply this chemical during Jan. to Feb. on pear tree, the bud emergence rate could reaching 70%. Application of 0.5% Hydrogen Cyanamide on tree could enhance the leaf dropping, budbreaking, and the bud emergence rate is above 90%. The flower bud will complete the initiation stage at January on the following year. Treated the flower bud between January to February with Hydrogen Cyanamide to enhance the fruit setting, and the fruit is ready to harvest at July ~ August. This method will replace the topgrafted practice in pear production.

Fig. 4. Kosui pears in Taichung DAIS.

Effect of Bagging on the Fruit Growth of Kyoho Grape

The production of table grape "Kyoho" is mainly on winter season, partly due to the unacceptance of fruit bagging practice at summer season by the farmers. The fact of high temperature and high berry rotting rate of summer

fruit resulted from bagging are well-recognized by farmers. The purpose of this study is to observe the effect of bagging on the growth and ambient temperature of berry cluster. The primary bagging result indicated that at July of summer season, the internal temperature of bag is 6℃ higher than that of unbagging treatment. The effect of bagging on the fruit growth and development as well as berry quality will be studied in the future.

SOIL AND FERTILIZER

Effect of Organic Manures on the Growth and Yield of Sweet Pepper

This experiment was conducted in a slate alluvial sandy loam soil in the farm of Taichung District Agricultural Improvement Station at Tatsuen, Changhua. The whole experiment consisted of the following six treatments arranged under randomized complete block design with four replications: (A) chemical fertilizers only (control); (B) hog manure compost added with microorganism; (C) chicken manure compost added with microorganism; (D) microbialized oil refuse; (E) microbialized oil refuse with rice hull; (F) microbialized oil refuse with rice straw. In treatment A, chemical fertilizers at the rates of 150-120-150kg/ha of N-P_2O_5-K_2O was applied as the common recommended way, and a pesticide, Benlate, was sprayed for three times during the whole growing period. In the other 5 organic treatments, the amounts of manures were applied based on the same rate of 150kg/ha of nitrogen calculated in accordance with the nitrogen contents of individual manures, and three sprays of sugar-vinegar solution were applied instead of chemical pesticides.

The results showed that the plant height, fruit size, fruit number, and fruit yield in all organic treatments were all very significantly higher than that of the chemical treatment; among them the yield of the plot of chicken manure compost with microorganism increased for 77% was the highest. Apparently this very significant increases in plant growth and yield was the combined effect of organic manures and the added microorganism.

Significantly lower iron content, and very significantly lower manganese content in the fruit of organic treatments suggested that it had the tendency to lose the nutrient of iron and manganese, however as the unfavorable metallic elements, sodium and nickel were both very significantly lower and fruit size were bigger in all organic treatments, it may say the organic sweet pepper is better in quality from the view point of their nutrient safety and outside appearance.

As to the diseases, the affected plants by phytophthora blight was significantly lower in organic treatments than in chemical treatment. The affected rate of soft rot also tended to be lower, and the virus chlorosis tended to be higher in organic treatments than in chemical treatment, but both of them were not statistically significant.

The Influence of Applying Phosphate Fertilizer on the Yield and Quality of Citrus

The study was to find out the effect of applying phosphate fertilizer on the yield and quality of citrus on Latsol. The field experiment was conducted in 1991 to 1993 at Shinsho in Taichung County. The 12 treatments of four levels of phosphate content (<200, 200-400, 400-600, > 600 ppm) in original soil and three application rates (0, 300, and 600 g/plant) on P_2O_5 base were used. The randomized complete block design with three replications was adopted in the experiment.

From three-year experiment, the results indicated that the yield of citrus fruit was 75.61 kg/plant and its juice had 10.4% Brix sugar content in the combination plot of applying 600 gram phosphate fertilizer per plant when the P content level was 200-400 ppm or less than that in the original soil. If P content in soil was lower than 200 ppm and together with no applying P fertilizer, the yield was 50.3 kg/plant. However, the P content in soil was 400-600 ppm or higher than 600 ppm, the citrus yield was 63.5 and 75.1 kg/ha, respectively. In addition, no significant difference of sugar content was found. Therefore, high yield and good quality could be expected if P content in original soil was 400-600 ppm or higher and phosphate fertilizer is not necessary to apply.

Evaluation of Chemical Indices of Potentially Available Nutrient for Compost

The mineralization potential of an organic fertilizer is referred to as its potentially available nutrient (PAN). The most efficient use of composts was to match their PAN values with the amounts of nutrients needed for the aim crops. Two corn pot experiments with different levels of composts (rice straw, chicken-sawdust , and dairy composts) were conducted to evaluate four chemical extracts (0.1 M NaOH, 1 M NaCO, 1M $(NH_4)_2CO_3$, 1 M Urea) in measuring the PAN value of composts.

Results showed that the high correlation between the amounts of N and P uptaken by corn shoot and extractable N and P was the ammonium carbonate extract. The relationship between the amounts of organic N and P extracted by ammonium carbonate and their amounts uptaken by corn shoot can be significantly described by Langmuir equation, r^2=0.831** for N, and 0.746** for P,

respectively. Their regression equations can be employed to estimate the quantity of compost which is required for production of a crop. Therefore, ammonium carbonate extracting method can be used to evaluate the PAN value of composts.

A Study on Preparation of Composts from Used Mushroom Culture Medium

A study on the characteristics of composting processes and products was conducted by piling used mushroom culture medium with soybean oil extract waste and bone meal (A treatment), chicken dropping (B treatment), hog feces (C treatment), urea and perphosphate (D treatment), under the condition of initial carbon/nitrogen (C/N) was 30, moisture content was around 60%, piling volume was slightly more than 1 m^3 (1 l x 1 w x 1 h) and turning frequency was every 10 days. The result showed that treatment A, B, C, D required 80, 20, 50, >110 days, respectively, to become matured composts with C/N ratio lower than 15. However, evaluating matured compost on the base of almost no temperature raising after turning those piles for several days, treatment A, B, C, D need around 72, 51, 58, 77 days, respectively. The maturity days of each treatment was different while judging them on different criteria, but the order of maturing speed were still the same as treatment B > C > A >D. The result of biological test indicated that the germination percentage of cabbage seed in 1:5 (w/v) water extract solution didn't increasing with piling days and showing the unstable tendency. Then, it is difficult to be as a criterion for the treatments in assessing maturity degree. However, cabbage seed could germinated more than 70% in same water extract solution from each treatment with 70 days' piling.

The treatments could become matured composts after piling for 110 days and the products' properties are as followings: (1) pH is in the range of 7.5～8.5. (2) electrical conductivity (EC) is more than 4 ms/cm for A and B product and less than 4 ms/cm for C and D product. (3) carbon content is between 30 and 36%. (4) total nitrogen content is in the range of 2.0～2.5% and product A is the highest while product D is the lowest. (5) product B has the highest phosphorus, potassium, calcium and magnesium contents among the four products.

The result of primary test showed that the initial effect of the products on cabbage growth didn't have a positive relationship with the total nutrient content. In other words, effect of different compost treatments on the early stage of the growth of cabbage was not coincided with the order of the total nutrient content.

Study on the Improvement of Salt-Accumulated Soil

The experiment is to evaluate the improvement method for salt accumulation slate alluvial soil under protected cultivation (PE film tunnul system). Based on the salt-tolerance concept of Maas and Hoffman, the threshold salinities for non-heading Chinese cabbage (*Brassica Chinensis* L.) and leaf lettuce (*Lactuca sativa* L.), which were grown on the slate alluvial soil under protected cultivation, were 9.77 and 3.30 m^{-1}, respectively. The relative efficiency of the reclamation by five techniques used for both non-heading Chinese cabbage and leaf lettuce grown on the slate alluvial soil under protected cultivation was quite regular with their ECe in the order: 1. Removed salt accumulated soil (5 cm) and applied with 3 Mg ha^{-1} dairy manure; 2. Deeply plowed to 50 cm below soil surface and applied with 3 Mg ha^{-1} dairy manure; 3. Applied with 3 Mg ha^{-1} dairy manure; 4. Covered with 5 cm paddy soil and applied with 3 Mg ha^{-1} dairy manure; 5. Applied with 20 Mg ha^{-1} dairy manure. The relationship of EC value of soil under protected cultivation in central Taiwan with concentration of water soluble ion is as follow: $I=1.895\ EC^{(1:5)}$ cmol L^{-1}, the unit of EC is dS m^{-1}, the correlation coefficient is r=0.997.

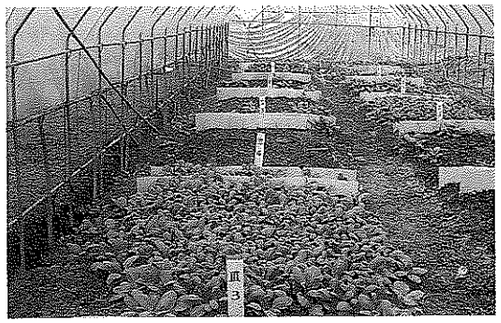


Fig. 5. Normal crop growth after improvement of soil salt accumulation under structural facility.

The Effect of Dairy Compost on Crop Production and Soil Characteristics

Field trials including rose, bitter gourd, gladiolus, and grape were conducted to study the effect of dairy compost on crop production and soil characteristics at Changhua (Teichung) and Taichung (Houlee, Waipu) counties.

The result showed that the use of dairy compost had positive effects on the improvement of soil characteristics such as the decrease of soil bulk density, soil hardness, and the increase of soil water content, pH, OM, and available phosphorus, but no difference for the exchangeable potassium and inorganic nitrogen content in soil. However, the effect of using dairy compost on soil characteristics showed only between 0～30 cm from soil profile during one cropping season. The application of dairy compost also significantly increased both yields and qualities of crops. For example,

the yield of rose, bitter gourd and gladiolus increased by 7.3%, 29.5%, and 9.6%, respectively. Therefore,it is recommended that dairy compost can be as a resource for organic fertilizer.

Fig. 6. The composting of dairy waste.

Effect of Application Rate of Hog Manure on the Growth and Yield of Spinach and Leaf Lettuce

Effects of hog manure on the growth and yield of spinach and leaf lettuce when grown on red soil and slate older alluvial soil were studied. Result of pot experiment indicated that the amount of hog manure is correlated with the growth and yield of spinach and leaf lettuce, the treatment of hog manure at 20 t/ha have the greatest increment effect. The percentage of yield increase for spinach is 113.0% and 44.9% and for leaf lettuce is 80.2% and 59.4%, while grown on red soil and slate older alluvial soil, respectively. It is recommended that hog manure is a very good organic fertilizer for field crop.

Effects of Soil Amendments on the Growth of Loquat and the Amelioration of Strong Acid Soil

Result of soil amendments experiment on strong acid soil in loquat orchard at Shinshe and Taiping, Taichung county, indicated that application of humic acid plus ammonium laureath sulfate (ALS) and gypsum have the best effect on growth, yield and fruit sugar content of loquat. Among treatments, application of humic acid 40 ml, ALS 3 ml and gypsum 5.0 kg for each plant per year have the best performance. Fruit yield increment in Shinshe and Taiping is 7.7% (2.9 kg/2 plants) and 10.8% (2.5 kg/3 plants) , respectively. Application of humic acid, ammonium laureth sulfate and gypsum could improve the soil bulk density, soil hardness, soil infiltration rate, and decrease the content of iron, manganese and aluminum in the soil.

PLANT PROTECTION

Identification of Tomato Spotted Wilt-like Virus on Peanut in Taiwan

Some ring-spotted plants of peanut were collected during the fall growing season of 1992 and 1993 from central Taiwan. The disease was characterized by one or more fan-shaped light green to yellow discolored areas along the main vein, each enclosing one ring spot. The plants showed tip necrosis and dieback symptoms in a later stage. When the diseased leaf samples were assayed on test plants by mechanical inoculation, local chloratic lesions or ring spots were produced on *Datura stramonium, Phaseolus vulgaris* L. (cultivar Victor) and *Chenopodium quinoa* and necrotic spots only produced on *Nicotiana benthamiana.* Symptoms on mechanically inoculated peanut seedlings were similar to those as observed in the field. Attempts to transmit the virus, tentatively designated as TSWV-P, by methods other than mechanical means were unsuccessful. In the crude saps of infected peanut leaves negatively stained with uranyl acetate, spherical particles 75-100 nm in diameter were observed. Particles with an elliptical outline, about 60-65 nm in width and 85-120 nm in length, were also observed frequently. In ultrathin sections of infected peanut leaf, virus particles were either spherical, enveloped, 80-100 nm in diameter, or elliptical, olive-like, about 60-90 nm in width and 90-140 nm in length. Most of the particles were arranged in line or clusters with a surrounding membranous structure and were found in the cyctoplasm adjacent to cell wall. In western blotting, polyclonal antisera raised against TSWV-W, TSWV-NY, TSWV-I and the peanut yellow spot virus reported from India failed to recognize TSWV-P. The results strongly suggest that TSWV-P occurring in Taiwan has no serological relationship with TSWV-W, TSWV-NY, TSWV-I and the peanut yellow spot virus.

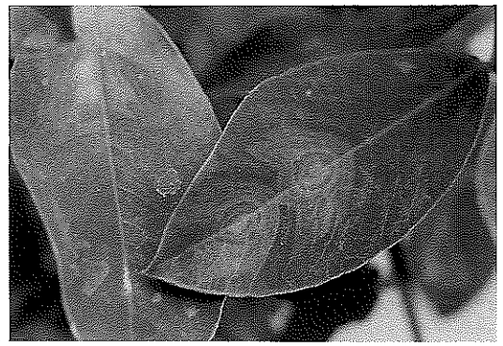


Fig. 7. Symptoms of tospovirus on peanut.

Investigation of Orchids Diseases

Orchidaceae is an extremely diverse group consisting of over 800 genera with at least 25000 known species. The Orchidaceae is the largest assemblage of flowering plants known to man. Cattleya, Dendrobium, Phalaenopsis, and Oncidium are major cutting flowers. Disease became dormant in the hot, moisture summers and with the advent of fall rains and splash water. The major diseases included black rot, anthracnose, southern blight, Fusarium wilt, petal blight, brown spot and soft rot. *Fusarium solani* caused by orchid is a new disease. Typical diseased symptoms on the leaves is a brown discoloration which is round or irregular in shape, more or less sunken and rather clearly defined.

Fig. 8. Soft rot of orchid.

Control of Gray Spot on Loquat

The loquat gray spot disease caused by *Pestalotia eriobtryicola* in Taiwan. The pathogens could isolated from diseased leaves, bud, stem, flower and fruit. The optimum temperature for pathogen germination and hyphal growth was found to be 20-28℃.The occurrence of gray spot in loquat was found to be most serious during the period of June to October in Taiwan. This disease could be controlled by spraying chlorothalonil and carbendazim-mepronil. There are totaled of 32 hectare demonstration plot for control of gray spot at Shin-she, Kaoshin, Taipen and Taichang 1n 1990. The number of application of fungicide is 9 times. The period of application is concentrated on July to August. Field experiments indicated that gray spot incidence of non-treated and treated plots were 38% and 8.3%, respectively. In 1992, field experiments with non-treatment and treatment incidence of 51% and 1.5%, respectively. Increase per yield 717797 NT$ per hectare.

Survey of the Diseases of Vegetables Under Structure in Central Taiwan

Different vegetable species, seasons, the sort of structures and managements, occurrence of different diseases and their seriousness under structure were surveyed during July 1991 to May 1992. The diseases found were Rhizoctonia blight, Pythium rot, soft rot, root knot, wilting, downy mildew, black rot, anthracnose, white rust and black spot (leaf spot). The continuous cultivation under structure favored the development of soil-borne diseases, such as *Rhizoctonia solani* and *Pythium* spp. For air-borne disease, the most serious one is downy mildew. Among 10 vegetable species surveyed, black mustard have the highest disease ratio which always results in devastating damage.

Studies on the Physical Control Methods of the Striped Flea Beetle

Sticky boards of six colors were placed in radish field to test the color preference of the striped flea beetle, *Phyllotreta striolata* (Fab.). The order of color preference of *P. striolata* was yellow> green> blue> white> red> black. Sticky card placed at a height of 25 cm from the ground trapped the largest number of adults of striped flea beetle. Radish plants were grown under green-house conditions in pots containing soils of different textures that were innoculated with adult beetles. Significantly fewer larvae and pupae were subsequently observed in sandy soil than in silt loam and clay loam. Pot experiments showed that soaking the soil with water for 48 hr resulted in complete death of the larvae and pupae inside the soil. The occurrence of this beetle was nil during the entire growing period (25-35 days) of Pok-choi in two experiments carried out under established house conditions when the soil was soaked in water for 48 hr before sowing. A survey made in harvest time gave 0.5 to 2 adult beetles per square meter for water-soaked soil as compared with 10 to 18 adult beetles per square meter for non-soaked soil. The occurrence of other insect pests, including tomato leaf miner, *Liriomyza bryoniae* and diamond-back moth, *Plutella xylostella*, was either very low or delayed when the soil was water-soaked. To ensure continuous cultivation of vegetables under established house conditions, after removing the debris and preparing the soil and before sowing, yellow sticky board was placed in the house to attract and kill large numbers of adults of striped flea beetle, tomato leaf miner and diamond back moth to reduce the sources of insect pests. The present work has demonstrated that soaking the soil for 48 hr before sowing could effectively control the striped flea beetles, and the production of good-quality vegetables is ensured without spraying any insecticides.

Integrated Control of *Frankliniella intonsa* and *Liriomyza bryoniae* in Pea Plant

Frankininla intonsa and *Liriomyza bryoniae* affected pea plants at 20 days after sowing to harvesting stage. The recommended control chemicals for *F. intonsa* is 25.3% Mevinphose E.C. 500 X, 2.8% Bifenthrin and Cyhalothrin E.C. 1000 X; for *L. bryoniae* is 75% Cyromazin W.P. 6000 X. Although placing yellow sticky card and water pan at ground level could attract *F. intonsa* and *L. bryoniae*. If combine Bifenthrin and Cyromagin with yellow sticky card, sugar-vinegar solution and detergent solution will increase the control effect. The pod yield of pea plant at plots of 2.8% Bifenthrin E.C. 1000 X, 2.8% Bifenthrin E.C. 1000 X plus 75% Cyromazin W.P. 6000 X and 2.8% Bifenthrin E.C. 1000 X plus two yellow sticky cards are 1.44, 1.35 and 1.33 kg/15m^2, respectively. The difference is significant compare with other treatments. Application of 75% Cyromazin W.P. 6000 X plus 2.8% Bifenthrin E.C. 1000 X plus 10.9% Penconazole E.C. 4000 X at 10, 15 and 20 days intervals showed that the 10 and 15 days applicaton intervals have the best control effect. The

difference also reaching the significant level.

From the above result, we recommended that during the occurrence period of *F. intonsa* and *L. bryoniae*, application of 2.8% Bifenthrin E.C. 1000 X plus 75% Cyromazin W.P. 6000 X at 10 - 15 days interval could reach the aim of integrated control.

The Damage of Bulb Mite on Gladiolus and Lily Plants

Bulb mites can damage many corm or bulb-flower plants and other crops on roots and shoots by reducing their growth vigor. Gladiolus corm and lily bulb are the major hosts of the bulb mites. A survey of selected spots in the field showed that bulb mites invaded the bulbs or corms immediately after they were planted and by the time of harvest, the infection rate was over 90%. Treating the bulbs or corms with pesticides before planting could reduce the damage slightly, yet the infection was still common, suggesting the existence of significant numbers of bulb mites and their eggs in soils. The damage was the most serious for both gladiolus and lily plants at harvest time. Those slightly damaged showing browning of the bulb or corm near the roots. Seriously damaged plants showing rotting at the roots and the base of the scales. The occurrence of bulb mites together with diseases hastens the rotting and the yellowing of leaves; eventually the plants dry up and die. Exeamination of yellowing and abnormal plants in the field revealed that 46.6% of the gladiolus and 29.3% of the lily plants had bulb mites together with disease infection. The average damage rate by bulb mites of gladiolus plants in Taichung area was 12.6%. Among the areas surveyed, the damage rate of gladiolus was the highest (17.7-21.5%) for Bei-dou and Tian-uei areas in Chang-hua and the lowest (4.5%) for Pu-li area. The average damage rate of lily plants was 6.8%. Lily plants in Bei-dou area had the highest damage rate (20.4%) and those in Pu-li area had the lowest rate (0.5%).

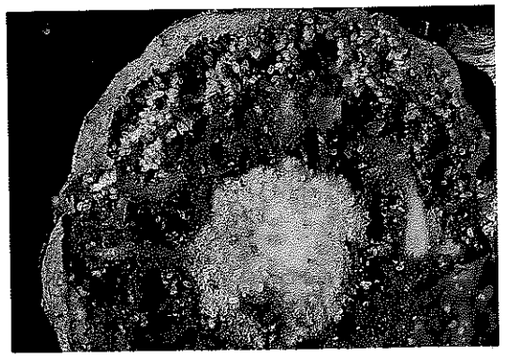


Fig. 9. Mites covering the entire damaged part.

Investigation on the Population Fluctuation and Life Cycle of the Mealy Bugs Damaging the Leguminous Vegetables

Nezara viridula, Riptortus clenaris and *Scotinophara lurida* are the three important mealy bug pests damaging leguminous vegetables in central Taiwan. Among them, *N. viridula, R. clenaris* and *S. lurida* mainly attack asparagus bean, snap bean and vegetable soybean, respectively. Usually, their population reached its peak after podding stage and damage the bean pod by sucking the juice that always results in unfilled pod fruit. Field survey showed the population of these mealy bug increasing from mid May (flowering and podding stages) and reached it peak during June to August, then the population declined since September. When *N. viridula* was fed on asparagus bean under laboratory conditions (26-30℃), duration of the egg, larval and adult longevity were approximately 5.4, 24.9 and 21.3 days, respectively, and it took 36.5 days in average to complete one generation. The predepositing stage was about 8.2 days. A female adult deposited 67.6 eggs in average each time and their consecutively deposited 1 to 6 times with a 3 to 8 days intervals. The highest total deposited egg number for one female was observed up to 425 eggs. The duration of the egg, larval and adult longevity for *R. clnearis* were approximately 4.7, 18.7 and 34.8 days, respectively and it averaged about 58.2 days to complete one generation. Under laboratory conditions, there were 12 overlapped generations in one year.

Toxicity of Mixtures of Several Miticides with Fungicide Triforine against Kanzawa Spider Mite

While the Kanzawa spider mite, *Tetranychus kanzawai* Kishida, is a major pest, powdery mildew and black spot are the major diseases on roses. Therefore, to save labor, rose growers often tank-mix miticides with fungicides for their control. This experiment first tested in the laboratory for the effectiveness of mixtures of fungicide 18.6% Triforine E.C. (1000-fold dilution) with seven miticides and two plant nutrient supplements that were proved to be effective against the spider mites. Four mixtures with better effect were subsequently tested in the field. In terms of toxicity against Kanzawa spider mites, mixing 18.6% Triforine E.C. with the 8 pesticides did not produce any adverse effect. In the field test, mixing 18.6% Triforine E.C. (1000-fold) with 2% Abamectin E.C.(2000-fold), 25% Bromopropylate E.C. and 2.8% Bifenthrin E.C. gave excellent control rate (92% to 100%) of eggs, larvae, nymphs and adults of Kanzawa spider mites. In contrast with laboratory results, a mixture of Triforine with 20% Amitraz E.C.(800-fold) was quite ineffective against this spider mite. Thus, growers should avoid mixing these two pesticides.

Survey on the Occurrence of Insect Pests on Vegetables under Pipehouse

In terms of cultivated areas, *Ipomoea reptans* L., *Brassica chinensis* L. (Pak-choi), *B. nigra* Koch, *B. campestris* L., *Lactuca sativa* L., *B. chinensis* L. (Chinggeeng), *B. juncea* Cosson., *Amaranthus mangostanus* L., *Chrysanthemum coronarium* L., *Spinacia oleracea* L. and *Apium graveolens* L. are the most important vegetables (in that order) grown under pipehouse throughout the year in central Taiwan. Insects occurring on vegetables under pipehouse vary with species of cultivated vegetable, seasons and management inside the facilities. The major pests on individual vegetable are tobacco cutworm (*S. litura*), Kanzawa spider mite (*T. kanzawai*) in *I. reptans,* striped flea beetle (*P. striolata*), diamond-back moth (*P. xylostella*), tobacco cutworm and Liriomyza bryoniae in *B. campestris*; diamond-back moth and tobacco cutworm in *B. nigra*; striped flea beetle and diamond-back moth in *B. campestris* and diamond-back moth, striped flea beetle and tobacco cutworm in *B. juncea.* Pests occurring in other cultivated vegetables are fewer and their damage is always limited. Striped flea-beetle, diamond-back moth and tobacco cutworm are three major pests under facility cultivation. These pests occur throughout the year, however, the striped flea beetle reaches it peak from October to December and from March to April during dry seasons. Diamond-back moth reaches it peak from November to the next May and tobacco cutworm always causes serious damage during October to December.

AGRICULTURAL MACHINERY

The Design and Development of a Furrow Digger and a Two-speed Belt Transmission

There are about 500 hectares of soft ginger producted in the Baogua mountain area in central part of Taiwan. These ginger farmers dig a lot of 40 cm depth and 15 cm width furrows first and then plant ginger rhizomes in the furrow. This part of digging work is all by hand and very hard thus the labor problem is very serious. To solve this problem, Taichung DAIS developed a cultivatormounted type furrow digger. This digger uses mechanism of rotary chain with digging knifes and can dig about 35～40cm depth. But the machine's original ground speed is too fast, so the 8.5 hp engine power is not enough. According to power calcu- lation result, the machine's ground speed should be lowered down 2.5～4 times. But if only change the original transmisson or pulleys to lower down the whole machine's speed, it will be too slow to move on road. A new design of two-speed belt transmission set has been developed to solve the ground speed problem and to help the machine matching its ground speed needs. This transmission set has 21 teeth solar gear, 17 teeth planet gear and 54 teeth ring gear inside to reduce speed by principle of self and around revolution. It is fully sealed and with lubrication oil fullfiled, can reduces speed about 3.6 times and is very easy to install. Take out the original pulley and replace by the transmision can make the cultivator driving on road for 1:1 speed and working in field for 1:3.6 speed. This transmission set can also use on similar field machinery.

Fig. 10. Overview of the furrow digger and a two-speed belt transmission.

Storage Quality and Bud Force Relaxation Quality of Chrysanthemum Cut Flower

For the purpose of improvement the quality of chrysanthemum, this research is to explore the quality change of chrysanthemum cut flower under various amount of compression deformation and period of transportation as well as its relaxation and creeping behavior. The information about compression effects, we can control the bud transformation and find the best packing size in practice.

The results showed that the longer chrysanthemum cut flower was in the post-harvest process, the more broken leaves it had, the shorter its flowers and leaves lasted, and smaller its blossoms were. It was also showed that the amount of broken leaves increased and the size of blossoms decreased when chrysanthemum cut flower was packed in the lower layers of packages.

The force relaxation of chrysanthemum cut flower was predicted by a Generalized Maxwell model which consisted of three parallel Maxwell elements. According to an equation of chrysanthemum cut flower force relaxation, it was predicted that in the condition of 10mm deformation, the relaxation force of chrysanthemum cut flower buds would became "0" after 15 hours.

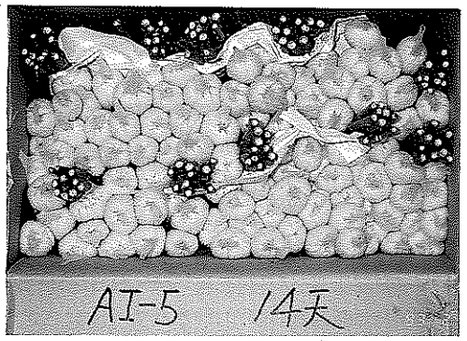


Fig. 11. Deformation of the chrysanthemum cut flower after 14 days of cold storage.

The Harvesting and Transporting Process of Grain Tank Rice Combine Harvester

The graintank rice combine harvester was imported from Japan in 1993. It was tested in the central area of Taiwan by Taichung DAIS. The harvesting grain are loaded into a 1000 liter bag or a truck and then transport to the rice drying center directly. This machine is better using in consolidated rice field to reach 0.3 ha/hr capacity, this is better than normal bagging combine. The volume of graintank is about 950 liter, it could be filled up after about 25 minutes harvesting, and then the grain could be moved from graintank to a transporting vehicle by a auger automatically in about 2.5 minutes. This harvester need two or more grain transporting vehicles when carrying distance is longer than 1 km, because the grain have to be unloaded in a carrier immediately , or the harvester will stop until the tank is empty.

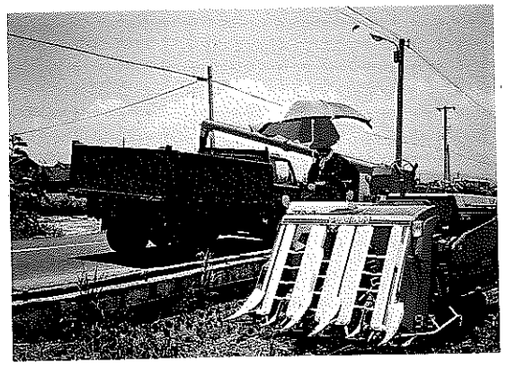


Fig. 12. Graintank rice combine harvester loading paddy rice to the truck.

Studies and Improvement of Manure Spreader on Agricultural Carrier

A Japan-made SASAKI GT-1110K manure spreader was imported by Taichung DAIS in 1991 for testing and comparing its performance with other kinds of spreaders. It was found that the mechanism of cutter blades with triangular spreading turnplates get better effects. According to this results, the research of fabricating a manure spreader in cutter/ turnplate form from a 13 Hp diesel engine agricultural carrier was set up. The original carrier's cargo deck was taken out and replaced by a spreading head with manure bin. The scraper at the bottom of manure bin was intermittently driven to scrape manure backward. The spreading head contains turning cutter blades and triangular turnplates to smash and spread the manure. This experimental machine has been assembled in this year. The spreading head can be easily removed when not in use, and then replaced by a piece of backboard to change the machine into a general agricultural carrier. The carrying capacity of this spreader is about 0.8 ton(1.4 m^3), and spreading width is 6-8 m. It spends 1.6-2.6 minutes to spread for each loading. If the recommended quantity of manure application is 5 ton/ha and the spreader is in high manure output speed with 9 km/hr ground speed, the machine spends only about 16.7 minutes to spread those manure except the time of reloading and transporting in road. This spreader works well when testing in field. But, a few defects of the spreader still need to be improved such as the slipping problem of scraping chain and the heaviness problem of the structure, etc.

Fig. 13. Overview of manure spreader on agricultural carrier.

AGRICULTURAL MANAGEMENT

Analysis on the Production Cost and Farming Income of Citrus Cultivation by Liu's Family

This study was suggested by the Agricultural Management Team of "Reducing Citurs Production Cost Project" to observe the citrus production cost and farming incomes of Liu's family in order to obtain useful information for further improvement. The owner of the studied farm, Mr. Liu, was at the age of 30. He graduated from high school and willing to work on citrus production for his future career. The farm located at the suburb of Taichung City with total land area of 1.85 ha. The results of the study indicated that the amount of total production, gross revenue, production cost, farming profit, return to family labor and farming earn were 32,865kg, NT$ 908,039, NT$ 771,385, NT$ 136, 654, NT$ 438, 764 and NT$ 493461, respectively. The analysis on the structure of production cost showed that labor cost, fertilizers and marketing cost were NT$ 302,110, NT$ 127,508 and NT$ 94, 620, of which they occupied about 67.96% of total production cost, the rest were around 32.04%. A study on the break-even point were found that the total production cost were NT$ 771, 385. Among them, the variable expense and fixed expense were NT$ 318,090 and NT$ 453, 295. The sale amount of break-even point were NT$ 697, 699 and 25, 253kg. The total sale of Liu's farm were higher than this break-even point to which the citrus production of Liu's farm had benefits.

An Investigation of Production-marketing Groups of Flowers and Vegetables in Taichung Area

Seven kinds of production-marketing groups , including teams of flowers and vegetables were organized by COA (Council of Agriculture) since 1993 to reduce the impact of attending GATT in future. In order to carry out the government's program of assisting farmers and

enhance the function of production-marketing groups of flowers and vegetables, a project of collecting basic data from the groups was conducted by staff of extension center of Taichung DAIS.

The result showed that 109 teams of flowers and 227 groups of vegetables in Taichung district were registered at Taichung DAIS in 1993. And among those registered groups, 81% was assisted by Farmer's Association while the other 19% was assisted by cooperative farm. However, there were overlapping of group within them.

In the aspects of the cultivated plants, farmers of flower group preferred Chinese cymbidium, lily, rose, gladiolus and baby's breath than others flower crops, while farmers of vegetables team preferred cauliflowers , co-ba, vegetable sponge, bamboo shoot, tomato, eggplant, kidney bean, watermelon, balsam pear, and cucumber than other vegetables.

As to the property of production-marketing group, only meeting place, tables and chairs are more popular than other facilities, members of a group gathered 6 times yearly at group leader's house, activity center or the meeting room of Farmers Association and they sale most of their product to consumer market.

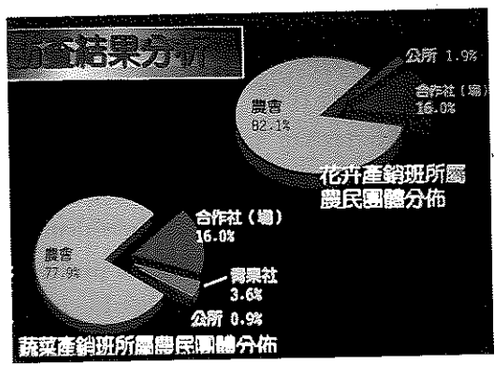


Fig. 14. Survey of flower and vegetable production-marketing groups in Taichung district.

A Case Study on Farm Management for a Joint Farming Group

The joint farming group engaged in the cut-flower production is an excellent type of enterprise organization. The purposes of this study were to analyze the characteristics of farm management and financial status in order to use as reference for guiding the agricultural production and marketing groups.

The results obtained showed that the annual management income was NT2,853, 664, the ratio of management income to business receipt was 15.7%. Both the net farm income and the return to operator's capital were all equal to NT3,286,814. The rate of return on operator's capital was 60.7% and that on total capital was 35.3%. The ratios of operator's capital and of long-term capital were 46.4% and 93.8%, respectively. The rate of security on equipment investment was 29.1%, current capital ratio was 1150.3%, the ratios of net worth to liability and of fixed assets to net worth were 86.7% and 58.7%. Turnover rates for total capital, fixed assets and operator's capital were 1.8, 8.5 and 3.4, respectively. The productivity per hectare cultivated land was NT7, 381, 091, the productivity of one person equivalent was NT5, 712, 825 and that of capital was NT1.78.

In general, the revenue for this joint farming group was high, but non-cash receipt was also high. It was excellent solvency for short-term debt although it may be just all-right for long-term debt. The liquidity position and security of finance were favorable. The recovery periods of fixed assets and operator's capital were very short although the total capital may be longer. The productivity for this business was very high.

In conclusion, several suggestions could be made as following: (1) Strengthening the collection of market information and establishing the marketing concept conducted by consumers. (2) Strengthening the management of seeds. (3) Repaying some long-term loan in order to reduce long-term liability, or adding operator's capital. (4) Farm record-keeping should be in detail so that the production cost and revenue of individual cut-flower can be analyzed and data obtained may be used for planning of the future production. (5) Training the members in the joint farming group to analyze record-keeping data and utilize data for improvement of farm management. (6) Strengthening the program for research and development.

AGRICULTURAL EXTENSION

Survey on the Recognization Trend of the Farmers' Subsidary Jobs' Training in Taichung District

Due to the comparative low income of the farm families and the rural-urban migration, the amount of full time farmers remaining in the village become fewer. A pioneer project namely programme of the subsidary jobs' training for farmers and fishermen were started conducting from 1990. A total number of 1000 trainees has attended these subsidary jobs' training courses since then. A survey was designed to make a better understanding of the recognization trend of farmers in Taichung district on these kinds of the subsidary jobs' training. A random sampling of 30 members from each of 61 Farmers' Associations (FA's) was questionnaired respectively. The results were summaried as follows:

(1) The information resources of training was obtained from the expansion of the extension agents of FA's, magazine and this questioinnaire issue.

(2) There were 45.1% of them thought to attend trainings which were organized by the public training institute and the venue closed to their village was better.

They were also preferring to obtain a training from district agricultural improvement station or FAs'(62.7%).

(3) The training held in the off-season or leisure time was better (51.7%).

(4) There were 62.7% of them thought to become part time farmers even if they were shifted to enjoy their secondary jobs.

(5) The training duration arranged in 1 - 3 month was better(54.4%).

(6) They were 54 % of them opted to get financial support from government due to they were shortage of income during the training duration.

(7) Four training courses i.e. car repairing, home watering and electric repairing, resturant service and home decoration were popular.

(8) The constraints of attending training of these secondary jobs were thought to be a) shortage of income, b) not acceptable in training period, c) not allowed by present job, d) far from the village.

Survey on the Living Quality and the Educational Needs for Rural Women in Taichung Area

The objective of this survey was to evaluate the responses of farm women to the home economic training courses conducted by the Farmers' Association and as well as to their living styles and characters. The sampled farm women were interviewed by questionnaire method. Based on the Maslow's theory, five levels of living demand of human being could be catalogued as physiological needs, safety needs, belongingness & love needs, social needs, esteem needs and needs for self-actualization. The results indicated that the majority of farm women were satisfactory in the mid-level of "belongingness and love needs", and they were urgent for the "safety needs". There were no significant differences between members of home economic group and those from non-home economic group in other four levels of living demand of human being. However, those from non-home economic group were more careful on the expression of "needs for self-actulization". The locations of villages made a significant influences in the living demand. Less satisfactory responses were shown on those from rural villages. Home economic training was practically useful for the improvemnet of the demand of health and the recognization of living demand. The individual farm woman showed more interesting in attending the activities of home economic group. Those from different locations of villages showed no differences in the demand of home economic training courses.

Studies on the Adoption of New Agricultural Technology by the Trainees of Rural Youth

In order to survey the adoption of new agricultural technology by the trainees of rural youth, a total of 270 trainees receiving an one-week specialized training course in 1989-1992 were evaluated by trainee followups according to the methods such as telephone interviews and questionnairs. These training courses included eight protected horticulture classes with 209 trainees, two organic agriculture classes with 40 trainees and one floriculture class with 21 trainees. The results indicated that 13.4 % trainees (28 person) of protected horticulture class grew greenhouse vegetables in which 16 of them by hydroponic technique and the others by simple vegetable farms. It was also found that the main factor of non-adopting protected horticulture techniques was the high cost of facilities. Consideration of the motivation of adopting hydroponic techniques was of industrial prospect. For the trainees worked at the protected structural vegetable farms, a marketing channel was identified as the main reason. 27.5 % trainees of organic agriculture class adopted new techniques because it is easy and practical. No space and material to making compost was considered to be the main factor by the non-adopted trainees. It is clearly indicated that 90.5 % trainees of floriculture class devoted themselves to the flower production in which only two of them adopted new floriculture techniques and the others was the Chinese orchid growers. For the motivation of growing flower, more than 50% trainees considered the industrial development in progress as the main priority reason, and then followed by the economic profits and personal interesting.

ACTIVITIES OF AGRICULTURAL EXTENSION IN 1993

AGRICULTURAL EXTENSION

Training and Education

A total of four subject matter training courses were held for young farmers in 1993, with 113 trainees attended. A total of four on-the-job training classes were held for agricultural extension workers, with 85 persons attended. A total of three foreign training classes were held for the agricultural technicians of friendly nations, with 35 participants attended. And a total of 79 persons attend related training programs at this station (Table 1).

Farmer's Services

The staffs of this station made the farmer's services work very productive and fruitful in 1993. A total of 9,178 local visitors and 835 foreign guests visited this station. A total of 1,872 farmer's letters or consulting services been answered. And local Farmers' Associations and agricultural cooperatives as well as agricultural production and marketing groups were guided in carrying 256 training classes of which the trainers were invited from the staff experts of this station (Table 2).

Table 1. Training activities of agricultural training center in 1993

Training activities	Class	Trainee
Special subjects training	4	113
On the subjects training	4	85
Foreign training	3	35
Other training	2	79
Total	13	312

Table 2. Activities of farmer's services of this station in 1993

Services item	Frequency	Person
Local visitors	135	9,178
Foreign guests	88	835
Consulting services	656	1,872
Trainers support	256	–

RURAL LIFE

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 1993. A total of 21 training classes were organized for the aged people in farming villages. A total of 25 training classes were organizing the courses of sanitation and health services and 28 training classes were giving the courses to strengthen guidance in family educatioin. A total of 12 villages were selected for the environment improvement in rural areas (Table 3).

Development of Rural Culture

Under the development program of rural culture, an integrated activities of rural culture were held at the three demonstration villages such as Pi-tou, Changhua, Ta-chia and Wu-chi, Taichung. A total of eight township's activities of rural culture were held to promote the traditional rural culture. And a total of 13 villages were selected to set up farmer's culture classroom (Table 4).

Table 3. Improvement of rural living environment and quality in 1993

County & city	Guidance of aging life (class)	Sanitation & health (class)	Family education (class)	Improvement of living environment (village)
Taichung	11	14	12	4
Taichung c.	1	1	–	–
Nantou	2	3	5	3
Changhua	7	7	11	5
Total	21	25	28	12

Table 4. Activities of rural culture in Taichung areas in 1993

County & city	Demonstration village	Township's activities	Farmer's classroom (village)
Taichung	2	3	4
Nantou	—	1	3
Changhua	1	3	5
Taichung c.	—	1	1
Total	3	8	13

Guiding for 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 1992 (Table 5).

Project for Guiding the Rural Youth to Establish Enterprise

The purpose of this project is to assist young farmers establishing new mordernized farms. A total of 134 rural youths were qualified to receive the low-interest loans from the government to start their new farms in 1993. The loan was used for farm of ornamental plants, tea tree, fruit tree, vegetables and layer (Table 6).

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

County/City	No. of crop	No. of village	No. of farmer
Taichung City	1	1	3
Taichung County	34	15	258
Changhua County	45	22	287
Nantou County	54	13	334
Total	134	51	882

Table 6. Kinds of farm enterprise managed by young farmers

County/City	Ornamental plant	Tea tree	Fruit tree	Vegetables	Layer	Others	Total
Taichung City	1	0	1	1	0	0	3
Taichung County	17	0	6	2	0	5	30
Changhua County	27	0	4	4	8	11	54
Nantou County	20	20	2	2	0	3	47
Total	65	20	13	9	8	19	134

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1.Chen, C. W. and Y. F. Tsai. Investigation on the Status and Willingness of Utilization of Organic Fertilizer in Central Taiwan. 38:1-10.

2.Chang, D. C. and C. C. Chen. Population Fluctuation of Major Insect Pests on Kidney Bean and the Proper Time of Control. 38:11-22.

3.Long, G. W. and Y. S. Tien. Performance and Economic Benefit Research of a Turnplate Type Manure Spreader. 38:23-36.

4.Huang, H. C. and Y. F. Tsai. Effect of Application Rate of Hog Manure on the Growth and Yield of Spinach and Leaf Lettuce. 38:37-43.

5.Hu, C. H. Historical Review of Semidwarf Rices and Breeding of A New Plant Type for Sustainable Agriculture. 38:45-63.

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22.Lin, C. S. Tolerance of Twelve Rice Varieties Against *Xanthomonas Campestris* pv *Oryzae*, Bacterial Leaf Blight Pathogen. 41:43-54.
23.Chiu, C. C., M. L. Hseu and L. S. Hsu. Field Observation on the Use of Sex Pheromone to Control *Spodoptera litura* on Soybean in Indonesia. 41:55-63.

一、研究成果摘要

水稻研究

新育成秈稻品系對二化螟蟲抵抗性及其農藝性狀之表現

林再發

新育成秈稻品系在田間遭受二化螟蟲為害較低者，進一步在網室以人工接蟲及室內以稻芽飼育幼蟲結果均顯示較台中秈10號具抗蟲特性。其抗蟲原因可能與供試品系莖稈之矽酸含量較高，稈莖的外徑較小，第三節間長度較短有關。供試品系之米質優良，稻穀產量除台秈育368號及台秈育1577號比對照台中秈10號稍低外，台秈育1154、1744、2154號及台秈糯育2143號均比對照高，深具命名推廣潛力。

水稻品種對螟蟲之抗感性測定及其與肥料之關係

陳啓吉、劉達修

於民國81年第一期作及第二期作選用台中190號、台農67號、新竹64號、台中秈10號、台中秈糯1號等五品種，於本場試驗田測定其對螟蟲之抗性結果不論側黃葉率、枯心率及白穗率均以台中秈10號最高。被害率在6.9～21.0%屬感蟲品種；次為台中秈糯1號為3.4～13.3%；而台中190號較具抗性被害率僅0.9～7.2%。於分蘖盛期調查各品種稻株之莖寬與莖厚，以台中秈10號之莖稈較寬平均為11.03mm，次為台中秈糯1號之9.07mm，而台中190及新竹64號則僅為7.28～8.15mm。莖厚也有類似情形，但差異較小。另以萬能物性試驗機測定莖稈強度，結果以台中秈糯1號之莖稈強度最弱為1,208公斤，次為台中秈10號為1,323公斤，而台中190號及新竹64號莖稈強度較高為1,385公斤及1,388公斤，以上結果顯示莖稈寬度、莖厚及莖稈強度與水稻品種之抗蟲性有密切之關係，亦即感蟲性品種莖稈較寬，稻莖較厚，莖稈強度較弱。在探討不同施肥量對稻株莖稈強度之影響時，發現標準施肥量＋矽酸爐渣可增加莖稈強度，螟蟲危害引起之白穗率降低；多氮少磷鉀肥區，水稻莖稈強度變軟而使螟蟲引起之白穗增加。

水稻抗白葉枯病之遺傳研究

張素貞、李成章

本研究以3個水稻抗白葉枯病的品系(種)與2個感病性的品種為雜交親本。五個親本彼此互相雜交，得20個雜交組合，雜交後代與5個親本同時種植於溫室盆缽中，俟分蘗期接種白葉枯病菌株 XF13 及 XM42。接種後6天及14天調查病斑長度(cm)，所得的資料經變方分析確定親本彼此間呈顯著差異，才進一步以 Hayman (1954) 完全互交法，統計分析之。分析結果Wr-Vr (Vr，某一序列的變方；Wr，某一序列中親本與其候裔之共變方)均質測驗不顯著 (XF13-7，XM42-14)，即符合 Hayman 全互交遺傳分析之前提：(1) 二元體之分離 (2) 同質結合親本 (3) 無正反交差異 (4) 無複等位基因 (5) 無連鎖現象 (6) 無上位性。由遺傳變異成份分析，D(相加性作用)與H_1，H_2及h_2(顯性作用)得知親本抗白葉枯病遺傳行為相加性大於顯性作用狹義

遺傳率對 XF13-7 為 85%，對 XM42-14 為 74% 台中在來一號為極感品種，感病性為隱性基因，但由於正負基因頻率分佈不均 (b_2 顯著，$H_2/4H_1<0.25$)，抗病品系台秈糯育 7 號為顯性基因所控制，而台秈糯育 1157 號則由部份隱性基因所控制，因為在抗病育種雜交親本選擇需要注意此差別的存在，爾後在分離後裔選拔對策會依親本遺傳行為而異。在遺傳變異成分中由 h_2/H_2 值小於 1，初步推測遺傳由微效基因所控制。

地域性水稻病蟲害聯合防治試驗

林金樹、黃金助、陳啓吉

近年來水稻病蟲害發生趨於輕微，有鑒於農村勞缺乏力之現實，本試驗著眼於減少使用農藥次數，並依據水稻病蟲害實際發生概況，採用廣效性殺蟲劑混合殺菌劑，以期能一次解決同時發生之病蟲害問題，而達到聯合防治之目的，並藉此建立防治模式以供農民推廣應用之參考。試驗結果第一期作在台中區下以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，增收益平均6,026元/公頃。防治二次者，在無效分蘗期以6.5%鐵甲砷酸銨S 1L/ha防治一次，再於抽穗前 3 ～ 5 天以 75% 三賽唑 WP 0.4kg+25%賓克隆 WP 0.5kg+75%歐殺松 SP 0.8kg/ha 混合防治一次，其增加收益平均 5389 元 / 公頃。彰化縣秀水鄉為螟蟲發生較多之地區，分蘗盛期以 6% 培丹 G 30kg/ha 施用一次，防治效果最好，枯心率僅2.8%，其增加收益為8,897元/公頃。第二期作於無效分蘗期用6.5%鐵甲砷酸銨 S 1L/ha 防治一次，再於抽穗前 3 ～ 5 天用 25% 賓克隆 WP 0.5kg+10% 鏈四環黴素 WP 1kg+75% 歐殺松 SP 0.8 kg/ha 混合防治一次計二次，其增加收益平均 2, 373 元公頃。沿海地區一期作一般可以不必施用化學藥劑，但於第二期作孕穗期若有瘤野螟或飛蝨類發生時，施藥防治一次即可。

土壤水份境況對水稻穀粒充實期生育之影響

李健捧、陳世雄、許愛娜、宋　勳

本試驗目的在探討水稻穀粒充實期間，減少田間灌溉水量及灌溉次數之可行性。1992年一、二期作分別在中興大學農場進行田間試驗。採裂區設計，以品種為主區，使用粳稻台中 189 號及秈稻台中秈 10 號兩品種，對土壤水分張力之反應。以 15 公分深度土壤水分張力處理為副區，分別以 0 MPa（連續浸水），0.02 MPa 及 0.04 MPa 等三級土壤水分張力，做為灌溉起點。試驗結果顯示在水稻穀粒充實期，兩個較高等級土壤水分張力處理，平均各需 5 天(0.02 MPa)及7天(0.04 MPa)才會到達灌溉起點。因此，提高土壤水分張力之處理，已明顯達到節省灌溉用水之目的。同時在0.02 MPa之處理，有增加稻穀產量之趨勢。穀粒充實期提高土壤水分張力，對於水稻之碾米品質、白米外觀、烹調及食用品質均不會有不利影響。多項式迴歸分析顯示在穀粒充實期，適當減少灌溉水，提高土壤水分張力一期作提高至 0.018 MPa，二期作則提高至0.027 MPa做為灌溉起點，可以得到最高的產量，似可作為稻田土壤水分管理之參考同時也顯示二期作台灣稻田土壤通氣不良的情況，需要較高的土壤張力改善土壤通氣。

台粳9號之育成

許志聖、張素貞、宋　勳

台粳 9 號係台中區農業改良場以北陸 100 號為母本，台農秈育 2414 號為父本雜交所選育的良質米品種，於民國七十年第二期作雜交，民國七十四年第一期作選出，參加各級產量比較試驗及各項特性檢定試驗，在民國八十二年六月審查通過，正式命名為台粳 9 號，納入推廣。該品種具有株型佳、不易倒伏、產量穩定、米質優良、食味佳及抗縞葉枯病、斑飛蝨與白背飛蝨等優點，與目前栽培最廣之台農67號比較，具有特色。在多次米質檢定中，台粳 9 號更具有優良且穩定的米質與食味，並優於目前推薦良質米品種台中 189 號。若將台粳9號與台中189號詳加比較，前者具有較強的抗倒伏能力耐寒性、抗脫粒性、再生能力及抗白葉枯病、縞葉枯病、斑飛蝨與白背飛蝨能力，而在米質方面，兩者同具米粒外觀優良與食味佳之特色，且在米質的穩定性方面，較台中 189 號猶有過之。

水稻白葉枯病國際統一病圃檢定試驗

張素貞、林金樹

水稻白葉枯病國際統一病圃檢定由位於菲律賓國際稻米研究所 (IRRI) 所主辦，將水稻育種品系分送不同國家及地方，進行白葉枯病檢定的工作。台灣檢定單位由本場負責，民國79年至81年三年內，共檢定366個品種(系)，每次檢定均以台中在來一號為對照品種。1990年以其四個菌株接種，並進行田間及溫室檢定，1991年以其中兩個致病力較強菌株為接種源，1992年則僅在田間進行檢定工作。1990年田間表現較佳者為IR20、Cisadane、IR22082-41-2、IR54、C702015、IR35361-59-3-3-2、RP1057-184-5-3-2 及 RP2151-192-1，其中 Cisadane、IR22082-41-2及IR2151-192-1在其他國家地區檢定結果亦具有抵抗性，但植株形態接受性均尚可，故僅可做為雜交育種。白葉枯病抗病性改良的親本。1991年田間及溫室均表現抵抗性佳者為 IR22082-41-2、IR25587-133-2-2-2、IR48787-54-1-1-1 及 Ayung 以前兩者在其他地區表現亦佳。1992 年檢定結果以 IR25587-133-2-2 等 34 個品系表現較佳。綜合三年檢定結果擬建議 IR22082-41-2 及 IR25587-133-2-2-2為雜交育種的親本。

稻米品質

臺灣稻米品質之研究

宋　勳、許愛娜

稻米品質主要是由碾米品質、白米外觀、理化性質及米質質地之入口品質等四大要素所組成、台灣近年來主要粳稻推廣品種皆屬於短粒粗圓形，具有較高之碾米率，其糙米、白米及完整米率通常分別為81%～83%、70%～75%及65%～72%，其中以新竹56號之碾米率最高。粳米之透明度大部份屬於2或3級，同時其心白或腹白介於0到2級。秈稻粒形比粳稻更具有變化，其米粒之形狀或白堊質的關係，通常其碾米率較差，秈米品種間之透明度由等級1到5皆有，而心腹白之等級介於0到4的等級之間。秈稻之理化性質遠比粳稻複雜，除了糯稻之外，其品種間直鏈性澱粉含量之變異由 10% 到 30%，而粳稻之變異僅

15% 到 21% ；籼稻品種具有各類型之膠體展延性，而粳稻皆屬於軟膠體性質；籼稻品種間之糊化溫度變異大，而粳稻品種僅屬於低糊化溫度；籼稻平均之蛋白質含量高於粳稻的 2% 。 由於低直鏈性澱粉含量之水稻品種之品質變異性狹小，故進而採用米飯質地分析儀來測試評估米飯質地之好壞，在米飯質地分析儀測試結果其均衡性之指標獲知，以台粳9號之0.14為最高，其次為台中 189 號、台農 70 號及台中籼 10 號之 0.12 ，而以台農 67 號之 0.06 為最差。最近由於速食食品開發之需求，進行米飯 18℃低溫貯存之米飯質地分析獲知，台中 189 號及台粳 9 號之米飯均衡性較不會隨溫度而下降，仍可維持其質地，而台農67號及台南9號之米飯質地隨溫度下降而變劣。

稻米粒及米飯之微細構造

許愛娜、宋　勳

米粒澱粉胚乳是由薄壁細胞構成，從米粒橫斷面觀之，是由中心點呈輻射狀延伸，從腹部到背部之薄壁細胞呈狹長形，而米粒另外兩側薄壁細胞為多角形或稍有伸長現象，薄壁細胞內部充滿澱粉粒以及一些蛋白質體。經利用掃描式電子顯微鏡觀察不同稻品種米粒與飯粒橫斷面，發現食味較佳之低直鏈澱粉含量品種米粒橫斷面薄壁細胞發生破裂露出澱粉粒之面積廣，而食味較差之高直鏈澱粉含量品種澱粉粒因薄壁細胞破裂而曝露的面積少。構成白米百分之九十之澱粉粒是為多角形，由 20～60個澱粉粒構成一個澱粉質體，再以澱粉質體存在於薄壁細胞中。但具有白堊質較多的部分，澱粉粒趨圓球形，變小且排列疏鬆。而糯米所造成米粒外觀之白霧狀，是因澱粉粒本身具有小洞，不同於前述白堊質之成因。至於米飯之微細構造方面，低直鏈澱粉含量品種有較細微之小孔，但多集中在腹部、背部或中央之部位，未呈輻射狀；高直鏈澱粉含量品種之米飯橫斷面則類似米粒之呈輻射狀，其造成之孔隙亦多較前者為粗大。

雜糧作物

薏苡栽培技術之改進

曾勝雄、楊錦蓮

為提高本省薏苡單位面積產量，利用台中選育 5 號及岡山在來進行薏苡播種期、栽培密度與氮肥用量及氮肥施用法等試驗，結果獲知薏苡之適當播種期為 3 月下旬～4月上旬，其中以3月下旬為最適期。其栽培密度以40×10公分及50×15公分較宜，其每公頃氮肥用量宜由目前之 180 公斤提高至 220 公斤。薏苡之氮肥施用法為50%做基肥，50%做粒肥，於始穗期(播種後80日)、抽穗期(播種後95日)及齊穗期(播種後110日)各施用16.7%。

期作對高粱自交系及 F_1 雜交種生育的影響

黃勝忠

利用24個高粱自交系(12個B-line與12個R-line)以及A-line與R-line相雜交的12個雜種 F_1 為試驗材料，種植於春秋兩個季節，分析自交系及 F_1 品種產量形成過程之變異。試驗結果，發現栽植地區對高粱自交系與 F_1 雜種的影響不顯著，但對季節間之反應變異很大，而且高粱自交系與雜種 F_1 間常因季節之變化而反應不一致。由生育日數之變異發現達到開花期所需的日數春作顯著大於秋作，但全生育日數與實際穀粒充實日數則呈現秋作大於春作的趨勢，而一般雜種 F_1 的各階段生育期比其親本短。不同栽培季節下的產量及各主要農藝性狀的平均值，除自交系及雜種 F_1 之千粒重在期作間差異不顯著外，其它性狀均以秋作顯著大於春作。春作高粱之產量與生育日數長短呈負相關，但秋作則相反。

蔬菜作物

豇豆雜交技術之研究(初報)

郭俊毅

為提高豇豆雜交授粉之結莢率，以期獲得大量子代供作選拔之用，同時提供育種者之參考，仍進行雜交技術改進之研究。由開花調查結果得知，豇豆花朵開放始於夜間，盛開則在早上6～7時之間。花朵閉合始於上午8時左右，上午9時以後大部份花朵已閉合。雜交授粉初步結果顯示，以授粉前一日傍晚去雄，並儘量保留花冠部位，以防水分散失。花粉之採取及授粉時間需在早上6～7時之間。授粉後花冠內加置濕棉球，並用膠帶粘位花冠。隨後將盆栽之母本放置於溫度21～24℃，濕度80～90%之生長箱內約3天。如此可獲得最佳之結莢率，其雜交成功率估計可達22%。

甘藍田殺草劑防治試驗

鍾維榮

甘藍屬於移植類蔬菜作物，其雜草防治的持性與直播類蔬菜作物不同。可在雜草萌芽前或萌芽後來進行防治，但目前登記殺草劑在使用時期上無明確劃分。本試驗目的是探討Butisan、施得圃、三福林、拉草、滅蘇民等五種藥劑，在甘藍田萌前處理及早期萌後處理時，對雜草防治情形及對甘藍生育之影響。五種藥劑各含兩種濃度，高濃度為萌後處理，低濃度為萌前處理，小區面積10平方公尺。初步調查結果，此五種殺草劑對甘藍生育不造成任何影響。試驗藥劑以Butisan萌前防治效果最佳，其雜草防治率可達97%，其次為施得圃95%。早期萌後處理，以滅蘇民防治效果最佳，防治率可達98%以上。

栽培密度對蔓性菜豆結莢性狀之影響

古錦文

本試驗係以本省主要蔓性菜豆栽培品種台中一號、灰仁、粉豆三個品種為材料於民國八十一年秋作在本場進行試驗，由於栽培者對各品種間採用之栽培密度不一，影響菜豆整體生產經營成本，故以不同栽植密度(75×45 cm，1、2、4、6、8株/穴)探討其對結莢性狀及產量之影響。試驗結果，同一密度栽培下，灰仁比台中一號、粉豆早熟，結莢節位最低。結莢節位可能影響單株結莢數。粉豆之嫩莢長度、莢寬、莢厚皆大於台中一號及灰仁兩品種，但總產量反而減少，顯示不同品種間莢長、莢寬、莢厚對產量無直接效應。同一品種不同密度間開花日數、結莢節位、嫩莢長度、寬度、厚度並無顯著差異。收獲總莢數灰仁大於台中一號、粉豆兩品種，其產量之反應亦然。正常莢(可售莢)與不良莢之比率與栽培密度無顯著關係，對三個參試品種而言，秋作栽植密度建議以台中一號6株/穴，灰仁8株/穴，粉豆2株/穴為佳。

番茄品種改良及區域試驗

林天枝、洪溢堂

本省夏季高溫多濕，番茄青枯病發生猖厥，嚴重影響番茄產量與收益，故耐熱抗病材料之引進已成為品種改良之主要標的，各區改良場自76～79年間自亞蔬中心引進FMTT品系多種，經在全省各地區域試驗，業已選出比目前夏季栽培品種好的品系FMTT 22號及3號，分別申請命名為台中亞蔬4號及花蓮亞蔬5號，具有中抗青枯病、產量高、裂果輕微等的待性，唯對耐熱性及抗青枯病的能力仍未臻理想，尚待改進。據1990年亞蔬年報（番茄育種）指出，該中心在番茄新的育種組合84品系中又篩選出七個具有60～90%抗青枯病的優勢品系，擬引進該批表現優異材料，進行區域試驗，而以農友301及台中亞蔬4號為對照探討各品系適應性，供為申請登記命名參考。

本試驗經1991～1993年試驗結果為：

1. 供試新品系其生長態勢可媲美台中亞蔬四號，具有耐熱、抗青枯病之特性。
2. 每花序著生4～6個果實，符合一般留果數量，可節省疏果人工費用，為其優點。
3. 番茄鮮果產量所有供試品系均比農友301號呈極顯著增產，但對台中亞蔬四號比較，則祇有FMTT 277、285、269三個品系有增產，增產因素為抗青枯病力強、果形大、單果較重所致。每10公畝鮮果產量分別為6326公斤、6104公斤及6020公斤。

上述選出三個高產新品系雖然具有產量高，品質好之優點，唯其果肩顏色淡綠至青綠，綠色稍嫌不夠深，又果臍大，常呈裂縫或條溝，影響觀瞻，且果實成熟期果色不佳，茄紅素分配不均，呈現不新鮮感覺，有待研究改進。

遮蔭網材質對蔬菜生育之影響蔬菜中硝酸／亞硝酸態氮含量之變化（第三報）

高德錚、林秋全、張惠群、吳碧紅、吳雪玲

本試驗旨在探討不同遮蔭材質對蔬菜生育之影響，　參試遮蔭網材質計有：2SB35(2銀1黑PE網，透光率65%)，R2650(黑色PE網，透光率50%)，AL810(銀色PE網，透光率40%)，LS(黑色PE網，透光率50%)，GB1010(綠色PE網，透光率40%)及B1010(黑色PE網，透光率60%)等6種。參試蔬菜種類計有小白菜、萵苣及白莧菜等3種。經試驗成果顯示：盛夏時，凡能促進參試蔬菜光合作用之進行處理，亦同時具有降低葉片中硝酸態氮含量之作用，但亞硝酸態氮含量不受影響。參試各遮蔭網材質中以LS-50處理最有利於降低小白菜及白莧菜之硝酸態氮含量，而以B1010處理最能降低萵苣硝酸態之含量。再者，由相關性統計分析得知，養液中硝酸態氮消耗量之多寡，與蔬菜中葉綠素硝酸態氮含量及產量呈正相關，但亞硝酸態氮含量相關性不顯著。換言之，利用適當之遮蔭材質除可促進夏季水耕蔬菜之產量外，亦可降低葉片中硝酸態氮之含量。

沸石供爲濾材對迴流水耕養液成分之影響(初報)

高德錚、羅麗華、蘇慧美

沸石 (Zeolite) 因具有吸附溶液中之重金屬而廣泛地使用於改良被污染之土壤或供為改良水質之濾材。本年度試驗先行測試以沸石為蔬菜水耕栽培過程之養液迴流再使用時之濾材的可行性。經初步試驗發現，沸石粒與沸石粉之吸附離子效果不一，在1.0公升之養液中添加1.0公克之沸石粉可將99.1% NH_4-N吸附著，而粒徑0.5公分之沸石粒在添加200公克下即有效地吸附NH_4-N，K，Mg，Mn等四種離子，若添加量增至500公克時，效果更佳。沸石粒之離子吸附或釋放作用亦隨沸石粒之添加量及浸漬時間之延長效果越顯著，而以沸石粒比養液量1：20時即可也產生效果。又沸石粉亦可有效地吸附NO_3-N，PO_4-P，NH_4-N，K，Mg，Mn及Na等七種離子而釋放出SO_4-S，Cl及Ca等三種離子，但對Fe，B，Cu，Zn等四種離子效果不佳。

花卉作物

遮陰對夏菊切花品質之影響

許謙信、許誌裕

夏菊城紅、新種黃及阿來粉分別種植於35%、45%、55%遮光網下，以一般露地栽培為對照，調查遮陰下及對照組切花之各項性狀。結果顯示：㈠遮陰栽培之株高一般較對照者為長。城紅平均約長7～8公分、新種黃平均長10～20公分、阿來粉長約15～20公分。㈡城紅對照組較各組遮陰約多3節，新種黃及阿來粉二品種無差異。㈢城紅品種對照組花頸較粗、短，莖直徑較粗。新種黃品種遮陰組花頸較長，其他二者沒有明顯差異。阿來粉之遮陰組花頸較長。㈣城紅品種沒有顯著差異，新種黃葉面積遮陰組較對照組多約20～30%，阿來粉遮陰組較對照組多約30～35%。㈤新種黃及阿來粉品種採收後切花吸水量及蒸散量遮陰組均較對照組為多。對照組瓶插時易發生葉片老化及黃化，而遮陰組減低黃化現象並延長瓶插壽命。㈥城紅及新種黃品種遮陰組葉片葉綠素含量較露地對照組多30%以上。

不同節位及不同節數對玫瑰扦插繁殖之影響

陳彥睿、顏裕楓

為改進扦插繁殖技術，穩定種苗生產，探討不同節位及不同節數對玫瑰扦插繁殖之影響。特進行本次試驗，結果顯示玫瑰單節扦插(第4、5、6節位比較)及雙節扦插(第4～5節及第5～6節比較)，各節位之插穗成活率、根部及地上部之表現相近，其間差異不顯著。但進行玫瑰扦插繁殖節數則有明顯差異。扦插後42天之苗，3節3葉之玫瑰扦插插穗之成活率優於2節2葉優於1節1葉，成活率均在85%以上。同時，3節3葉插穗之根數亦優於2節2葉優於1節1葉，但各不同節數插穗之不定根長度則差異不顯著。地上部側芽發芽率、芽生長高度及新芽生長葉數，3節3葉均優於2節2葉優於1節1葉。3節3葉優於2節2葉之整體表現有快4～7天採收之可能。但若過於延遲採收插穗(扦插50天)則3節3葉與2節2葉之根部整體表現相似，差異不顯著，但仍以3節3葉之插穗地上部有較高的側芽發芽率、新芽長度及新芽生長葉數。

果樹作物

頂端優勢對溫帶梨生長之影響

林信山、林嘉興

本試驗以新世紀梨及幸水梨 (*Pyrus serotina* Rehd. cv. Hsinseiki and cv. Kosui) 為材料，探討頂端優勢對梨樹生長之影響，及其應用於改進栽培技術之潛力。1990年9月20日調查一年生新世紀梨三種不同頂端生長狀態下之落葉數，以生長中之植株最少，為5.7葉；次多者為二次生長者7.8葉；停止生長者最多，為8.8葉，彼此差異顯著；部份萌芽之側芽數正好相反，生長中之植株最少，為1.9芽，二次生長之植株居次，為3.3芽，停止生長之植株最多，為3.9芽，彼此亦有顯著差異。根據結果，1993年繼續比較幸水梨、幸水梨高接烏梨及烏梨直根苗側接幸水梨等三種處理之植株，在頂端生長方面，前者於8月30日完全停止，後二者於9月13日才完全停止；7月31日至10月4間樹幹截面積之淨增加量，三者依次為268 mm^2，272 mm^2，及482 mm^2；同期間三者之落葉率依次為73.3%，76.8%，及79.9%；至11月3日，三者之萌芽率依次為58.1%，50.8%，及72.4%；三者之花芽率依次為3.5%，3.2%，及4.2%。上述結果顯示烏梨直根株側接幸水梨之生長速率最大，可維持較長時間之頂端優勢，且對於秋季之催芽作業有較好之反應。

葡萄天然災害損害率之探討與調查

林嘉興、張林仁

為瞭解天然災害如豪雨、水災、颱風等氣候對葡萄生理障礙及產量與品質之影響，進行本試驗。民國80年10月之露絲颱風及81年9月連續兩次之寶利及歐馬颱風吹襲。兩年之葡萄生育均因連日強風及豪雨、使果園嚴重積水，葉片枝條受損，使葡萄在成熟前果實脫粒、果腐及裂果等而影響收量。中部各產區因地緣及葡萄生長期不同而有不同程度之損害。此外在台中場以盆栽葡萄苗進行淹水處理，對不同品種及不同生育期之葡萄植株的影響，如光合作用及葉片老化、果實生長等均有初步之觀察結果。

低海拔地區栽培溫帶梨之研究

廖萬正

本省低海拔地區栽培溫帶梨最大問題為萌芽不整齊及花芽壞死等問題，本場經多年之試驗結果發現以Hydrogen cyanamide 1%～2%對促進溫帶梨萌芽效果最佳。於1～2月處理溫帶梨之植株，萌芽率可達70%以上。克服花芽壞死問題，可在果實收獲後之8月下旬，用Hydrogen cyanamide 0.5%噴施植株，可促使植株落葉及萌芽，萌芽率可達90%以上。此芽可在翌年1月間花芽分化完成，在1～2月間可用Hydrogen cyanamide處理，則花芽可開花結果，果實可在7～8月收獲。應用此方法可在低海拔地區栽培溫帶梨，以取代高生產成本之高接法。目前本場正朝一年二收方向研究，期能增加果農收益。

套袋對巨峰葡萄果實生長影響之探討

張林仁、林嘉興

本省鮮食巨峰葡萄之栽培，多施行於冬果之生產，而套袋夏果葡萄之生產則較不為農民接受。因農友認為生長及成熟於夏季之葡萄果實較不耐袋內較高的氣溫，甚而會因此而增加腐爛比率。然而栽培技術較成熟之農友以套袋生產夏果、亦有優良品質之葡萄。本試驗之目的為觀察目前慣行之套袋或果傘等對葡萄果串溫度及生長之影響，期能找出夏季葡萄套袋之對策。初步觀察結果，在盛夏七月時，紙套袋內果串溫度比未套袋果串高、可提高達6℃左右，而套果傘者僅比未套袋者溫度稍高。至於套袋後對各階段之果實生長發育又及果實品質之影響則有待繼續觀察。

土壤肥料

有機質肥料對甜椒生長與產量之影響

謝慶芬、徐國男

本試驗是在彰化縣大村鄉台中區農業改良場農場一處粘板岩沖積砂質壤土進行。全部試驗計有下列六個處理按照逢機完全區集排列重複四次：A.化肥區、B.豬糞堆肥添加微生物區、C.雞糞堆肥添加微生物區、D.微生物油粕肥區、E.微生物稻殼油粕肥區、F.微生物稻草油粕肥區。化肥區N-P_2O_5-K_2O用量為150－120－150 kg/ha，按照推薦方法使用並使用化學農藥萬綠三次，有機肥區按照每公頃150 kg氮素計算各有機肥使用量，不用化學農藥而只噴射糖醋液三次。甜椒品種為福瀾銘星6號，於9月25日播種，10月27日移植，12月29日開始採收到1月15日止，其餘部分都予放棄。

試驗結果顯示，任何一種有機肥添加微生物處理之甜椒株高、果粒大小、果粒數、果實產量都極顯著增加，其中雞糞堆肥添加微生物區之產量增加77%，為所有處理當中最高的。此一甜椒株高、果實大小、果粒數和產量之極顯著增加顯然是有機肥與微生物之連合效果。

甜椒果實之化學分析結果，發現所有有機肥添加微生物處理果實之鐵顯著減少，而錳則極顯著減少，似有損失營養元素之虞，但對人體不利元素，鈉和鎳也極顯著減少，果實較大，都是對果實品質有利因素，所以從果實外觀與營養安全性觀點而言，有機肥區甜椒之品質應屬較好，也就是施用有機肥添加微生物有改善果實品質之效果。

病害方面，所有有機肥添加微生物處理之根腐病都顯著減少，軟腐病也有減少傾向，而毒素病則有增加傾向，但其差異都未達到顯著水準。

柑桔施用磷肥對果實質量之影響

王錦堂、陳鴻堂、賴嘉珍、吳尚鑒

於台中縣新社鄉進行試驗，探討強酸性紅壤果園土壤有效性磷酐含量及不同施磷量對柑桔果實質量之影響，試驗採用完全逢機區集設計，土壤含磷量4種(P:<200、200～400、400～600、>600ppm)，施磷肥量3種(P_2O_5:0、300、600g/株)組合成12處理，單株區，3重複，計36株，行株距5m×4m，以16年生供試驗，據試驗結果顯示，椪柑產量及糖度在土壤含磷量P 200～400 ppm及以下時施P_2O_5 600g/株分別為75.6kg /株11.3% Brix及77.6kg/株10.8% Brix，比土壤含磷量<200ppm不施磷之66.9kg/株11.0% Brix較高。在土壤含磷量P 400～600ppm及以上時不施磷之柑桔產量及糖度分別為81.4kg/株10.6% Brix及

91.9kg/株 10.5% Brix，後者糖度並達顯著差異。故土壤含磷量在P 400-600ppm或以上時可以不施磷肥。

化學萃取法評估堆肥養分潛能之研究

蔡宜峰、黃祥慶

有機質所含化合物成分在土壤中經過微生物之礦化作用釋出無機養分。一般有機質礦化潛力可定義為有機質可利用性養分潛力 (PAN, Potentially Available Nutrient)。本研究目的為利用碳酸銨萃取法，以探究有機物及堆肥中可分解有機成分之組成分及含量，並由玉米養分吸收量分析，評估最適於估算堆肥養分潛能之化學萃取法。以期能將堆肥的養分供應潛能配合作物生育特性，使堆肥的效益發揮最恰當。

經由多種有機材質製成之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萃取性有機氮及有機磷量與施用相同種類堆肥之玉米植體氮及磷吸收量最接近，且由迴歸分析顯示，可利用Langmuir equation描述碳酸銨萃取之有機氮量與玉米植體氮吸收量之關係，其相關性(R=0.831**)可達極顯著水準。同樣地，利用碳酸銨萃取堆肥之有機磷量與玉米植體磷吸收量之間關係亦符合 Langmuir equation (R=0.746**)。因此，利用碳酸銨萃取法評估堆肥可利用性養分潛力具可行性。

利用廢棄菇類栽培介質製作堆肥之研究

林景和

本試驗以廢棄之木耳菇類栽培介質與農家常見的豆粕類、雞糞、豬糞、化學肥料等混合製作堆肥，探討其過程與成品特性。試驗結果發現在C/N=30，水分含量約60%，堆積體積為1 m^3(約1m長x1m寬x1m高)及每10天翻堆通氣之條件下，此菇類廢渣分別與豆粕(A)、雞糞(B)、豬糞(C)、尿素(D)混合者，若以C/N降至15以下為腐熟指標，則四種處理達腐熟所需天數依次為80天，20天，50天，>110天；若以翻堆後品溫無特別升高且呈穩定來判斷腐熟時，則其腐熟所需天數72天，51天，58天，77天，兩者所需的天數雖不同，但腐熟速度順序一致，均為B>C>A>D。以1:5水抽出液所做之生物檢定結果顯示，白菜種子之發芽率並不隨各處理之堆積日數升高，而是呈不穩定的趨勢，故以此生物檢定方法做為比較此類堆肥之腐熟速度有其困難。但若種子發芽率需達70%，則四種處理約在堆積70天後即可使用。此類處理經堆積110天而成之腐熟堆肥，其pH在7.5～8.5間，EC值中A、B兩者>4mS/cm，而C、D則<4mS/cm，四種堆肥成品之碳含量在30～36%之間；氮含量2.0～2.5%之間，以A成品最高，D成品最低；磷、鉀、鈣、鎂含量均以B成品最高，D成品最低；就N+P+K+Ca+Mg植物要素總含量而言，其大小順序為B＞A＞C＞D，但初步試驗結果各種堆肥對白菜初期生長優劣之影響與其所含之這些植物要素總含量順序並不一致。

鹽分累積之土壤改良研究

陳鴻堂

本研究針對粘板岩石灰性沖積土，設施(塑膠布隧道式)栽培內累積鹽分土壤，研擬改良方法。在設施栽培條件下，蔬菜生長遵循Maas和Hoffman (1977)鹽分忍受的減產理論，應用此減產理論可以改良設施栽培土壤的鹽分累積。小白葉 (non-heading Chinese cabbage, *Brassica Camperstris* L. var. *chinenesis*) 和葉萵苣 (leaf lettuce, *Lactuca quercum* L.)在粘板岩沖積土環境，其土壤鹽分瓶頸限值分別為9.770 dS m^{-1}和3.299 dS m^{-1}，而五種改良方法的效果隨ECe值下降而提高，順序為(去除鹽分累積土壤5公分+牛糞3 Mg ha^{-1})>(深耕至表土以下50公分+牛糞3 Mg ha^{-1})>(施牛糞3 Mg ha^{-1})>(客以稻田土壤5公分+牛糞3 Mg ha^{-1})>(施牛糞20 Mg ha^{-1})。中部地區設施栽培土壤EC (1: 5)值與水溶性離子強度關係為I=1.895EC(1:5) cmol L^{-1}，EC單位為dS m^{-1}，相關係數r=0.997。

施用牛糞堆肥對一般作物及土壤特性之影響效應

蔡宜峰、陳清文

為配合加強廢棄物處理政策及瞭解牛糞堆肥對作物產量、品質及土壤特性之影響效應，于彰化縣田中鎮、台中縣后里鄉及外埔鄉，分別針對玫瑰、苦瓜、蕗蕘蒲及葡萄等多種作物實施田間試驗。試驗結果顯示，牛糞堆肥有改良土壤理化性之效果，包括降低土壤總體密度、土壤硬度及增加土壤水分含量、pH值等，在土壤肥力方面，牛糞堆肥處理有增加土壤有機質及有效性磷含量之效果，對土壤交換性鉀及無機態氮含量則無顯著影響。惟以上處理效益僅顯現在土壤深度0～30cm以內。牛糞堆肥處理對作物產量及品質亦均有極良好的效果，例如對玫瑰、苦瓜及蕗蕘蒲之平均增產率分別可達7.3%、29.5%及9.6%。顯然，牛糞廢棄物如經過適當堆肥化處理，將可製成品質優良的有機質肥料，而回饋於農業生產。

不同用量乾豬糞對菠菜、葉萵苣生育及產量之影響

黃祥慶、蔡宜峰

利用紅壤 (CCe) 及粘板岩老沖積土(LU)等二種不同土壤施用不同用量之乾豬糞，以探究對菠菜、葉萵苣生育及產量之影響。盆栽試驗結果顯示隨著乾豬糞用量之增加對菠菜、葉萵苣等蔬菜作物之生育及產量均有顯著相關，但以施用20t/ha乾豬糞增產率最大，菠菜增產率較對照區在紅壤及粘板岩老沖積土各達 113.0% 及44.9%,葉萵苣增產率各為80.2%及59.4%，足證乾豬糞可應用於農田作為很好的有機質肥料。

強酸性枇杷果園施用土壤改良劑效果之研究

黃祥慶、蔡宜峰

在台中縣新社鄉及太平鄉之強酸性土壤試驗結果顯出，施用腐植酸加月桂硫酸銨鹽製劑 (ALS) 及硫酸鈣處理對枇杷生育、產量及果實糖度均有較佳效果，處理中以每年每株施用腐植酸40ml、月桂硫酸銨鹽製劑3ml加硫酸鈣5.0kg處理較優，新社試區平均枇杷增產7.7%(2.9 kg/3棵)，太平試區平均增產10.8% (2.5kg/3棵),且施用腐植酸加月桂硫酸銨鹽製劑及硫酸鈣處理可改善土壤總體密度、土壤硬度及土壤滲透率等土壤物理性質，更可降低土壤中鐵、錳、鋁含量。

植物保護

花生上番茄斑點性萎凋病毒之鑑定

陳慶忠、施季芳、黃婉玲、柯文華

民國81及82年10月於中部秋作花生園採集到花生葉片沿葉脈產生黃化而形成大型扇狀斑紋或輪圈或暈狀黃化斑點。發病中、後期全葉黃化或於病斑區產生褐化、枯焦現象。罹病花生粗汁液以機械方法接種蔓陀蘿(*Datura stramonium*)可以產生黃化斑點或輪圈； 在白藜 (*Chenpodium quinoa*)及四季豆(Victor品種)上亦能產生局部斑點；在煙草(*Nicotiana benthamiana*) 上則產生壞疽性斑點。 以機械方法可以成功將罹病花生粗汁液接種到健康花生上並產生與田間相似之病徵。利用醋酸鈾陰染罹病花生粗汁液， 可觀察到直徑 75 ～ 100nm之近似球形，或寬65 nm×長85 nm之橢圓形，或寬60 nm×長120 nm之外觀似花生豆夾病毒粒子並具突起構造。超薄切片罹病花生葉片組織於電子顯微鏡下可觀察到近球形含包膜直徑約75～100 nm或寬60～90 nm長90～140 nm之橢圓形病毒粒子。在罹病花生細胞內病毒通常排成列狀或群聚於腔囊內，其外圍似由膜狀物包圍，病毒通常分佈於鄰近細胞壁之細胞質內。利用西方浸漬法(Western blotting)進行血清免疫反應結果顯示花生上之 TSWV與TSWV-W、TSWV-I、TSWV-NY及印度之peanut yellow spot等抗血清均無免疫反應產生,顯示其間並無血清類緣關係。

蘭花病害調查

黃秀華

蘭科為分布極廣的世界性花卉，為世人所共同喜歡的一種花卉。嘉德利亞蘭、蝴蝶蘭、石斛蘭、虎頭蘭及素心蘭等已為切花材料，且亦有大量的外銷，對未來極具發展潛力。本省一年四季由於春夏高溫多濕，一般蘭園的蘭花常因淋雨或澆水過多，易受病害的感染，經由田間調查結果在本省中部地區最常見的病害為炭疽病，其次為細菌性軟腐病。另外亦發現一新的病害由 *Fusarium solani*所引起之葉斑病，主要危害葉片其病徵與炭疽病非常相似，最主要之區別在於病斑周圍會有幅射狀小點出現，但炭疽病則無此現象出現。本病原菌之最適生長溫度為30℃，本病害目前只在國蘭類發病，在蝴蝶蘭上尚未發現。白絹病的發生與栽培基質有關以樹皮為栽培基質則最為嚴重，以蛇木及碎石為栽培基質則較少見。由 *Fusarium oxysporum*所引起之萎凋病於調查期間尚未發現。

枇杷灰斑病防治示範

劉添丁

枇杷感染灰斑病，被害株葉片捲曲萎凋，花蕊枯死，果實粗糙腐爛，影響產量品質，嚴重時造成果園廢耕。為援救枇杷產業，本場於78年開始調查灰斑病田間發生消長情形，瞭解該病每年6月開始發生，7～8月為發病盛期，9月以後隨溫度降低發病轉趨輕微。室內試驗得知20～32℃為灰斑病胞子及菌絲的發芽與生長適宜溫度，此與田間情況極為吻合。經室內外篩選出75%四氯異苯腈W.P 600倍及75%貝芬普寧W.P 1000倍，對灰斑病有良好的抑制效果，並於79年開始在新社、國姓、太平、台中市等地辦理灰斑病防治示範工作，面積32公頃。實施前先將參加果農編班組訓，指導果農於6月亦即發病初期噴藥2次，7、8月亦即發病盛期每隔10天噴藥一次計6次，9月亦即發病末期再行噴藥一次總計9次，以75%四氯異苯腈W.P與75%貝芬普寧W.P輪流使用。79年示範結果，一般區罹病率38%，示範區僅8.3%，效果良好。80年除上述鄉鎮擴大辦理面積外，並增加苗栗縣大湖鄉，示範面積為 100 公頃。81年示範面積擴大為300公頃，本場再推薦經由篩選之 25% 克熱淨溶液 500 倍配合75%四氯異苯腈W.P供防治灰斑病，示範結果一般防治區罹病率51%，示範區罹病率均在1.5%以下，成效卓著。前述示範結果，估計每公頃增加收益717797元。

中部地區設施蔬菜之病害調查

劉興隆

設施蔬菜栽培期間，發生之病害種類及危害情形，因栽培蔬菜之種類、季節及設施種類與管理情形而異，台灣中部地區發生之病害包括立枯病、腐霉病、軟腐病、根瘤線蟲、萎凋病、露菌病、黑腐病、炭疽病、白銹病及黑斑或葉斑病等。長期連作之土壤無法更新，導致土壤傳播性病害普遍發生， 其中土壤傳播性病害以*Rhizoctonia solani*與 *Pythium* spp.所引起之病害最為嚴重； 空氣傳播性病害則以露菌病較嚴重； 以芥藍菜之病害發生率及被害率最高，常造成嚴重損失。

黃條葉蚤物理防治方法探討

陳慶忠、柯文華、柯忠德

黃條葉蚤(*Phyllotreta striolata* (Fab.))幼蟲棲息土中啃食十字花科蔬菜寄主之根部，成蟲啃食地上葉部， 為十字花科蔬菜較難防治之害蟲。利用紅、黃、藍、白、綠、黑等不同顏色粘板於蘿蔔園誘集黃條葉蚤成蟲，結果以黃色誘集效果最佳；粘板放置高度以距地表 0～0.25 公尺者比 0.5～2.0 公尺者誘集蟲數多， 此項結果可提供棲群偵測應用。選用砂土、砂壤土及壤土三種質地土質，利用盆栽(40×30公分)網罩方式在田間種植蘿蔔於5～6葉期時接種50對黃條葉蚤成蟲，放蟲後21日檢視土中幼蟲及蛹數。結果顯示黃條葉蚤在砂土中繁殖數量每盆平均 42.2 隻，顯著較砂壤土及壤土者少， 後者分別為 222.2 及 197.5 隻。利用砂壤土盆栽以塑膠布墊盆底方式，蘿蔔於5～6葉期接種20對黃條葉蚤成蟲二週後進行淹水處理， 結果隨淹水時間增長，黃條葉蚤死亡率遞增至48小時達100%。一般習慣以灌水處理之設施或露地蔬菜栽培之園圃， 黃條葉蚤發生程度均較輕微。有關淹水在田間實際防除本蟲之效果目前正於網室內評估中。

豌豆上台灣花薊馬與番茄斑潛蠅聯合防治試驗

方敏男、劉月珠、曾素英

台灣花薊馬 (*Frankliniella intonsa* Trybom) 及番茄斑潛蠅 (*Liriomyza bryoniae* (Kalt.))自豌豆播種後約20天至採

收完畢皆可為害。已推薦之防治藥劑，台灣花薊馬有25.3% Mevinphose E.C. 500倍，2.8% Bifenthrin及Cyhalothrin E.C. 1000倍，番茄斑潛蠅有75% Cyromazin W.P. 6000倍。黃色粘板及水盤置於距地面0 cm處，對台灣花薊馬及番茄斑潛蠅具有誘捕效果，但單獨使用難以達到防治目的。將Bifenthrin與Cyromazin混合同時使用，對於台灣花薊馬及番茄斑潛蠅可以同時防治，若加上黃色粘板、糖醋液及洗潔精同時施用則防治效果更佳，但產量調查結果以2.8% Bifenthrin E.C. 1000倍、2.8% Bifenthrin E.C. 1000倍加75% Cyromazin W.P. 6000倍及2.8% Bifenthrin E.C. 1000倍加黃色粘板二片，分別為1.44、1.35及1.33kg/15㎡較高,與其他處理間有顯著差異。以75% Cyromazin W.P. 6000倍加2.8% Bifenthrin E.C. 1000倍加10.9% Penconazole E.C. 4000倍分為10、15及20天三種不同施藥間隔進行防治試驗結果，以每隔10天及15天施藥一次之效果較佳，與其他處理間有顯著差異。綜合上述結果，建議於薊馬或斑潛蠅發生時，以2.8% Bifenthrin E.C.1000倍加75% Cyruomazin W.P. 6000倍，每隔15天施藥一次，即可達到聯合防治目的。

根蠕對唐菖蒲及百合之危害

劉達修、曾阿貴

根蠕可危害多種球根花卉及其他作物之根莖部位，使被害株之生長勢減弱，唐菖蒲及百合球莖為其重要寄主。在定點調查田中，種球種植後，根蠕即開始侵入球莖危害，至切花期其危害球莖率達90%以上。種植前種球經藥劑處理者其被害率可稍減輕，但被害仍相當普遍，顯示土壤中殘存著不少的根蠕的個體和卵。依作物生育期而言，一般栽培區不論唐菖蒲或百合，均以切花期之被害最高。被害輕微者球莖靠根系部位呈褐化，嚴重者根系及球莖鱗片基部開始腐爛，若與病害複合發生可加速其腐爛程度，植株葉片亦呈黃化終至枯死。隨機採回植株黃化異常株，檢視根蠕之發生率，在唐菖蒲上約有46.6%，百合上約有29.3%係根蠕與病害複合發生。台中地區主要栽培區唐菖蒲平均被害率約為12.6%，不同地區間以彰化縣之北斗、田尾一帶被害率最高，達17.7~21.4%，埔里地區最低為4.5%。百合平均被害率為6.8%，仍以北斗地區之被害率最高，達20.4%，埔里地區最低僅0.5%。

危害豆類蔬菜椿象族群消長調查及生活史之觀察

張德前、柯文華、陳慶忠

中部地區危害豆類蔬菜之椿象主要有綠椿象(*Nezara viridula* Linne)、條蜂緣椿象(*Riptortus clnearis* Limaeus)、黑椿象(*Scotinophara lurida* Burmeister)等三種。不同豆類蔬菜發生之椿象種類並不相同，菜豆以條蜂緣椿象，豇豆則以綠椿象，而毛豆以黑椿象之發生密度較高。前述椿象類在不同豆類上主要於開花結莢期以後棲群密度開始升高，主要吸食豆莢汁液導致果莢不飽滿。在田間椿象族群密度消長調查結果，其族群密度自5月中旬(開花結莢期)逐漸上升，6~8月為高峰期，9月以後族群密度漸低。室內(26~30℃)以豇豆豆莢飼養綠椿象及條蜂緣椿象其結果，綠椿象卵期平均為5.4天，若蟲期平均24.9天，若蟲脫皮4次計5齡成蟲產卵前期平均8.2天，每一成蟲每次產卵數平均為67.6粒，每隔3~8天產卵一次，連續產1~6次，最高產卵量達425粒，卵孵化率平均68.6%，初產卵孵化率較高後逐漸降低，成蟲壽命21.3天，一生交配1~6次，交尾次數與卵孵化率無顯著相關，平均飼養一個世代，約需36.5天。條蜂緣椿象卵期平均4.7天，若蟲期平均18.7天，若蟲脫皮4次計5齡，成蟲產卵前期平均7.6天，每一成蟲產卵數平均52.2粒，卵孵化率66.10%，成蟲平均壽命34.8天，平均飼養一個世代約需58.2天。在室內一年可以連續飼養12個世代，世代間重疊發生。

數種殺蟎劑與殺菌劑 Triforine 混合後對神澤氏葉蟎毒效之影響

王文哲、劉達修

神澤氏葉蟎 (*Tetranychus kanzawai* Kishida) 為玫瑰主要害蟎之一，白粉病及黑斑病為玫瑰主要病害，為省工起見，玫瑰花農常常將殺蟲劑與殺菌劑在田間立即混合施噴。為此本試驗乃選7種對神澤氏葉蟎較有效之殺蟎劑及2種對葉蟎亦有效之植物營養劑，於室內分別和殺菌劑18.6% Triforine E.C. 1000倍混合使用，再從中選4種混合效果較優之藥劑，在田間做藥效比較試驗。室內測試結果，顯示18.6 %Triforine E.C.與供試之8種藥物能混合使用，對神澤氏葉蟎之毒性無不良影響。另於田間比較4種混合藥劑對神澤氏葉蟎之防治效果，以2% Abamectin E.C. 2000倍、25% Bromopropylate E.C.及2.8% Bifenthrin E.C. 三種殺蟎劑分別與18.6% Triforime E.C. 1000倍混合噴施方式，對神澤氏神葉蟎之成若蟎、幼蟎及卵之防治效果均甚優，其防治率在92~100%之間。而20% Amitraz E.C. 800倍混合18.6% Triforine E.C. 1000倍後，對神澤氏葉蟎之防治效果則較差，與室內測試結果不同，故該二種藥劑不宜混合使用，以免降低藥效。

中部地區簡易設施蔬菜害蟲發生調查

柯忠德、陳慶忠、劉興隆

中部地區簡易設施栽培葉菜類蔬菜依面積多寡依序為甕菜、小白菜、芥藍菜、油菜、萵苣、青梗白菜、芥菜、莧菜、茼萵、菠菜、芹菜等。不同蔬菜發生之害蟲別及其經濟重要性隨栽培蔬菜種類、季節及設施內管理情況而異。主要栽培蔬菜發生害蟲之重要性依序甕菜為斜紋夜盜蟲、葉蟎；小白菜為黃條葉蚤、小菜蛾、斜紋夜盜蟲；芥藍菜為小菜蛾、斜紋夜盜蟲；油菜為黃條葉蚤、小菜蛾；芥菜為小菜蛾、黃條葉蚤、斜紋夜盜蟲，其他如莧菜、萵苣、芹菜、菠菜、茼萵發生之害蟲種類較少，危害也較輕微。重要害蟲之主要發生季節黃條葉蚤以10~12月及翌年3~4月之乾燥季節發生最為嚴重；小菜蛾以11月至翌年5月發生較嚴重;斜紋夜盜蟲以10~12月發生較為嚴重。

農業機械

掘溝機及雙速皮帶輪組設計研製

龍國維、田雲生

本省中部八卦山脈嫩薑生產約500公頃，佔全省栽培面積1/2強，其栽培方式全採人工開掘深40cm；寬15cm深溝將薑

母種植於溝底。此部份作業極費人力，工人難尋，因此本場研製掛載於中耕機之掘溝機以冀使此作業能機械化。掘溝機採鏈條式挖掘刀機構，挖掘深度可達35～40cm，目前機構均已完成，可順利完成掘溝作業，但遭遇問題是中耕機行進速太快致使8.5hp引擎動力不足。計算上行走速至少要降低2.5～4倍，但如果降低整體行進速，則於路面移動相形太慢會喪失其機動性。因此如何於中耕機有限空間中傳動來達成田間低速行走而路面上高速移動成為一項挑戰。經多方考慮尋思並收集資料比較後終於完成設計一組創新之雙速皮帶輪組。此雙速輪內部構造有太陽齒輪，行星齒輪及外環齒輪，利用行星齒輪自轉及公轉原理達成減速，如果將外環齒輪放開而與輸出軸鎖定，則可達成同步傳動。目前試製完成之雙速輪內部齒數依次為21,17及54齒，可達成約3.6倍減速，內部完全密封加注潤滑油以確保傳動之潤滑。其優點為更換簡易，以雙速輪組直接取代原皮帶輪即可達成1:1路面行走及1：3.6田間作業兩個速度的變化，除可應用於本掘溝機外，更可用於許多類似需求之田間作業農機上。

菊切花儲運品質與花苞負荷鬆弛特性研究

何榮祥、陳俊明

為有效的改善農產品之品質，必須先瞭解農產品基本物性，避免農產品在收穫、儲存、運輸、加工過程中造成品質變化之情形，在探討本省輸日菊花，在現行包裝儲運過程中，品質變化之情形，並針對其花苞部份，探討其在不同的壓縮量與不同儲運時間下之品質變化與花苞受壓縮變形後之負荷鬆弛現象，以期改善菊花輸日品質。菊花在現行儲運方式下，其外觀品質以及瓶插品質之各項指標均隨儲存時間之延長呈下降趨勢，各處理間均呈現極顯著之差異。其中儲存時間對破損葉片數目、葉片壽命、花朵壽命、花朵開度均呈極顯著之影響。裝箱位置對破損葉片數量有極顯著之影響，對花朵開度亦有顯著之影響。各處理間儲存時間與裝箱位置間交感均不顯著。藉由反應曲面設計，可以估算儲存時間與變形量對菊切花品質之影響程度，並藉由固定其中一個因子，以求得另一因子之影響與變化趨勢。菊花花苞之負荷鬆弛特性可用三個併聯的一般化馬克斯威爾模式來預測。在相同之變形量下，壓縮速度較高者其負荷均較高，鬆弛時間亦較短，顯示壓縮速度較低時，菊花之花苞能藉由調整本身結構，以避免本身遭受傷害。其中第三個馬克斯威爾元件之鬆弛時間，各處理均小於兩秒，顯示菊花花苞，在受到外力擠壓時，均能快速的調整本身結構，以抵抗外力。

水稻散裝聯合收穫作業搬運模式

陳令錫、何榮祥、龍國維、田雲生

82年引進日規水稻散裝聯合收穫機壹台，製作承裝散裝稻穀大穀袋並改裝附傾卸斗農用搬運車做為散裝稻穀搬運工具，經試用結果顯示，該散裝聯合收穫機於農地重劃區段規則稻田較可發揮性能，工作能量可達0.3公頃／小時，較一般裝袋式聯合收穫機佳，收穫後散裝稻穀可直接由收穫機上稻穀暫存桶經卸料螺旋輸送管送至大穀袋或搬運工具載台上，卸料時間約2～2.5分鐘，載運機具便可直奔稻穀乾燥場所，輕易地將稻穀卸下，即刻返回田區待命裝料。　收穫機上稻穀暫存桶容量約750公升，每桶收割滿載時間約20～25分鐘，農用搬運車每一車次僅能承裝一次卸穀容量，搬運距離超過1Km以上便有配置二輛農用搬運車的需要；工程用附傾卸斗貨車承載量雖大，但搬運距離過遠時，仍有第二輛車待命的需要。散裝收割的稻穀均須即刻裝載搬運，否則稻穀暫存桶滿載狀況下，收割作業無法繼續進行，將影響散裝聯合收穫機工作效率。

堆肥撒佈搬運車研製及改良

龍國維、田雲生、陳令錫

本場於八十年間引進日製　SASAKI GT-1110K　型曳引機承載式堆肥撒佈機壹台，針對該機之性能狀況及使用情形連同其他型式撒佈車進行測試與研究，其中發現以迴轉切刀配合三角轉盤之作業方式最為理想，便據以作為規劃設計農用搬運車兼作堆肥撒佈設備（即堆肥撒佈搬運車）之參考。目前雛型機已研製完成：以13Hp柴油引擎搬運車為底盤，撒佈裝置採載肥貨斗及撒佈頭兩段式分離設計，前者包括具有四段變速選擇之撥肥鏈條組，將堆肥以間歇方式向後輸送；後者承接前端堆肥，藉迴轉切刀切碎團塊，再利用三角轉盤散佈於後方地面上。撒佈頭平常不用時可輕易地拆除，貨斗另加裝後柵板即成為一般搬運車使用，不僅操作簡便，又達到一機多用途的功能。經各項測試結果顯示：載台容量約0.8ton(1.4m^3)，撒佈寬度為6～8m，每車次撒佈時間需花費1.6～2.6分鐘。若每公頃堆肥推薦量為5噸，搬運車以高速一檔9km/hr速度行駛，撥肥鏈條採用第四段速，扣除載肥往返時間，實際僅約耗費16.7分鐘即可完成，作業效率相當地高，撒佈均勻度亦很理想，將繼續補強結構缺失與田間試驗後，推廣予農民使用。

農業經營

劉姓農家椪柑生產之成本與收益分析

陳清文、陳炎星

本個案係降低柑桔產銷成本計畫中經營管理小組選定之調查項目，主要是調查劉姓農家椪柑之生產成本與收益，期供經營管理小組輔導之參考。劉姓農家，經營主現年30歲，高職畢業，對柑桔生產技術認眞學習，並加強地力維護，期能永續經營。果園位於台中市大坑，椪柑栽培面積1.85公頃，根據調查結果顯示，八十一年期椪柑產量為32865公斤，粗收益908039元，生產費用771385元，損益136654元，家族勞動報酬438764元，農家賺款493461元。　就生產費用結構而言，　以人工費302110元，占39.16%，居首位；肥料費127508元，佔16.53%居次；運銷費94620元，佔12.27%居第三位，以上三項合計占生產總費用67.96%，其餘生產費用計占32.04%。依損益平衡點觀之，生產總費用771385元中，變動費用318090元，固定費用453295元，損益平衡點銷售額為697699元；銷費量為25.253公斤，實際銷售額與銷售量均高於此點，表示可確保利潤。

台中地區花卉蔬菜產銷班調查研究

高德錚、李嘉元、邱存金、林正賢、陳武揚、陳清文、黃穎捷、廖萬正、鄭健雄、戴登燦

為因應我國加入 GATT 對農業造成的影響，農委會於八十二年度開始輔導花卉等七大產業組織產銷班，而本場為配合政府政策及加強蔬菜與花卉班之輔導，遂動員農業推廣中心同仁進行產銷班基本資料調查。八十二年度台中區已整合登記之產銷班計有花卉109班、蔬菜227班。經本場調查結果發現， 其中 80% 歸農會輔導；19% 在合作社場下運作，惟部分班隊之輔導單位仍出現重疊現象。依主要作物別來看，花卉班以經營國蘭類、百合、玫瑰、唐菖蒲及滿天星較多，蔬菜班則以種植花椰菜、茭白筍、絲瓜、竹筍、番茄、茄子、菜豆、西瓜、苦瓜、胡瓜較普遍。一般而言，產銷班之共同設備除集貨場及聚會用桌椅外，其餘甚為缺乏，其集會場所往往利用集貨場、班長家及活動中心和農會等地舉行。班會的召開次數以一年 6 次最多。至於班產品則以寄交消費地之蔬菜、花卉拍賣市場所佔比率最高，其餘販售至其它市場或行口。

后里鄉十三張區段共同經營班之個案研究

林月金

后里鄉十三張區段共同經營班係一具有共同事業體與統收統支的農業產銷班，是非常理想的生產組織型態。本研究希望分析其經營管理特性與財務狀況，供作農業產銷班輔導之參考。分析結果顯示，該班全年農場經營利潤 2853664 元，利潤率 15.7% ， 農場淨所得與自有資本報酬同為 3286814元，自有資本報酬率高達60.7%，總資本報酬率35.3%，自有資本比率46.4% ，長期資本比率 93.8% ，設備投資安全率 29.1% ， 流動比率 1150.3% ， 速動比率 532.0%，權益比率86.7%，固定比率58.7% ，總資產週轉率 1.8 ， 固定資產週轉率 8.5 ，自有資本週轉率 3.4 ， 每公頃耕地生產力 7381091 元， 每一人工等數的生產力 5712825元，每元資產的生產力1.78元。綜合而言，該班收益高，但非現金收入比率亦高，短期償債能力極高，長期償債能力尚可，財務流動性及安全性佳，固定資產及自有資本回收快，總資本回收略慢，生產力極高。建議：(一)加強市場資訊蒐集，建立消費者導向的行銷理念。(二)加強種球管理。(三)償還部分長期借款，減少長期負債，或增資以增加自有資本。(四)記賬期能更為詳細，以便於分析各種切花之生產成本及收益，供作擬定生產計畫參考。(五)訓練班員自己分析記賬資料，並利用記賬資料，進而改善農場經營。(六)加強研究發展。

農業推廣教育

中部地區農民對第二專長訓練認知之研究

陳廷煥、李嘉元、洪淑芬、高德錚

近年來由於農民所得偏低農村人口外流，實際上留在農村之專業農民比例日益降低。依據民國79年全國經濟會議之決議，于當年度展開全省性『輔導農漁民轉業第二專長訓練計畫』之推動，至82年度止全省共有一千名農友結訓。為了解中部地區對農友轉業第二專長訓練之認知， 本研究乃於82年度間從轄區61個鄉(市)鎮農會中，每一農會隨機取樣30個會員，以郵寄方式進行問卷調查。由調查結果得知，樣品農户獲知轉業訓練之消息大致源自農會推廣人員、刊物或此問卷調查，且大多以政府職訓中心來承辦是項轉業第二專長訓練且經費由政府負責，但訓練機構以離家較近為宜(45.1%)，尤其是以地區改良場或農會之地點為佳(62.7%) 51.7%之樣品農户認為參加轉業訓練之動機為農閒時兼業，一旦離農後其農地仍以『利用部份時間耕種』為主(64.6%)。受訓期間則以1～3個月為宜(54.4%)，且受訓期間需要政府貼補生活及訓練資材費用 (54%) 。 樣品農户期望第二專長之受訓項目以汽車修護、 水電配管、餐飲及室內裝璜較熱門，係因該項工作未來較具發展性， 而參加轉業訓練過程中遭受最大之困難為①家庭生活支出②訓練時間難配合③目前工作無法離開④訓練地點過遠不方便。

中部地區農村婦女生活素質與家政教育需求之調查研究

張嘉真、黃淑嘉、邱阿勤

本調查研究是以台中地區農村婦女為對象，利用問卷調查方式，收集受訪農村婦女對生活素質有關問題的主觀感受及家政教育需求之意見，並藉以瞭解不同都市化程度及不同角色農村婦女間生活素質及家庭教育需求之差異。 調查結果發現： 1. 受訪農村婦女對於生活素質最感滿意的層面是相屬相愛的需求， 其次是尊重的需求；而最感不滿意的層面為安全的需求，其次為自我實現的需求。 2. 參加家事改進班之班員與未參加之非班員農村婦女，在『生理需求』、『安全需求』、『相屬相愛的需求』及『尊重的需求』等層級的滿意程度並無差異，而自我實現的需求，班員與非班員的滿意程度有極顯著的差異， 且非班員的滿意程度高於班員。 3. 不同都市化程度之農村婦女對『相屬相愛的需求』、『尊重的需求』及『自我實現的需求』之滿意程度都有顯著的差異， 其中以高度農村地區之滿意程度最低。 4. 家政教育需求對身心健康及家庭生活需求之需求程度最高， 有實用之取向。 5. 家事改進班班員與非班員對整體家政教育， 非班員的需求程度高於班員， 非班員對『家事改進班值得參加』之需要程度高於班員。 6. 農村婦女對家政教育需求， 並不因都市化程度之不同而有需求上之差異， 而且也不影響參加家事改進班之需要性。

農村青年參訓學員對新技術採用之研究

鄭健雄

本研究為瞭解農村青年專業訓練班參訓學員採用新技術及其影響因素，及以78～81年度參加本場舉辦之設施蔬菜班、有機農業班及花卉生產班所有參訓學員為考評對象，採取對參訓者事後調查的方式搜集研究資料。 研究發現在 209 名設施蔬菜班參訓學員中有 13.4% (28 人)採用設施蔬菜生產技術；採用創新的主要動機，從事水耕的參訓學員表示未來水耕深具發展潛力，從事設施土耕的學員則表示係自己能夠掌握蔬菜銷售市場；而未採用設施蔬菜生產技術的最主要原因是設施成本太高，

直接影響參訓學員採用創新與否。有機農業班所有參訓學員(40名)中有27.5%採用有機農業生產技術，大多數表示他們之所以會採用有機農法主要是因這套方法簡易且實用性高；而未採用新技術自行製造堆肥的主要原因是缺乏場地及資料；其次是缺乏人工及時間來製造堆肥。在花卉生產班參訓學員(21名)中，高達90.5%的參訓學員實際從事花卉生產，但大部分學員係從事國蘭栽培，僅2名從事與授課內容有關的洋蘭及切花生產，半數以上學員表示當初投入花卉生產工作主要認為花卉市場看好，頗具經濟利益，其次是個人興趣所在。

二、農業推廣教育成果

農業推廣工作

教育訓練工作

本場為增進青年農民之農業新知技術，八十二年度辦理花卉、設施蔬菜、有機農業及農業經營等4班農村青年專業訓練班，結訓學員113人。為提升農業推廣人員的工作技能，本場辦理投影片製作班1班及幻燈片教材製作班2班及生產技術訓練班1班共計4班，受訓學員85人。同時接受海外會及海合會委託代訓3班別之友邦農技人員專業訓練班，共計35人；本場亦另代訓2班之訓練班，受訓學員共計79人(表一)。

農民服務工作

本場為推展各項農民服務工作，八十二年度接待來訪貴賓及農民9178人、外賓835人，提供諮詢服務及推廣教材1872人，派員擔任基層農會講習會講師254人次(表二)。

表一、農業推廣中心之訓練業務

訓練班別	班數(班)	人數(人)
農村青年專業訓練班	4	113
推廣人員在職訓練班	4	85
友邦農技人員訓練班	3	35
其他代訓班	2	79
合計	13	312

表二、八十二年度農民服務情形

服務項目	次數	人數
引導國內團體參觀	135	9,178
引導外賓參觀	88	835
農民諮詢服務及教材	656	1,872
安排講師	256	—

農村生活

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21村里辦理高齡者生活改善班、25村里組班辦理預防保健工作、28村里組班辦理強化家庭功能、12村里辦理農村社區實質環境改善工作(表三)。

鄉村文化發展

本場為塑造具有鄉土性之社區文化，建立具有文化氣氣之現代化鄉村社會，八十二年度共輔導彰化縣埤頭鄉、台中縣大甲鎮及梧棲鎮等農會設置農村文化示範村里，8鄉鎮辦理鄉村文化系列活動，13村里設置農民教室(表四)。

表三、台中區農漁村生活環境改善情形

縣市別	高齡者生活改善	預防保健工作	強化家庭功能	社區實質環境改善
台中縣	11	14	12	4
台中市	1	1	—	—
南投縣	2	3	5	3
彰化縣	7	7	11	5
合　計	21	25	28	12

表四、八十二年度台中區辦理鄉村文化活動情形

縣市別	農村文化示範(村里)	鄉村文化活動(鄉鎮)	農民教室(村里)
台中縣	2	3	4
南投縣	—	1	3
彰化縣	1	3	5
台中市	—	1	1
合　計	3	8	13

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134位青年農民獲得低利貸款從事花卉、茶、果樹、蔬菜及蛋雞等農場經營（表六）。

表五、農產品生產成本調查概況

縣市別	調查作物數	調查鄉鎮數	調查户數
台中市	1	1	3
台中縣	34	15	258
彰化縣	45	22	287
南投縣	54	13	334
合　計	134	51	882

表六、青創農場之經營種類

縣市別	花卉	茶	果樹	蔬菜	蛋雞	其它	合計
台中市	1	0	1	1	0	0	3
台中縣	17	0	6	2	0	5	30
彰化縣	27	0	4	4	8	11	54
南投縣	20	20	2	2	0	3	47
合　計	65	20	13	9	8	19	134

三、出版刊物

A．發表文章(臺中場研究彙報第38～41期)

1.陳清文、蔡宜峰 台中地區農友使用有機質肥料之現況調查及意願分析 38:1～10。
2.張德前、陳慶忠 菜豆主要害蟲之族群消長及藥劑防治適期 38:11～22。
3.龍國維、田雲生 盤式堆肥撒佈機性能效益研究 38:23～36。
4.黃祥慶、蔡宜峰 不同用量乾豬糞對菠菜及葉萵苣生育及產量之影響 38:37～43。
5.胡兆華 水稻短稈品種歷史的回顧暨永續性農業新株型育種 38:45～63。
6.劉達修、王文哲 常用殺蟎劑對二點葉蟎(*Tetranychus urticae* Koch)之防治效果 39:1～15。
7.林景和 利用廢棄菇類栽培介質製作堆肥之研究 39:17～27。
8.謝慶芳、徐國男 甜玉米與毛豆有機栽培試驗 39:29～39。
9.李健拯、陳世雄、許愛娜、宋勳 穀粒充實期土壤水份境況對水稻生育及米質之影響 39:41～50。
10.林信山、林嘉興、張林仁、林金和 植物生長阻礙劑對新世紀梨生長之影響 39:51～59。
11.劉達修、王文哲、陳啓吉 數種非農藥物質在葉蟎防治上之應用 39:61～71。
12.王文哲、劉達修 常用殺蟎劑對神澤氏葉蟎(*Tetranychus kanzawai* Kishida)之防治效果 40:1～8。
13.蔡宜峰、陳清文 施用牛糞堆肥對一般作物及土壤特性之影響效應 40:9～16。
14.林俊義 台灣高粱麥角病之研究 40:17～28。
15.林再發 新育成秈稻品系對二化螟蟲抵抗性及其農藝性狀之表現 40:29～36。
16.林天枝、莊杉行 香菇栽培之太空包廢渣在番茄生產利用之研究 40:37～44。
17.柯忠德、陳慶忠、劉興隆 中部地區簡易設施蔬菜害蟲發生調查 40:45～54。
18.劉興隆 中部地區設施蔬菜之病害調查 41:1～9。
19.何榮祥、劉達修 自動控溫浸種機之研製與應用 41:11～19。
20.方敏男 台灣花薊馬(*Frankliniella intonsa* Trybom)在豌豆上之族群密度與防治試驗 41:21～32。
21.陳慶忠、黃婉玲 水稻縞葉枯病毒之純化及部份性質研究 41:33～41。
22.林金樹 水稻品種對白葉枯病耐病性試驗(Ⅰ) 41:43～54。
23.邱建中、許明禮、許雨順 在印尼利用性費洛蒙防治大豆田斜紋夜盜蛾之觀察試驗 41:55～63。

B．台中區農推專訊(月刊)

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

C．台中區農業專訊(季刊)：自81年10月創刊發行

第一期 (81.10)
第二期 (82. 2)
第三期 (82. 5)
第四期 (82.12)

D．台中區農業改良場特刊

第30號 作物之遺傳育種及生理栽培研討會專集 (特刊82.6)
第31號
第32號 永續農業研討會專集 黃秀華、謝順景、陳慶忠 主編(82.6)

四、八十二年度國內外來賓訪問及參觀本場統計表

Local Visitors
國內部份

82.01.06　台北縣政府共80人來場參觀水耕、花卉。
82.01.11　大溪鎮公所共45人來場參觀水耕、花卉。
82.01.16　彰化縣立文化中心共45人來場參觀水耕、米質、果樹。
82.01.28　員林高級中學共60人來場研習。
82.02.01　員林高級中學共60人來場研習。
82.02.10　台北板橋實踐小學共50人來場參觀。
82.02.17　台中縣線島小學教師共2人來場研習水耕。
82.02.23　水土保持局第二工程所辦理82年度農民講習觀摩會共40人來場研習果樹。
82.02.24　後龍鎮公所共100人來場參觀。
82.03.05　台中縣立日南中學共50人來場參觀水耕。
82.03.06　彰化縣立文化中心共40人來場參觀水耕。
82.03.06　南投縣立北屯國中共40人來場參觀水耕、花卉。
82.03.16　仁武鄉農會共50人來場參觀有機農業。
82.03.16　斗南鎮農會共60人來場參觀高接梨、葡萄。
82.03.17　關西鎮公所共140人來場參觀水耕、花卉。
83.03.20　明倫國中共274人來場參觀水耕。
83.03.22　和平鄉農會共60人來場參觀梨栽培。
83.03.23　學甲農會共45人來場參觀有機農業。
82.03.27　明倫國中共228人來場參觀。
82.04.01　北門高級農工職老師共50人來場參觀水耕、花卉。
82.04.02　台中家商師生共160人來場水耕、花卉。
82.04.03　明倫國中師生共45人來場參觀水耕。
82.04.03　鹿鳴國中師生共90人來場參觀水耕、花卉。
82.04.07　泰山鄉農會共140人來場參觀水耕。
82.04.10　明倫國中共70人來場參觀蔬菜、花卉。
82.04.16　苗栗高級中學農工學校共167人來場參觀水耕、花卉。
82.04.16　苗栗市農會共90人來場講習幸福家庭。
82.04.21　嘉義溪口鄉農會共90人來場參觀及簡報。
82.04.22　田尾鄉農會共90人來場參觀蔬菜設施。

82.04.29　二崙鄉農會共90人來場研習認識老化與生活調適。
82.04.29　竹崎鄉農會共45人來場參觀花卉病害。
82.04.29　花蓮縣壽豐鄉會共50人來場研習有機農法及永續性農業。
82.04.29　台北縣樹林鎮農會共50人來場參觀有機農業。
82.05.03　金門農政人員及農機代耕中心負責人共15人來場參觀作物改良技術改善及農機研究。
82.05.04　士林區農會共45人來場研習永續性農業技術。
82.05.04　林內鄉農會共40人來場參觀觀光果園經營概念。
82.05.05　三星鄉鄉民代表共35人來場參觀水耕。
82.05.06　三星地區農會共150人來場參觀蔬菜設施栽培。
82.05.06　中央廣播電台共12人來場參觀。
82.05.07　岡山高級農工職校師生共37人來場參觀農機。
82.05.10　東勢鎮公所共45人來場參觀高接梨管理技術。
82.05.11　雲林縣大埤鄉農會共90人來場參觀水耕栽培。
82.05.12　褒保鄉農會共45人來場參觀永續性農業技術。
82.05.11　埤頭鄉農會共50人來場參觀良質米189及糖醋液、木醋液。
82.05.11　觀音鄉農會共90人來場觀有機農業、花卉、瓜果。
82.05.13　花蓮縣高級農業職校共39人來場參觀園藝。
82.05.13　花蓮市農會共50人來場有機米、
82.05.14　二崙國中共35人來場參觀水耕、花卉。
82.05.17　鹿港鎮公所共45人來場參觀再生稻栽培方法。
82.05.19　大村國中教師共13人來場參觀水耕。
82.05.20　中央氣象局共20人來場參觀。
82.05.20　台南安定鄉農會共45人來場參觀水耕。
82.05.24　雲林縣斗南鎮農會共30人來場參觀葡萄栽培技術。
82.05.25　東勢鎮公所共45人來場參觀高接梨管理。
82.05.25　省新聞處大專院校教授共80人來場參觀。
82.05.26　泰山鄉農會共130人來場參觀水稻栽培、病蟲害防治、有機肥料。
82.05.26　草屯鎮農會共80人來場參觀良質米、糯稻栽培技術、病蟲害防治方法。
82.05.27　省新聞處大專院校教授共80人來場參觀。
82.05.27　草屯鎮農會共80人來場參觀良質米、糯稻栽培技術、病蟲害防治方法。
82.05.28　宜蘭縣員山鄉農會共50人來場參觀蔬菜簡易設施。
82.05.28　獅潭鄉農會共90人來場參觀水耕、花卉。
82.05.28　和平鄉農會共40人來場參觀平地溫帶梨栽培管理。

82.05.31 新竹縣五峰鄉公所共45人來場參觀果樹病蟲害防治。
82.06.03 屏東縣潮州鎮農會共90人來場參觀自然農法有機米。
82.06.08 台中市中山國中共84人來場參觀。
82.06.08 雲林縣斗六市公所共100人來場參觀水稻栽培管理。
82.06.09 大溪鎮農會共105人來場參觀。
82.06.16 三星鄉公所共45人來場參觀有機農業應用。
82.06.15 中興大學共6人來場參觀水耕。
82.06.10 楊梅鎮農會共47人來場參觀有機農業。
82.06.18 宜蘭縣政府共45人來場參觀有機農業。
82.06.23 旗山農工教員共23人來場參觀水耕。
82.06.25 和平鄉農會共50人來場參觀果樹栽培。
82.06.28 泰山鄉農會共70人來場冬家政。
82.07.01 屏東縣高樹鄉農會共90人來場參觀水耕。
82.07.01 台北縣泰山鄉農會共100人來場參觀水耕。
82.07.05 板橋市農會共190人來場研習家政觀摩。
82.07.05 通霄農會共50人來場參觀果樹栽培。
82.07.08 苗栗市農會共45人來場參觀有機農業。
82.07.08 善化鎮農會共96人來場參觀水耕。
82.07.17 彰化救國團共80人來場參觀。
82.07.20 竹崎鄉公所共96人來場參觀梨新品種特性。
82.07.22 台東地區農會共45人來場參觀有機農業。
82.07.27 嘉義市立國民中學共60人來場參觀水耕。
82.08.02 南投縣國姓鄉農會共45人來場參觀有機農業。
82.08.07 雜糧基金會共40人來場參觀。
82.08.10 烏松鄉農會共90人來場參觀水耕、花卉。
82.08.12 桃園縣農會共45人來場參觀花卉。
82.08.13 東勢鎮農會共45人來場參觀梨栽培管理。
82.08.23 台北縣深坑地區農會共90人來場參觀水耕。
82.08.24 屏東縣潮州鎮農會共45人來場參觀水栽。
82.09.17 花壇鄉婦會共35人來場參觀。
82.09.20 溪州鄉農會共92人來場參觀水耕。
82.09.22 雲林縣麥寮鄉農會共90人來場參觀水耕。
82.09.24 台中高農共45人來場參觀雜糧。
82.10.01 石岡鄉農會共45人來場參觀梨栽培。

82.10.01 秀水高級職校師生共100人來場參觀。
82.10.07 石岡鄉鄉民代表會共30人來場參觀果樹及蔬菜耕作。
82.10.07 竹崎鄉公所共47人來場參觀柑桔、有機農法。
82.10.16 和美鎮農會共90人來場參觀水耕。
82.10.13 台中縣政府共45人來場參觀水稻管理。
82.10.15 北投區農會共90人來場參觀有機農業。
82.10.20 二崙鄉農會共90人來場參觀水耕、花卉。
81.10.21 田尾鄉農會共90人來場參觀有機農業。
82.10.21 大寮鄉農會共90人來場參觀有機農業。
82.10.22 宜蘭農工職校共45人來場參觀果樹栽培。
82.10.22 復興農會共90人來場參觀有機農業。
82.10.28 宜蘭市公所共90人來場參觀水稻栽培技術。
82.11.03 集集鎮公所共180人來場參觀手耕、花卉。
82.11.04 嘉義縣農會共70人來場參觀有機農業。
82.11.09 草屯鎮公所共50人來場參觀水稻新品種。
82.11.10 屏東縣農會共40人來場參觀有機農業。
82.11.10 二崙鄉農會共80人來場參觀花卉溫室培。
82.11.10 甲仙地區農會共40人來場參觀花卉、有機農業。
82.11.16 高樹鄉農會共50人來場參觀家政改良業務。
82.11.18 太保市農會共169人來場參觀水耕及有機農業。
82.11.19 橋頭鄉農會共45人來場參觀有機農業。
82.11.19 後龍鎮農會共155人來場參觀良質米栽培。
82.11.19 中寮鄉農會共45人來場參觀柑桔栽培。
82.11.23 旗山鎮農會共45人來場參觀美化環境。
82.11.23 冬山鄉農會共49人來場參觀水耕。
82.11.24 台中縣溪南國中共45人來場參觀水耕。
82.11.24 台北南港區農會共60人來場參觀水耕。
82.11.25 楠西鄉農會共45人來場參觀水耕栽培。
82.11.30 台南高級農校共45人來場參觀水耕。
82.12.01 新港鄉農會共120人來場參觀GATT及有機農業。
82.12.01 溪口鄉農會共80人來場參觀有機農業。
82.12.01 九如鄉農會共45人來場參觀家政業務。
82.12.07 農林廳水土保持局第一工程所共45人來場參觀有機農業。
82.12.08 私立啓智技藝訓練中心共4人來場參觀水耕。

82.12.10 蘇澳地區農會共56人來場參觀水稻新品種。
82.12.14 雲林蔴桐農會共45人來場參觀葡萄栽培技術。
82.12.17 嘉義農專共55人來場參觀水耕。
82.12.20 新社鄉農會共45人來場觀摧教家政設施及果樹栽培。
82.12.27 芬園鄉農會共100人來場參觀水稻研究栽培。
82.12.27 信義鄉農會共50人來場參觀梅栽培。

Foreign Visitors
國外部份

82.01.13 日本鹿兒島縣共10人來場參觀。
82.01.14 日本和歌山町農業協同組合共17人來場參觀碗豆試驗田。
82.01.15 幾內亞比索共和國共6人來場參觀。
82.02.11 日本靜岡縣達州中央農業協同組合共24人來場參觀。
82.02.15 中南美洲及加勒比海地區官員共26人來場參觀。
82.02.19 日本JA燒津市梨部會共12人來場參觀果樹生產。
82.02.23 Carlos Alberto martins Portar 教授共1人來場參觀。
82.03.04 千里達共2人來場參觀。
82.03.17 中興工程顧問杜率來華受訓學員共20人來場參觀。
82.03.25 以色列農業專家共2人來場參觀。
82.05.04 土地改革所正規班中外學員共36人來場參觀。
82.05.06 外交部(越南農業代表團顧問)共2人來場參觀。
82.05.11 日本鹿兒島縣始良町協會共17人來場參觀。
82.05.14 外交部(紐西蘭國會議員)共9人來場參觀。
82.05.22 馬拉威農業部開發處工長共3人來場參觀。
82.06.09 土地改革所(外籍學員)共19人來場參觀。
82.06.09 中國農校流協會共6人來場參觀。
82.06.09 亞洲蔬菜中心共2人來場參觀。
82.06.16 日本鹿兒島縣立德之島農業高等學校校長及師生共34人來場參觀。
82.06.22 省糧食局(日本村上明先生)共3人來場參觀。
82.06.30 馬來西亞考察團共27人來場參觀。
82.07.08 中流文化經濟協會(日本東京都)共6人來場參觀。
82.07.17 外交部(南非波布那邦議會)共8人來場參觀。
82.07.24 外貿協會(越南官員與生意人員)共53人來場參觀。
82.08.10 農藥所(馬來西亞農業部官員)共4人來場參觀。

82.08.13 中興大學(日本東京大學交流學生)共15人來場參觀。
82.08.22 越南東方種子公司共8人來場參觀。
82.08.26 中興大學(東京農業大學)共16人來場參觀園藝及推廣
82.08.30 日本農業委員共15人來場參觀水稻、園藝。
82.09.15 亞洲農業技術服務中心(菲律賓南科把巴都省農業考察團)共18人來場參觀。
82.09.22 農委會美國普渡大學蔡嘉寅教授共1人來場參觀。
82.09.29 亞洲蔬菜菜研究中心共3人來場參觀永續性農業。
82.10.04 中華民國全國工業總會(蒙古地區司處長官員)共11人來場參觀。
82.10.05 農委會(南斐京大學教授共3人來場參觀農業推廣工作。
82.10.06 亞太糧肥作物中心(菲律賓農業考察團)共7人來場參觀水稻、蔬菜、水果。
82.10.06 外交部(越南峴港度南省書記)共3人來場參觀葡萄。
82.10.12 韓國青年農民訪問團共17人來場參觀推廣工作。
82.10.27 外交部(利比亞農業部研究所所長)共4人來場參觀。
82.11.11 日本北海道農業協會共28人來場參觀。
82.11.15 日本靜岡縣共9人來場參觀花卉栽培。
82.11.18 外交部(非洲司南非祖魯國王)共8人來場參觀。
82.11.22 農委會(菲律賓農業商業化觀摩團)來場參觀。
82.11.24 農委會(象牙海岸農業部顧問)共3人來場參觀。
82.11.26 青年救國團(日本農漁村青年代表團)共40人來場參觀訪問。
82.11.30 土地改革所共27人來場參觀。
82.12.03 越南團共7人來場參觀。
82.12.04 聖露西亞總理夫人及秘書共10人來場參觀。
82.12.10 亞蔬研究中心(菲律賓大學校長及引種作局長)共3人來場參觀。
82.12.13 土地改革所共23人來場參觀。
82.12.17 韓國農業教育協會師生共25人來場參觀。
82.12.18 南非非洲民族議會共7人來場參觀。

五、八十二年度出國人員統計表

姓　名	前往國家	出國日期	目的及任務
高德錚	阿　曼	3.03～3.16	應阿曼王國農漁業部函邀赴阿曼王國講授「臺灣推廣農業技術經驗」
陳慶忠	韓　國	4.12～4.17	參加亞洲熱帶及亞熱帶蟲媒病害管理國際研討會
謝順景	大　陸	5.24～6.05	出席國際永續性農業及農村發展研討會並發表論文
方敏男	大　陸	5.14～5.22	參加第六屆華東昆蟲學術研討會
謝順景	泰　國	5.11～5.15	參加永續農業「為人類生存所需替代性農業國際會議」
蔡宜峰	大　陸	7.05～7.20	參加青輔會舉辦之「八十二年度輔導大專在學青年赴大陸地區從事農業服務交流活動」
宋　勳	西　非	11.28～12.08	應外交部邀請赴西非參訪水稻發展協會

六、八十二年專題討論

日　期	主講人	題　　目
82.02.01	龍國維	模糊理論與控制應用
82.02.08	林金樹	稻麴病發生生態與防治
82.02.06	李健拯	缺水對稻之生理反應
81.02.13	林再發	水稻白葉枯病抗病性之遺傳及有關之生理特性研究
82.02.15	劉添丁	白絹病菌殘存與使用尿素防治
82.02.20	鍾維榮	新類型殺草劑的研究趨勢
82.02.27	沈　勳	水稻－小麥耕作制度栽培上及肥料管理之探討
82.03.01	陳慶忠	植物保護試驗研究題目之選定及論文撰寫
82.03.06	林嘉興	環境因子對柑桔花芽分化之影響
82.03.08	劉興隆	抑病土之抑病機制及應用
82.03.13	楊嘉凌	種子水分含量與種子貯藏之關係
82.03.20	張素貞	過氧化酶與作物抗病性
82.03.27	許志聖	同功酶研究及其應用
82.04.03	郭俊毅	十字花科蔬菜之自交不親和性
82.04.10	宋　勳	麥草等農作物廢棄物處理技術之探討
82.04.17	古錦文	寒冷對蔬菜的傷害
82.04.19	王錦堂	樹皮堆肥之肥效與應用
82.04.24	張隆仁	高粱延遲老化型與老化型品種之比較
82.05.01	郭孚耀	不織布在農業上之應用
82.05.08	黃勝忠	DNA聚合酶連鎖反應(PCR)在生物技術之應用
82.05.10	趙佳鴻	蕃茄斑點萎凋病毒研究之概況（Ⅰ）基因表現之策略
82.05.15	張林仁	簡易溫室環境對葡萄生育之影響
82.05.22	許愛娜	水稻穀粒蛋白質
82.05.24	劉達修	寄生蜂的世界（Ⅰ）卵寄生蜂在農業上之應用
82.05.29	陳彥睿	玫瑰之產期調節
82.06.05	許謙信	光線強度對菊花生長之影響
82.06.12	蔡素蕙	影響唐菖蒲葉尖枯萎之可能因子
82.06.19	曾勝雄	蕎麥乾物質生成與產量之關係
82.07.19	林景和	磷肥在石灰質土之反應
82.08.02	方敏男	東方果實蠅之生態與防治
82.08.09	田雲生	電腦影像處理及應用
82.09.13	王文哲	二點葉蟎之生態與防治
82.09.20	陳鴻堂	施肥對環境之影響
82.10.04	黃金助	竹盲椿象生活史、棲群消長、為害暨防治

日　期	主講人	題　　目
82.11.08	張德前	農藥引起之害蟲再猖獗
82.11.15	陳令錫	可程式控制器介紹及應用
82.12.06	黃秀華	桔抗微生物對作物增產之潛能
82.12.20	陳啓吉	大螟之發生與防治

七、八十二年度各獎項名冊

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	Enhancement of Budbreak of Container Grown Shinseiki Pear in Taiwan's Lowlands by Split Application of Cyanamide
陳慶忠	甲種	花生上蕃茄斑點性萎凋病毒純化、性質及血清分析
林月金	乙種	臺中地區水稻施肥效率之調查研究
鍾維榮	乙種	大蒜種球休眠性之探討
劉添丁	乙種	梨瘤蚜在高接梨之綜合防治技術
蔡素蕙	乙種	有機及化學肥料對小白菜生長、硝態氮及維生素含量之影響
王文哲	乙種	數種殺蟲劑對小菜蛾幼蟲、蛹及成蟲之毒性

其他獲獎名冊

姓　名	得　　獎　　項　　目
許志聖	獲得八十二年青年獎章
邱玲瑛	獲得八十二年行政院模範公務人員
鄭健雄	獲得中國農業推廣學會傑出報告獎 題目：農村青年參訓學員對新技術採用之研究
張惠眞	獲得中國農業推廣學會傑出報告獎 題目：中部地區農村婦女生活素質與家政教育需求之調查研究

八、民國八十二年氣象

台中地區每月最高、平均、最低溫度及總降雨量，82年度
Monthly maximum, mean, minimum, temperature and rainfall of central Taiwan, 1993

月份 Month	溫度 (Tempearture ℃) 最高 Max.	最低 Min.	平均 Mean	降雨量(mm) Rainfall
January	27.8	4.5	15.1	7.5
February	30.8	7.2	17.5	0.0
March	31.3	11.9	18.9	116.5
April	31.9	14.1	21.8	91.5
May	31.2	19.4	25.2	235.0
June	34.6	22.5	27.7	310.0
July	34.0	23.6	28.9	63.5
August	34.3	22.8	28.5	99.5
September	36.8	20.1	27.2	9.0
October	31.2	15.7	23.8	0.0
November	30.7	13.3	21.8	36.5
December	28.1	8.4	17.3	3.5

八、台中場主要職員
MAIN PERSONNEL

S. C. Hsieh(謝順景) Former Director
C. Y. Lin(林俊義) Director
H. S. Lin(林信山) Vice Director
L. S. Yang(楊麗賢) Secretary
H. C. Kao(高和增) Head of Comptroller's Office
S. P. Kin(金松坡) Head of General Affairs Office
S. M. Chu(朱孝茂) Head of Personnel Office (1)
Y. Y. Lee(李雨玉) Head of Personnel Office (2)
L. I. Chiu(邱玲瑛) Assistant

Crop Improvement Division

S. Song(宋勳) Head

Rice Staff

C. C. Chiu(邱建中) Associate Agronomist
T. F. Lin(林再發) Associate Rice Breeder
A. N. Hsu(許愛娜) Associate Agronomist
S. J. Chang(張素貞) Assistant Agronomist
M. C. Hong(洪梅珠) Assistant Agronomist
C. S. Sheu(許志聖) Assistant Agronomist
C. P. Lee(李健拌) Assistant Agronomist
C. E. Shiao(蕭浚二) Assistant
C. L. Yang(楊嘉凌) Assistant

Upland Crop Staff

S. H. Tseng(曾勝雄) Associate Agronomist
S. C. Huang(黃勝忠) Associate Agronomist
L. Z. Chang(張隆仁) Assistant Agronomist
S. Shen(沈勳) Assistant Agronomist

Horticultural Crop Staff

J. H. Lin(林嘉興) Associate Pomologist
W. J. Liaw(廖萬正) Associate Pomologist
L. R. Chang(張林仁) Assistant Pomologist
J. Y. Kuo(郭俊毅) Associate Horticulturist
W. J. Chung(鍾維榮) Assistant Horticulturist
J. W. Gun(古錦文) Assistant Horticulturist
F. Y. Kuo(郭孚燿) Assistant Horticulturist
C. S. Sheu(許謙信) Assistant Horticulturist
S. H. Tsai(蔡素蕙) Assistant
Y. R. Chen(陳彥睿) Assistant

Crop Environment Division

C. C. Chen(陳慶忠) Head

Plant Protection Staff

M. N. Feng(方敏男) Associate Entomologist
T. S. Liu(劉達修) Associate Entomologist
C. S. Lin(林金樹) Assistant Entomologist
S. H. Huang(黃秀華) Assistant Pathologist
C. H. Chao(趙佳鴻) Assistant Entomologist
T. C. Chang(張德前) Assistant Pathologist
T. T. Liu(劉添丁) Assistant Pathologist
W. Y. Chen(陳武揚) Assistant
K. C. Huang(黃金助) Assistant
K. N. Sheu(徐國男) Assistant
C. S. Lin(林正賢) Assistant
M. C. Yi(易美秀) Assistant
C. C. Chen(陳啓吉) Assistant
C. T. Ko(柯忠德) Assistant
H. L. Liu(劉興隆) Assistant
V. J. Wang(王文哲) Assistant

Soil and Fertilizer Staff

C. F. Hsieh(謝慶芳) Soil Scientist

C. T. Wang(王錦堂) Associate Soil Scientist

H. C. Huang(黃祥慶) Assistant Soil Scientist

Y. F. Tsai(蔡宜峰) Assistant Soil Scientist

C. H. Lin(林景和) Assistant Soil Scientist

H. T. Chen(陳鴻堂) Assistant

Agricultural Machinery Staff

J. H. Ho(何榮祥) Assistant Agricultural Machinist

G. W. Long(龍國維) Assistant Agricultural Machinist

Y. S. Teng(田雲生) Assistant

L. H. Chen(陳令錫) Assistant

Agricultural Extension Center

T. C. Kao(高德錚) Head

Agricultural Economics Staff

Y. J. Lin(林月金) Agricultural Economist

C. W. Chen(陳清文) Assistant Agricultural Economist

Agricultural Extension Education Staff

T. J. Chiu (邱存金) Assistant Extension Specialist

H. Y. Lee (李惠元) Assistant Extension Specialist

J. S. Cheng(鄭健雄) Assistant Extension Specialist

D. T. Day(戴登燦) Assistant Extension Specialist

Y. J. Huang(黃穎捷) Assistant

H. C. Chang(張惠貞) Assistant

Puli Branch Station

T. C. Lin(林天枝) Head

S. T. Hong(洪溢堂) Assistant Horticulturist

S. H. Chuang(莊杉行) Assistant