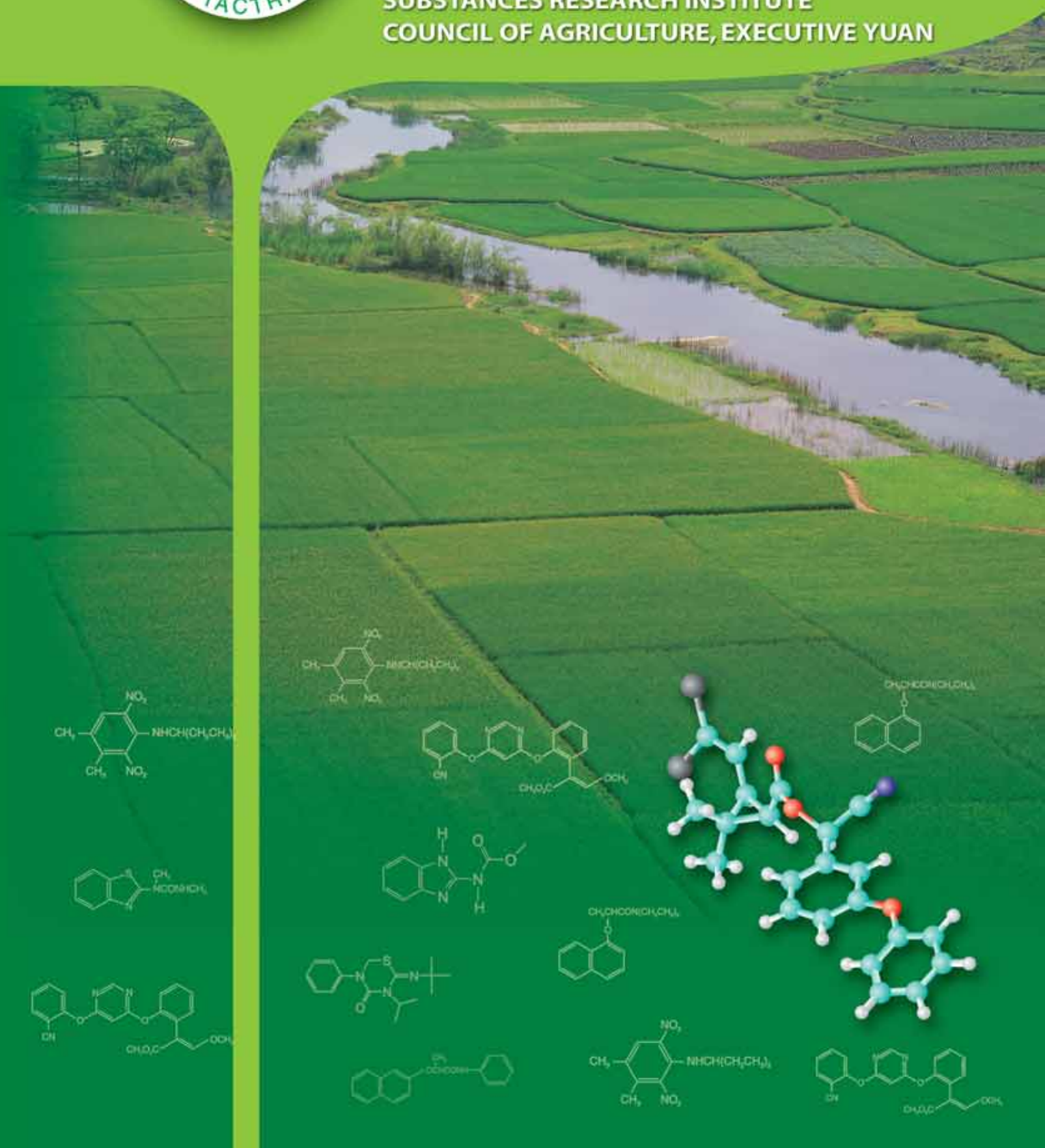
行政院農業委員會
農業藥物毒物試驗所

AGRICULTURAL CHEMICALS AND TOXIC SUBSTANCES RESEARCH INSTITUTE
COUNCIL OF AGRICULTURE, EXECUTIVE YUAN



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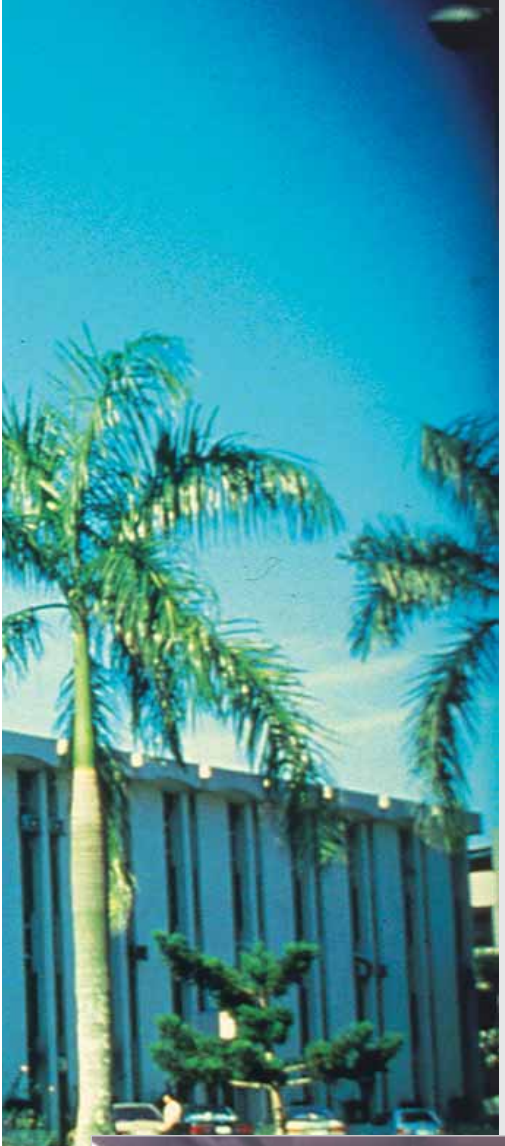
成立經過

HISTORY

本所成立於民國74年元月1日。其前身為臺灣植物保護中心，設立於民國60年，原為政府與聯合國合作設立之機構，自從撤出聯合國後，經費則完全由政府負擔。由於在維護農藥安全正確使用及降低農藥用量之研究上，成就傑出，遂於民國74年正式納編為農林廳所屬專責農藥及毒物研究之機構，民國88年省府改制後改隸行政院農業委員會。



The Agricultural Chemicals and Toxic Substances Research Institute (TACTRI) established in January 1,1985, arose from the framework of previous Taiwan Plant Protection Center. The Center which was established in 1971, was under the joint auspices of the Development Program of the United Nations and the R.O.C. Government. Following the R.O.C's withdrawal from the UN, the R.O.C. Government assumed sole financial responsibility for the Center. In recognition of the outstanding research achievements in the safe and minimal use of pesticides, the Center was subsequently converted to TACTRI and restructured as a governmental research institute under the Provincial Department of Agriculture and Forestry (PDAF) in 1985, and then under the Council of Agriculture, Executive Yuan in 1999. The Institute focuses primarily on research involving pesticides and toxic substances.

宗旨目標
OBJECTIVES

本所隸屬於行政院農業委員會，職掌為農藥之研究與發展，農產品殘留有毒物質之管制，植物保護新方法之開發，技術服務及訂定各種檢定方法與評估標準，以確保農藥之安全使用及農產品之安全品質。

本所之主要工作目標為：

1.技術上支援農藥管理機構，加強農藥管理、登記、及品質改良。

2.改良植物保護資材產製技術，提升農藥品質，改良配方，降低農業生產成本並加強植保資材使用之安全評估。

3.協助各實驗場所及農民，發展植物保護之新方法，並促進農藥安全、經濟、有效的使用。

The Agricultural Chemicals and Toxic Substances Research Institute (TACTRI) is under the auspices of the Council of Agriculture, Executive Yuan. The Institute is responsible for pesticide research, monitoring pesticide residues and toxic substances in agricultural products, developing plant protection technologies, providing technical services, and establishing evaluation methods and guidelines to regulate pesticides.

TACTRI's missions can be summarized as follows:

1.To technically support the regulatory control and registration of pesticides.

2.To improve the production process of plant protection materials, supply high-quality pesticides, develop new formulae to increase the efficiency of agricultural production, and carry out safety evaluation of the usage of pesticides.

3.To assist other national research institutes and local farmers by developing plant protection techniques to ensure the safe, economic, and effective use of pesticides in Taiwan.

功　能
FUNCTION

農藥管理
Regulatory Control of Pesticidies

國外工業及研究機構
International Industries and
Research Institutions

（與國外交換資訊）
(Information exchange)

(Solving far

政府農藥管理及
植物保護機構
Governmental Agencies

協助農藥工業
Pesticide Industries

行政院農業委員會
農業藥物毒物試驗所
TACTRI

國內研究機構
National Research Institutions

（協調國內農藥研究）
(Pesticide research coordination)

農民
Farmers

（解決農民農藥使用問題）
mers' problems related to the pesticide usage)

組織架構表

ORGANIZATION

- 殘毒管制組
  Division of Residue Control
- 農藥化學組
  Division of Pesticide Chemistry
- 應用毒理組
  Division of Applied Toxicology
- 生物藥劑組
  Division of Bio-Pesticide
- 農藥應用組
  Division of Pesticide Application
- 公害防治組
  Division of Plant Toxicology
- 技術服務組
  Division of Technical Service
- 行政部門
  Administration
  - 秘書室
    General Service
  - 會計室
    Accounting
  - 人事室
    Personnel

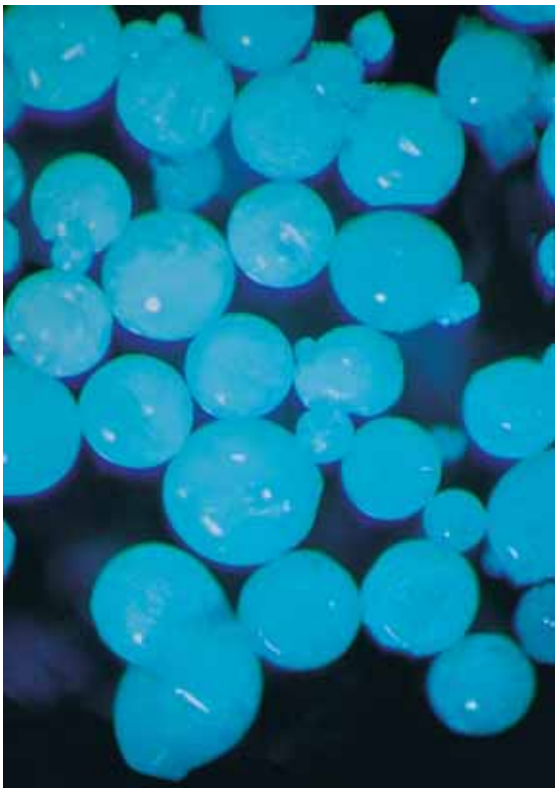
現有人員（民國95年）

所　長 Director	1人	副研究員 Associate Specialist	16人	技 Rese
研究員 Senior Specialist	10人	助理研究員 Assistant Specialist	22人	行 Adm

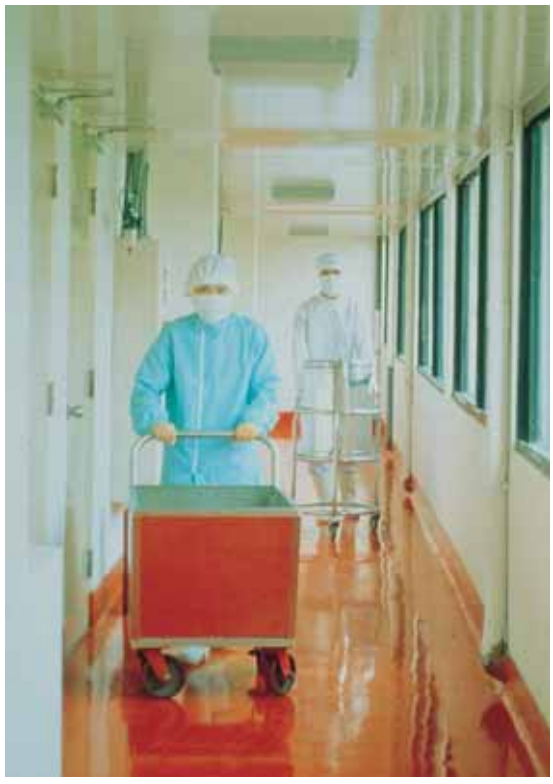
) PERSONNEL(2006)

技　佐 arch Assistant	7人	技工 / 工友 / 司機 Technician & Janitor & Driver	57人	合　計 Total
行政人員 inistrative Staff	7人	約用人員 Project Employee	172人	292人

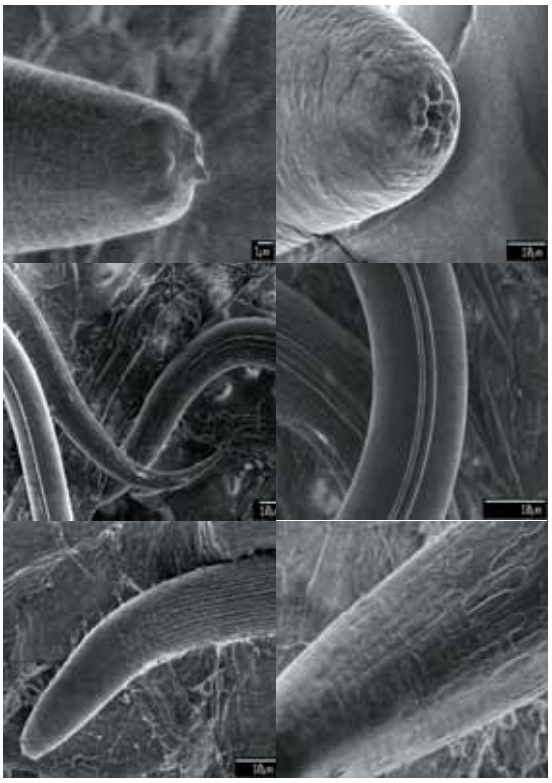
主要工作項目
MAIN WORK



技術方面本所共分6組，即殘毒管制組、農藥化學組、應用毒理組、生物藥劑組、農藥應用組及公害防治組，從事研究工作；另設技術服務組，辦理技術性之綜合業務及推廣傳播工作，各組之主要工作項目為：



Within TACTRI's organizational framework, the following six research departments attempt to fulfill the above missions: Residue Control, Pesticide Chemistry, Applied Toxicology, Plant Toxicology, Bio-Pesticides, and Pesticides Application. The Division of Technical Service coordinates the activities of these departments. Each department is highlighted in the following pages.



殘毒管制組
DIVISION OF RESIDUE CONTROL

殘毒管制組之工作目標為掌握蔬果及環境水土中農藥毒物之殘留現況，進行安全評估，並防止農藥之殘留危害。主要之工作目標有下列5點：

1.負責農藥登記上市前之殘留量資料製備工作，以研訂農藥在作物上之殘留安全容許量及建立農作物施藥後之安全採收期。

2.研發農藥殘留之標準檢驗方法：個別農藥之殘留檢驗方法經中央標準局公告為國家標準檢驗方法；多種農藥同時檢驗方法已公告為國家標準方法，並廣泛應用於蔬果農藥殘留篩檢工作。

3.農藥暴露量安全評估：包括取食風險評估、食前處理減少暴露量之研究及調查農藥工廠工人製藥及農民施藥作業環境之暴露量，並進行安全評估。目前建立農藥在尿液及血液中之分析方法，完成水稻及多種果園農民農藥暴露量安全評估工作，可作為農藥上市前評估要件。

4.負責國內農作物生產區之蔬果農藥殘留檢驗，並據以教育農民安全用藥。負責觀光果園開放前農藥殘留檢驗及農產品安全標章「吉園圃」之核發工作。

5.研究農藥在環境中之分佈與降解、重金屬在土壤與農產品中含量之監測及農藥對水生生物毒性之評估。

The Residue Control Division (RCD) monitors pesticide and toxicant residues in the agricultural products and the surrounding environment, and performs risk assessment of pesticide exposure. The Division's missions can be summarized as follows:

1. To complete the data file of pesticide residues in crop(s) for pesticide registration.
2. To establish standard analytical methods for pesticide residues.
3. To assess the potential exposure risk of pesticides towards pesticide manufacturers and farmers.
4. To survey pesticide residues in agricultural products before and after harvesting, and educate farmers on efficient and safe use of pesticides.
5. To study the residues of pesticides and heavy metals in the surrounding environment and their toxic effects on aquatic organisms.

農藥登記田間農藥殘留試驗

Tests of pesticide residues on crops for registration

▲間施藥試驗。
Pesticide application.

▲田間採樣。
Sampling.

▲農作物採收前之殘留檢驗。
Pesticide residue analysis of commodities before harvest.

▲殘留量試驗報告書。
Report on pesticide residue tests.

蔬果農藥殘留田間監測

Monitoring program of pesticide residues in agricultural products

▲田間安全用藥輔導。
Guidance of pesticide application.

▲採收前農藥殘留抽測。
Monitoring of pesticide residues before crop harvest.

▲農作物農藥殘留檢驗。
Pesticide residue analysis of commodities.

▲吉園圃標章轉換CAS標章(since 2006.01.01)。
Change of approval mark from Good Agricultural Practice (GAP) to Certified Agricultural Standards (CAS).

▲吉園圃蔬果展售。 Show-sale of GAP products.

農藥作業環境暴露量安全評估

Risk assessment of pesticides in the working environment

▲ 農民施藥暴露量之安全評估。 Exposure risk assessment of pesticide applicators.

▲農藥工廠作業環境及作業人員暴露量之測定及安全評估。
Pesticide exposure risk assessment of pesticide plant workers.

▲ 生物檢體分析。 Analysis of blood and urea samples.

農藥及重金屬對環境安全影響評估

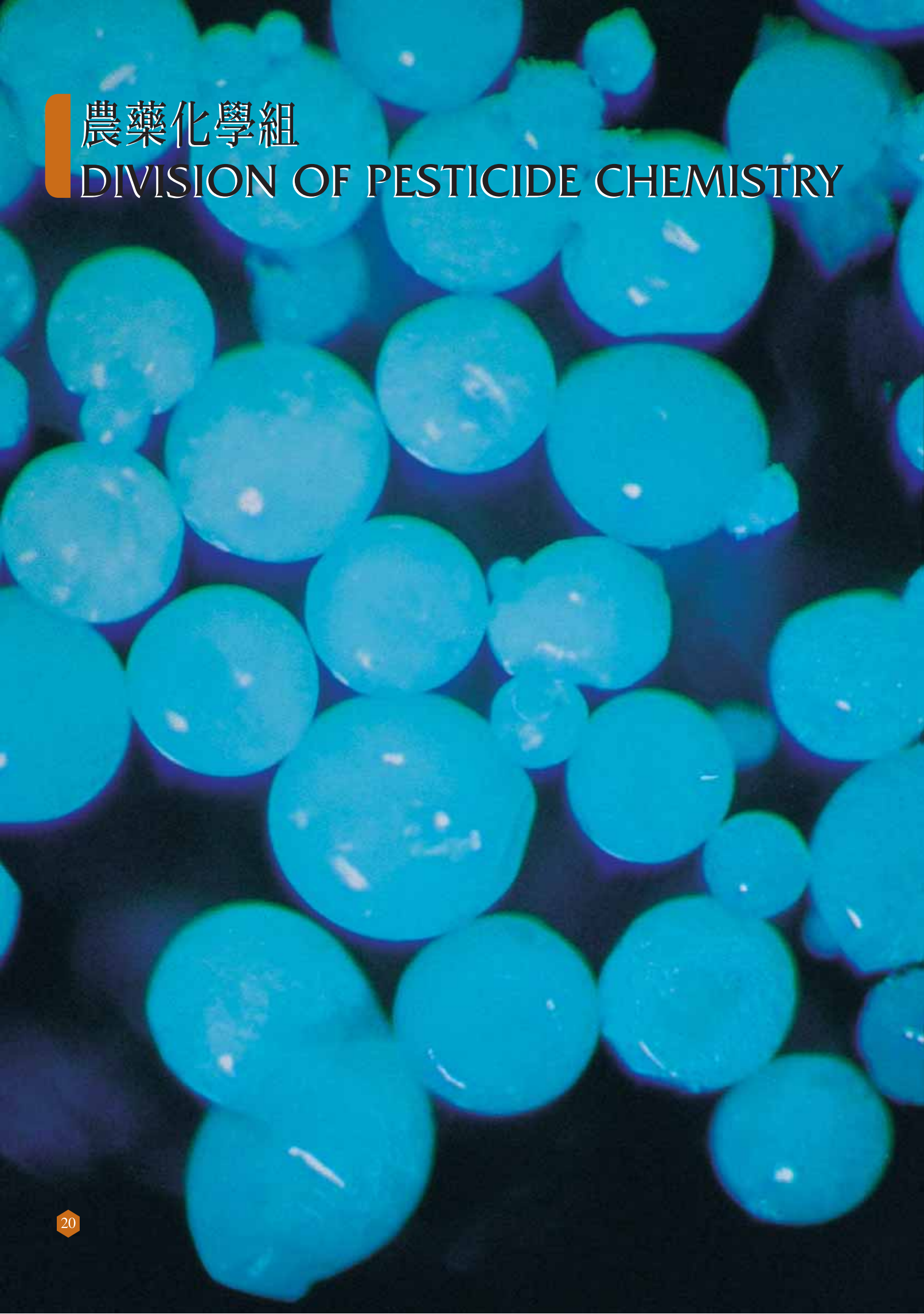
Safety evaluation of pesticides and heavy metals in the environment

▲模擬生態系。
Model ecosystem.

▲重金屬之分析。
Analysis of heavy metals.

▲水生生物毒性評估。
Evaluating the risk to aquatic organisms.

農藥化學組
DIVISION OF PESTICIDE CHEMISTRY



農藥化學組之主要工作項目為：農藥標準規格之檢驗、農藥之安定性分析與製劑改良、生化藥物及試劑之研究與開發。其目的在維護農藥之品質，提昇農藥之效果。進行中的研究工作包括：擬定與建立標準化之農藥規格檢驗方法、化學與生物農藥之配製、昆蟲性費洛蒙之鑑定與合成、天然生物活性物質之研究、害物抗藥性偵測試劑之開發等。農藥化學組接受委託執行農藥品質管制之成品農藥檢驗工作，協助農藥管理以促使農藥工廠生產優良產品。

This Division devotes its efforts to synthesis of pesticide compounds, identification of organic compounds and study of pesticide stability and specifications. The main purpose is to improve the conventional production process of pesticides, thereby upgrading the quality of pesticides in Taiwan. The Division has been quite successful in synthesizing insect sex pheromones, analyzing and identifying impurities in pesticide products, and establishing specifications for some pesticides. These specifications are used by quality assurance laboratories to ensure high quality agrochemical production using state-of-the-art agrichemical manufacturing techniques.

較安全農藥製劑之研發

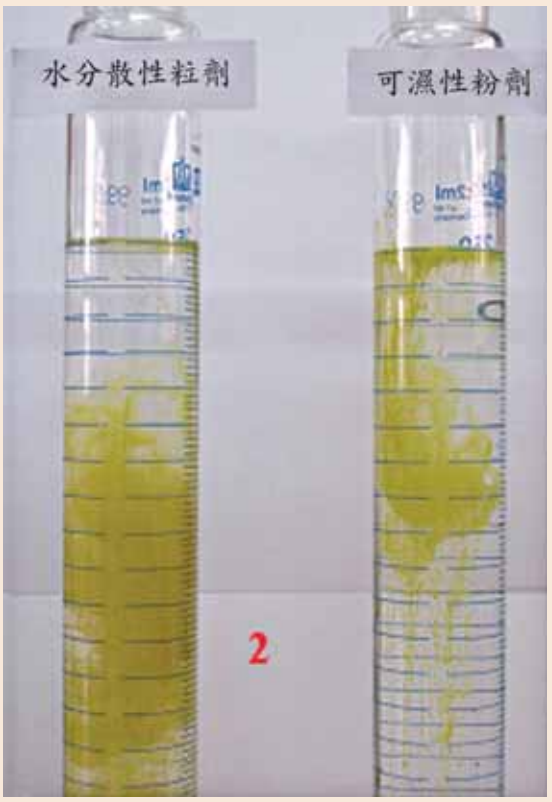
Developing pesticide formulations with low application hazard

▲膠囊懸著劑(左)以水為基質，可減少有機溶劑危害，該劑型於水中分散及懸浮良好(右)。

Capsule suspension (left) was formulated in water to reduce the organic solvent hazard. The product shows good dispersion and suspension properties when placed in water (right).

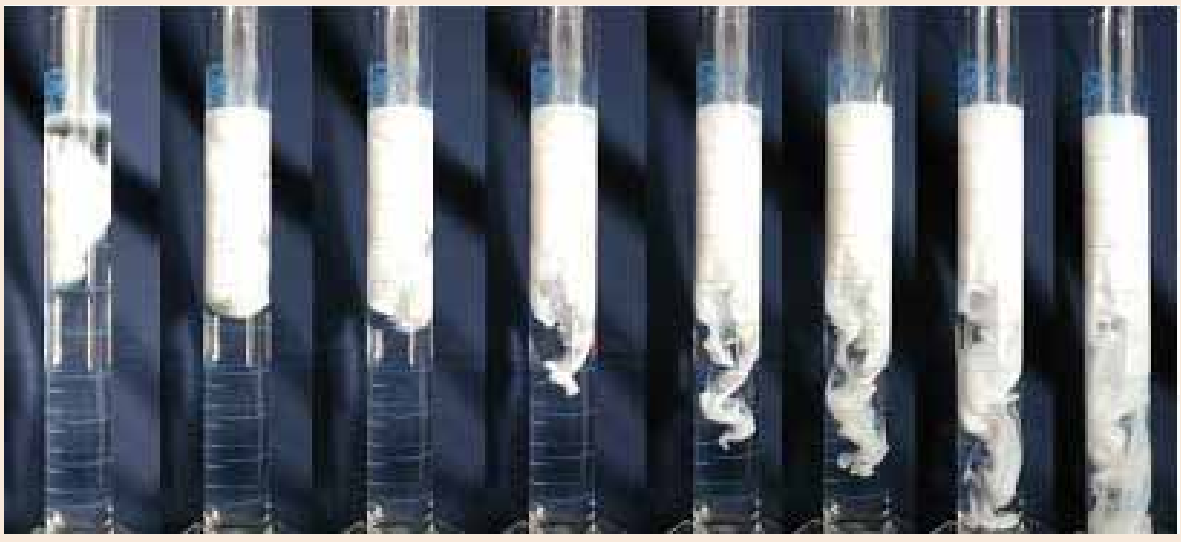
▲無粉塵之快得寧水分散性粒劑（1左）及傳統可濕性粉劑（1右）；水分散性粒劑水濕迅速、分散良好（2左）與可濕性粉劑（2右）比較之情形。

A dustless formulation of oxine-copper water dispersible granule, WG (Fig.1, left) and its traditional wettable powder, WP (Fig.1, right). Comparison between WG (Fig.2, left) and WP (Fig.2, right), the WG shows faster wetting and dispersing properties.



◀以生物可分解溶劑為助劑調配之安全環保乳劑（左），及其於水中自動乳化之情形（下）。

A safer and environment friendly new emulsifier concentrate was formulated in a biodegradable solvent (left), and its auto-emulsifying phenomenon when placed in water (below).



▼將藥劑製為水懸劑(右)不具粉塵或有機溶劑危害風險，其良好自動分散的情形(下)可保證使用時調配便利。

Suspension concentrate developed by this Division (right), prevents risks of inhaling dust or vapor of organic solvents, and shows good dispersibility when placed in water (below).

農藥標準規格之檢驗

Inspection of pesticide products

農藥品質規格包含：(一)名稱、(二)外觀描述、(三)有效成份、(四)其他成份、(五)相關不純物、(六)理化性質，及(七)貯存性質。

The pesticide quality specifications consist of: (1) name, (2) outward appearance description, (3) active ingredient, (4) other ingredients, (5) relevant impurities, (6) physical properties, and (7) storage properties.

▲ 本組於民國93年6月14日通過財團法人全國認證基金會認證為符合ISO 17025之實驗室。
This Division was accredited to the compliance of ISO 17025 by Taiwan Accreditation Foundation on June 14, 2004.

▲ 抽檢市售成品農藥樣品之採樣、分裝及編號。
Processing the commercial pesticides sampled for inspection.

▲ 以氣相層析質譜儀鑑定農藥之成分。
Identification of pesticides by GCMS.

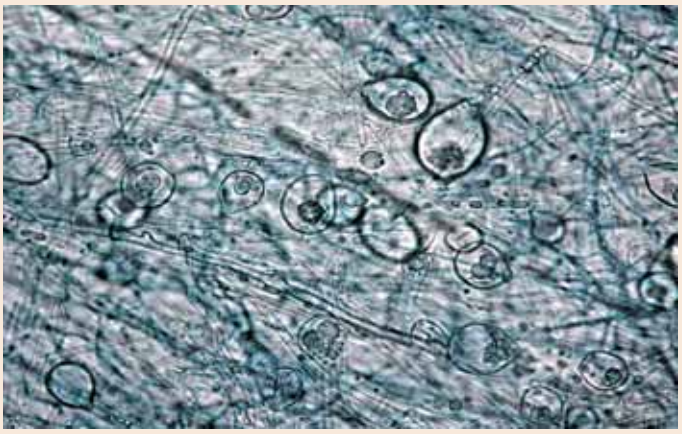
▲ 利用檢驗流程資訊管理系統作線上委託檢驗、查詢檢驗流程進度與檢驗結果。
Web-based laboratory management system for inspection requests and inquires of progress and result of inspection.

生化藥物及害物抗藥偵測試劑之研究與開發

Development of biopesticides and pesticide resistance diagnostic kits

▲ 鑑定植物源生物活性物質是發展新農藥或藥品的首要步驟。

Identification of the biological activity from plant source is the first step to the development of new pesticides or drugs.



▲ 由南嶺蕘花中鑑定出造成疫病菌胞囊空胞化的生物活性物質。

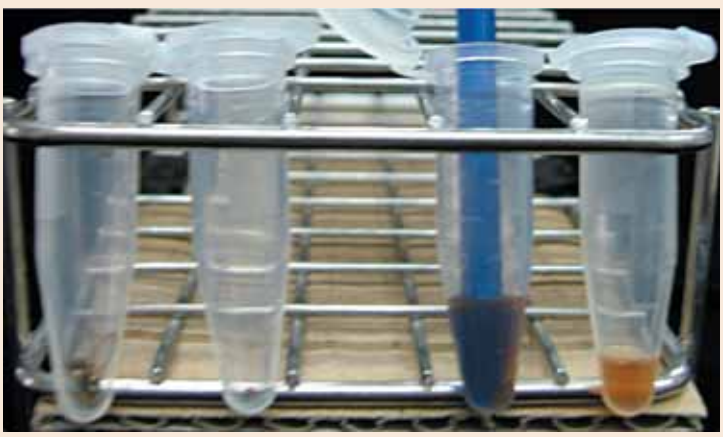
Biological components isolated from the *Wikstroemia indica* induced abnormality of *Phytophthora parasitica* sporangia.

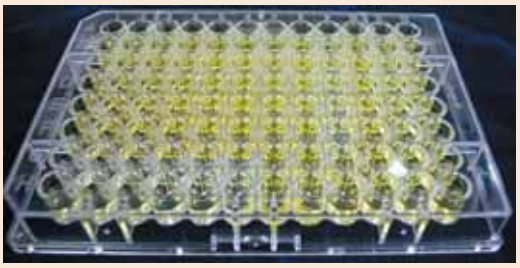
▲ 可測定不同材質中的昆蟲性費洛蒙之揮發速率。

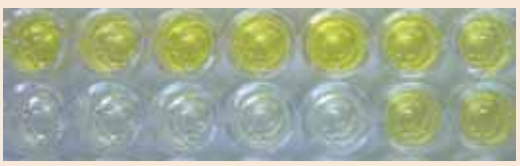
Determination of the volatility speed of insect sex pheromone in different materials.

▲ 合成多種昆蟲性費洛蒙單一成份。

Various individual insect sex pheromones synthesized by this Division.







▲ 利用東方果實蠅對有機磷抗性的作用機制，發展生化檢測抗藥性的方法。

Development of the biochemical diagnostic tool for detection of pesticide resistance by utilizing the mechanism of organophosphate resistance in oriental fruit flies.

應用毒理組
DIVISION OF APPLIED TOXICOLOGY

應用毒理組之主要工作，為研究開發藥毒物、生物技術產物、保健農產食品等，對動物毒性及功能性測試技術或實驗動物模式，並探討動物毒理機制，據以評估各種藥毒物產品對人體潛在的危險性或功能性；另外負責鼠害防除技術之研究工作。其目的在配合政府農藥管理之需求，技術支援植物保護工作，以確保農藥安全與有效使用，維護人體健康及生態環境之安全。另外協助廠商產品登記上市所需毒理資料之製備，以促進各項產業發展。

目前已建置無特定病原（SPF）實驗動物飼育房與動物健康監測體系及相關標準操作手冊，以支援各項動物毒理試驗。同時研發實驗動物大體解剖、組織病理檢驗與判讀技術、光學及電子顯微鏡觀察與拍攝、毒物或病原傷害標的器官研判等技術平台，以作為中毒或致病之證據。又陸續建立的化學農藥及生物農藥毒性測試技術方法，包括：急性毒性七項測試方法、28天與90天亞慢性毒性測試方法、致畸胎及生殖毒性測試方法、基因/非基因毒性或致癌性快速篩檢評估體系、微生物農藥急毒性/致病性測試體系、動物免疫功能測試體系等毒理安全測試項目。鼠害防除主要工作項目包括：野鼠生物特性與族群生態研究、毒餌配方製劑研發、野鼠防除技術與防除效果評估等。

The Division focus its mission on developing various toxicity tests and animal models for testing pesticides and bio-pesticides, investigating the toxicology mechanism, and evaluating the potential hazards of chemical pesticides and bio-pesticides. The toxicity studies are mainly for supporting governmental pesticide regulations for the safe and effective use of pesticides, and preparing toxicological data of pesticides for manufacturers. The Division achievements include:

1. Constructing a specific pathogen free (SPF) animal house, and establishing an animal health monitoring system and related standard operation procedures for ensuring that toxicological tests comply with Good Laboratory Practice guidelines.
2. Setting up procedures for animal necropsies, postmortem examinations, tissue and specimen processing and photographing and pathology diagnoses for identifying different toxicants or pathogens in target organs.
3. Establishing various toxicity tests for evaluating the impacts of pesticides on mammals, including seven different acute toxicity tests, 28-day and 90-day sub-chronic toxicity tests, genetic/epigenetic toxicity and rapid carcinogenicity tests, teratogenicity and reproductive toxicity tests, acute toxicity/pathogenicity tests for microbial agents, and animal immunity function tests. The Division is also involved in rodent control, carrying out the biological and ecological studies, bait development and evaluation of rodenticide efficacy.

SPF實驗動物管理及健康監測

Management and health monitoring of SPF animals

▲動物房管理與動物照護。
SPF animal house care services.

▲實驗動物之微生物健康監測。
Microbiological monitoring of laboratory animals.

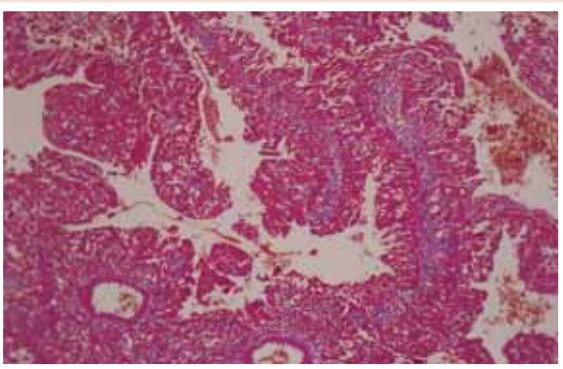
▲自動測量系統。
Automated data collection system.

▲血清生化分析。
Clinical-biochemical analysis.

病理試驗

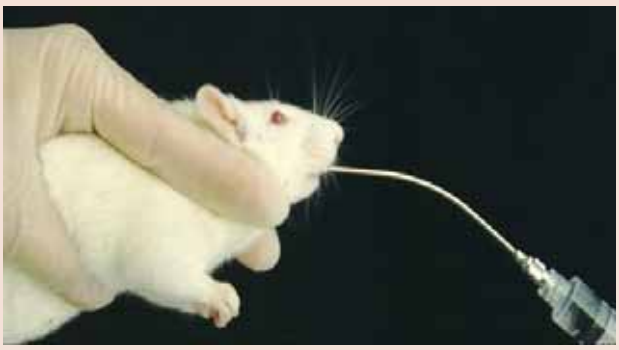
Pathology test

▲病理組織之判讀。
Tissue and specimen examination with a light microscope.



▲黃麴毒素誘發大鼠肝腫瘤病變。
Pathological changes of hepatocarcinoma caused by aflatoxin B1 in rats.

毒性測試
Toxicity test



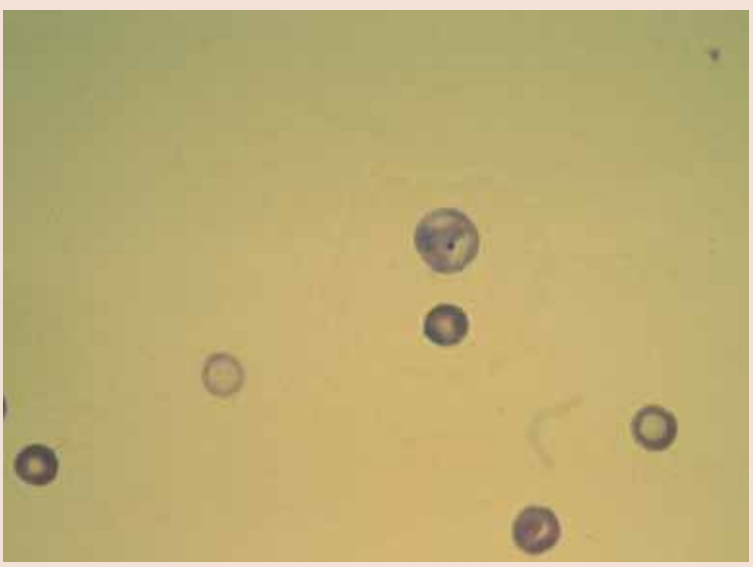
▲ 口服急毒性試驗。
Acute oral toxicity test.

▲ 呼吸急毒性試驗。
Acute inhalation toxicity test.

▲ 微生物製劑急毒性及致病性試驗。
Microbial acute toxicity and pathogenicity test.

▲ 禽類急毒性及致病性試驗。
Microbial avian toxicity and pathogenicity test.

▲ 姊妹子染色體交換試驗。
Sister-Chromatid Exchange (SCE) test.



▲ 生體內脊髓細胞的微核試驗。
In vivo micronucleus test.

毒性測試
Toxicity test

▲ 遲發性神經毒性試驗。
Delayed neurotoxicity test.

▲ 致畸胎試驗。
Teratological test.

▲ 生殖毒性試驗及後代生殖毒性試驗。
Reproductive and multi-generation test.

鼠害防除
Rodent control

▲ 野鼠防除。
Rodent control.

▲ 入侵鼠種之生態調查。
Ecological study on invaded rodents.

▲ 鼠餌劑研發。
R&D of rodent baits.

生物藥劑組
DIVISION OF BIO-PESTICIDE

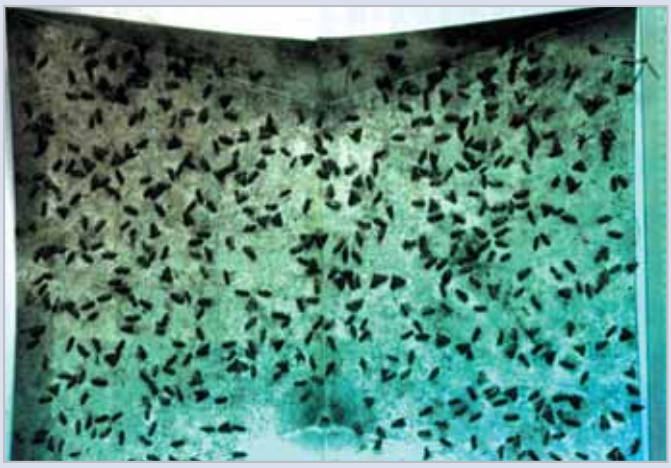
本土新發現的短尾異小桿線蟲。

A new isolate of entomopathogenic nematode, *Heterorhabditis brevicaudis* TG01 (Rhabditida: Heterorhabditidae), from Taiwan.

生物藥劑組主要工作目標為研究開發微生物製劑、建立生物製劑之品管技術，以及研發生化製劑，同時也利用遺傳工程技術以增進微生物製劑之產能及效力。在生化製劑之開發及應用方面，主要研究有源自植物殺蟲基因的找尋和利用、生化製劑之製劑配方和田間綜合應用技術之開發；在微生物製劑之開發及應用方面，含本土品系之收集和品系之改良、發酵最適化技術與其他生體量產技術之研發、分離及製劑配方技術之改善；在品質管制方面包括微生物製劑品管規範之訂定以及生化製劑，如費洛蒙之生物檢定技術之研發及標準規格之訂定等。基因重組微生物之風險評估，及微生物製劑於害蟲綜合管理系統中之利用及推廣教育也為本系之重要工作。由於研發過程需要大量之供試昆蟲，故昆蟲之大量飼育方面，含飼育設備和環境之提升、消毒程序之發展及生產程序之自動化，近年來也頗具成效。

This Division uses biotechnology to develop new bio-pesticides, establishes guidelines for regulatory control of bio-pesticides, and provides application technologies of bio-pesticides for farmers. The Division missions include integrating the application of bio-pesticides with chemical pesticides to ensure the safe, effective and economic usage of pesticides, maintaining the sustainable agroecosystems, developing biochemical pesticides, exploring plant-derived insecticidal genes, developing formulation and field application technology of biochemical pesticides, utilizing biochemical pesticides in IPM system, and establishing guidelines for regulatory control of biochemical pesticides. Also included in the studies are development of microbial pesticides, collection of local strains of microorganisms, strain improvement using conventional and genetic engineering technologies, establishment of fermentation optimization techniques and other *in vivo* mass production technologies, improvement of separation and formulation process, establishment of guidelines for regulatory control of microbial pesticides, evaluation of the risk of releasing genetically engineered microorganisms, utilization of microbial pesticides in IPM system, establishment of insect mass-rearing technology, upgrading rearing facilities and surrounding environments, developing the disinfection process, and automating manufacturing procedures. In recent years, this Division has successfully developed sex pheromones and microbial control agents for pest control and established a technology for quality control and bioassay of bio-pesticides to support regulatory control.

▲ 監測。 Monitoring.



▲ 大量誘殺。 Mass trapping.

▲ 大量誘殺。 Mass trapping.

▲ 交配干擾。 Mating disruption.

微生物製劑之開發及應用

Development and application of microbial pesticides

▲ 固態醱酵糟。 A solid-state fermenter.

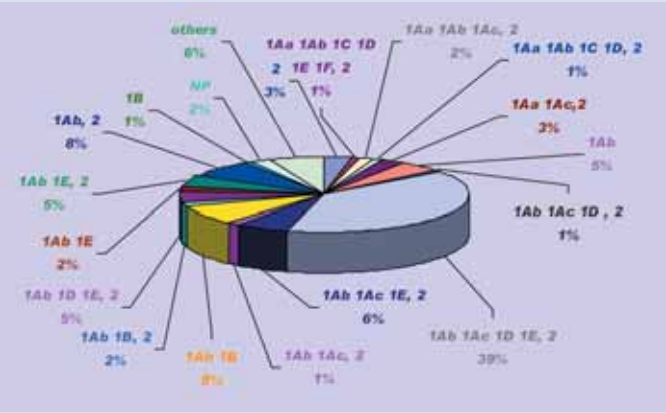
▲ 液態自動接種系統。 A liquid inoculation system.

▲ 親油性回收裝置。
An oil-based recovery system developed for separation and concentration of hydrophobic conidia.

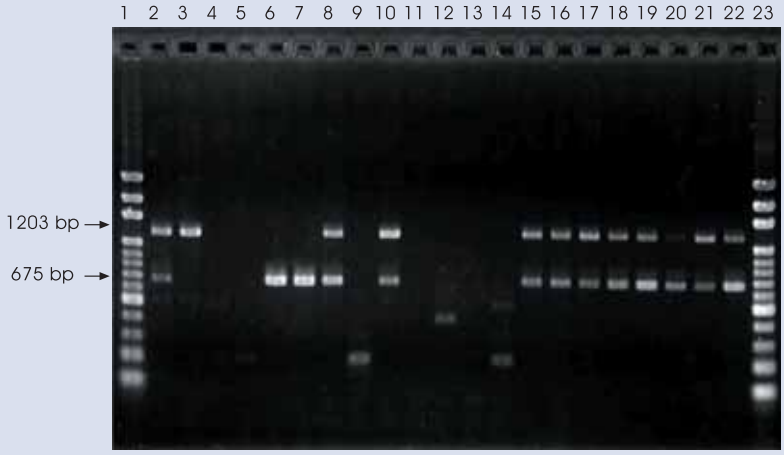
▲ 利用黑殭菌防治紅胸葉蟲。
Control of the *Brontispa longissima* with *Metarhizium anisopliae* on *Washingtonia filiferra*.

微生物製劑之開發及應用

Development and application of microbial pesticides



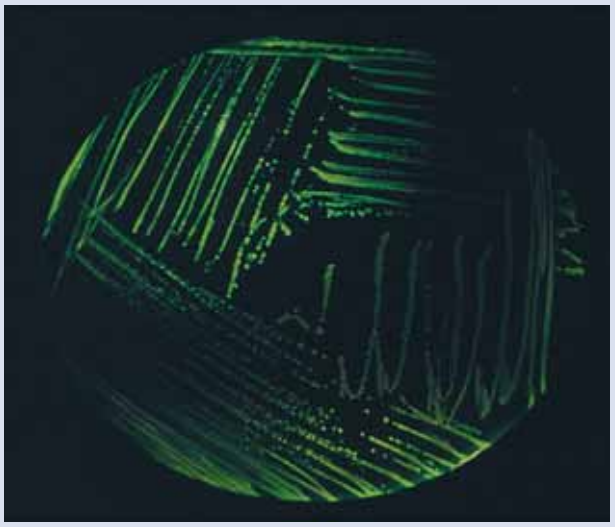
▲ 蘇力菌篩選及基因鑑定。
Screening of new Bt strains and Identifying their *cry* genes.



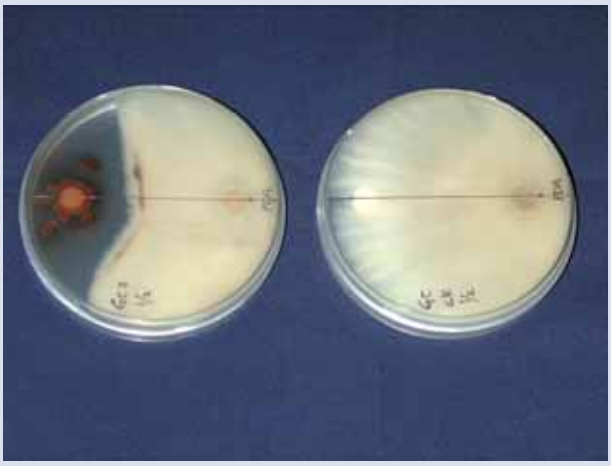
▲ Surfacin 與iturin A 抗菌物質基因之PCR檢測。
Detection of surfactin- and iturin A-producing *Bacillus* spp. based on PCR.

▲ 由土壤中篩選之枯草桿菌及液化澱粉桿菌菌株防治檬果炭疽病之效果。
The disease incidence of mango anthracnose was decreased by the treatment of *Bacillus subtilis* and *B. amyloliquefaciens*.

▲ 台灣蘇力菌商品化技術研發。 R&D of technology for the Bt commercialization.



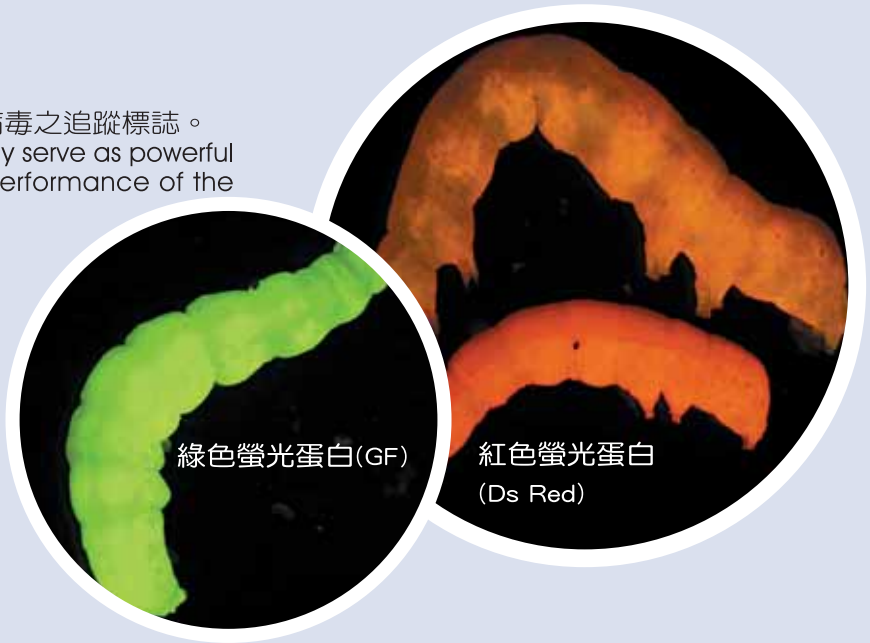
▲ 光桿菌菌落在自然光與暗室中的情形。
Photo taken under light and dark condition, showing the bioluminescence of *Photorhabdus luminescens* ATCC 29999 in petri dish.



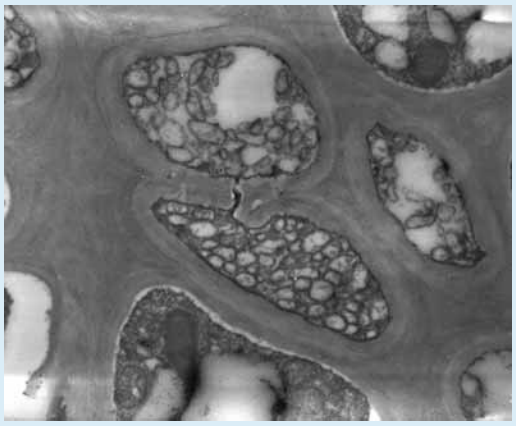
▲ 光桿菌菌液對檬果炭疽病菌之抑菌情形。
Growth inhibition of *Glomerella cingulata* by *Photorhabdus luminescens* on agar plate.

▲ 以大臘蛾誘釣土壤中之蟲生病原線蟲短尾異小桿線蟲。
An entomopathogenic nematode, *Heterorhabditis brevicaudis* was isolated from soil by *Galleria* bait method.

▶ 螢光蛋白質可作為重組病毒之追蹤標誌。
Fluorescence proteins may serve as powerful tracers to evaluate the performance of the recombinant virus.



農藥應用組
DIVISION OF PESTICIDE APPLICATION



農藥應用組主要工作為探討農藥在田間合理有效的使用規範，研究殺蟲劑與殺菌劑之毒性、藥理及藥效，改進防疫技術以擬定作物整合性病蟲害防治策略，期能減少農藥使用量，降低農業生產成本。近年來已完成之試驗成果包括：葡萄及檬果之綜合防治曆、殺菌劑對疫病菌、炭疽病菌、灰黴病菌、露菌病菌及貯藏病害等之毒效試驗等基本資料、十字花科蔬菜害蟲之綜合防治技術、茄子南黃薊馬之取樣技術、果實蠅與重要夜蛾類害蟲之監測與預測技術，及主要檢疫病蟲害之鑑定技術與藥劑測試。未來的研究與工作重點為：（一）殺蟲劑及殺菌劑對關鍵病蟲害的毒性、藥效之測試及基本資料庫之建立。（二）整合各種防治資材及技術成為病蟲害綜合防治系統。（三）參與全國性病蟲害監測網，成為全國疫情通報系統負責資料及分析彙整工作之疫情資料中心。

The Division's major mission is to establish feasible guidelines for pesticides applications. The research objectives include testing the toxicity and efficacy of pesticides for major pests, improving pest control techniques, and developing integrated crop management programs to provide farmers with safe, economic and effective means of plant protection. In recent years, the Division has successfully developed IPM programs for grape and mango orchards. Baseline toxicity data were established for *Phytophthora*, *Colletotrichum*, *Botrytis*, and *Plasmopara*, and also for many post-harvest diseases. The Division also completed an IPM program for major insect pests on the cruciferous crops and a simple and effective method for sampling thrips on eggplants. In addition, monitoring and forecasting techniques were established for the Oriental fruit fly and important plant diseases. The Division plans to focus on establishing basic toxicity and efficacy data in using pesticides on major pests, improving IPM programs for major crop-systems, and actively engaging in the creation of nationwide Plant Health Information Center.

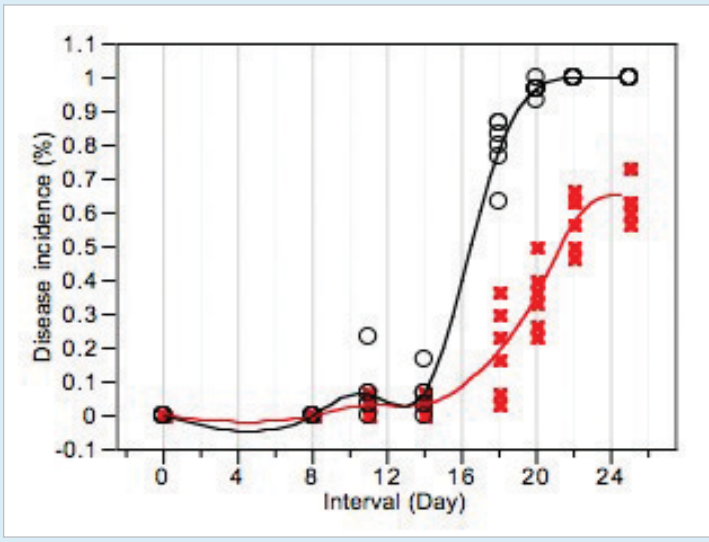
農藥在田間合理有效使用技術之研究

Study of rational pesticide application techniques

▲ 田間藥效試驗。 Field pesticide efficacy test.

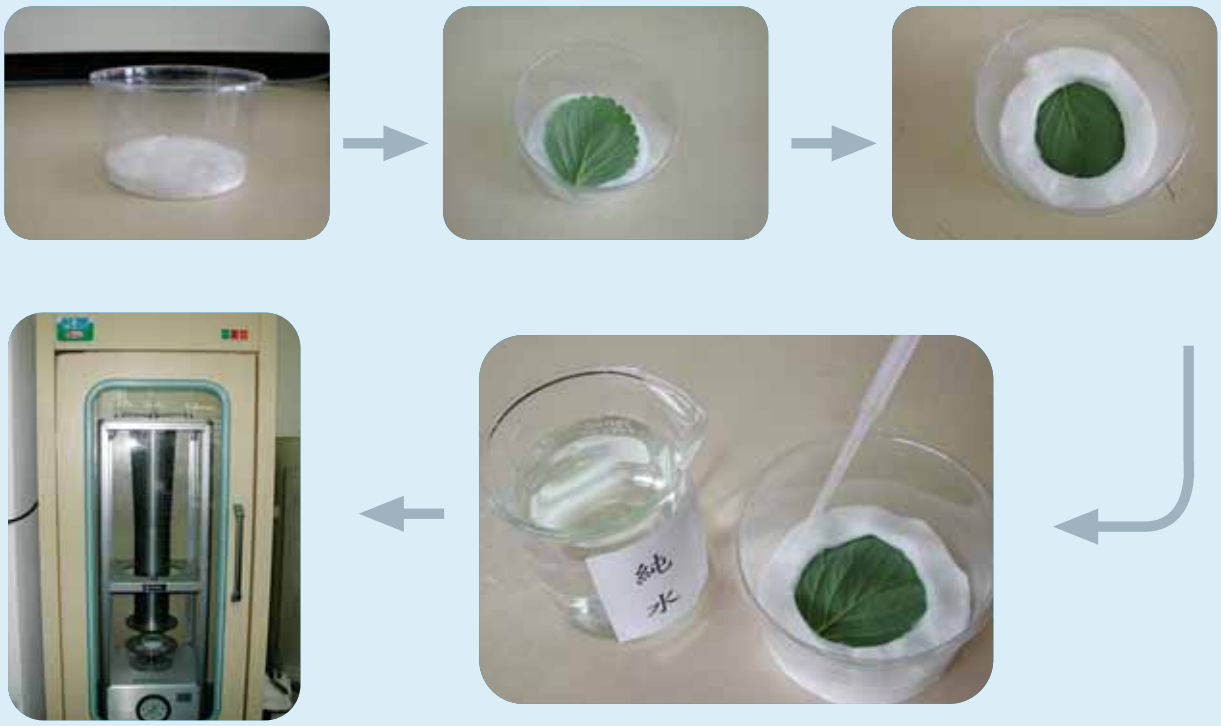
◀ 使用瓜實蠅改良式毒餌之誘蟲器可節省誘引劑之使用量，降低防治成本。
Traps with improved poison bait reduce the cost of field control of melon fly.

▶ 透過植物流行病學的研究，可以推算出防治莧菜白鏽病的最佳時機。
Estimation of optimal timing to control white rust of edible amaranth in field though epidemiological study.

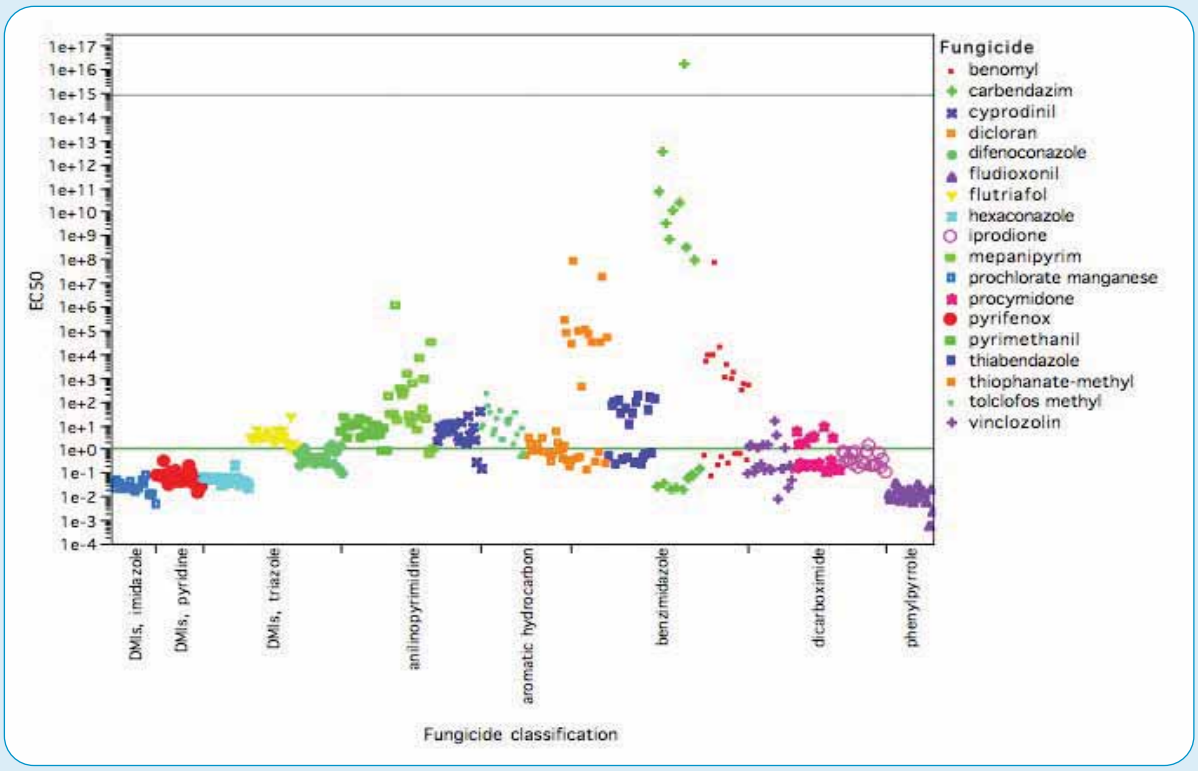


殺蟲劑與殺菌劑之毒性、藥效與抗藥性研究

Study of toxicity, efficacy and resistance of insecticides and fungicides



▲ 神澤氏葉蟎室內藥劑測試過程。
Process of acaricide toxicity test against Kanzawa spider mites (*Tetranychus kanzawai*).



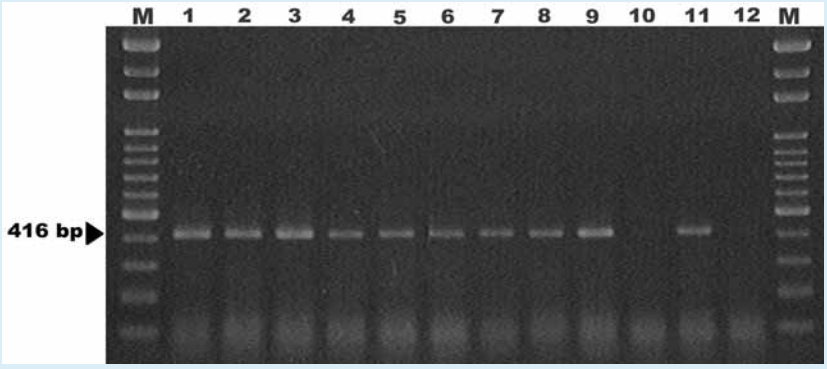
▲ 花卉灰黴病菌對殺菌劑之感受性與交叉抗藥性分析。
Analysis of fungicide sensitivity and cross resistance of *Botrytis cinerea* from various hosts.

植物疫情之監測與預測

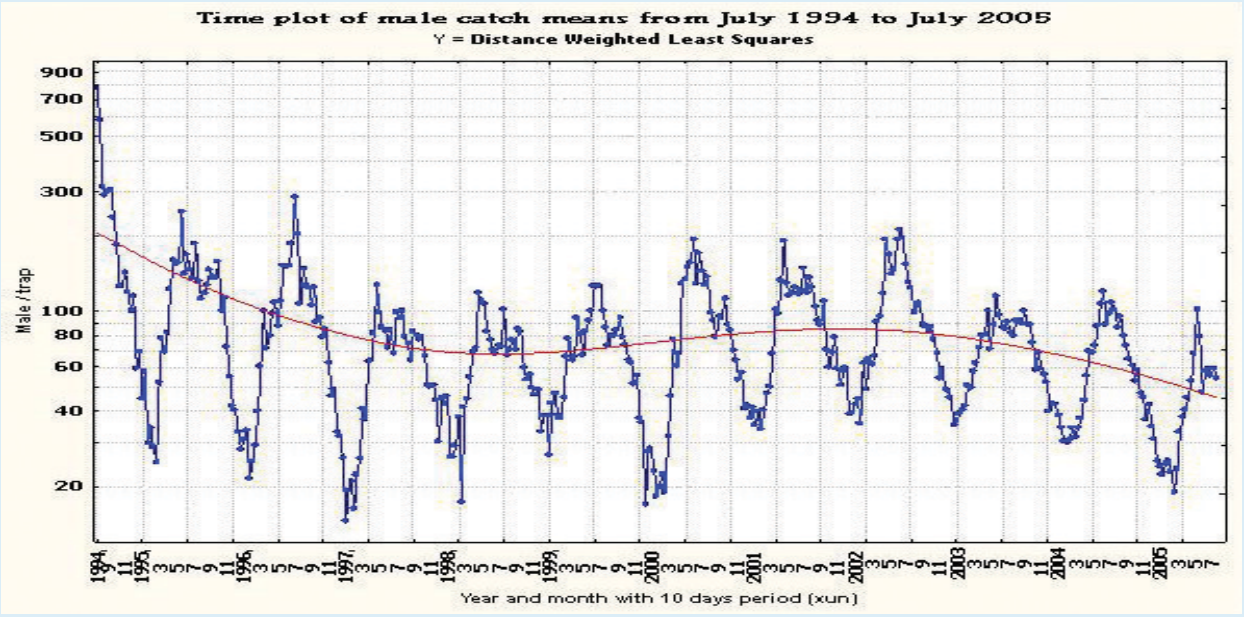
Monitoring and forecasting the infestation and incidences of plant pests

▲ 利用小菜蛾的性誘引劑陷阱作為監測族群密度，以訂定施藥的適當時機。
Timing of insecticide applications using DBM pheromone trap as monitoring tool.

▲ 利用甲基丁香油監測東方果實蠅的族群密度。
Monitoring of oriental fruit fly population with methyl eugenol traps.



◀ 利用專一性引子對PLS-F/PLS-R 偵測梨葉緣焦枯病罹病組織。1-9為罹病組織；10為健康組織；11為梨葉緣焦枯病菌；12為無菌水。
Detection of *Xyllela fastidiosa* in diseased tissue of pear with specific primer PLS-F/PLS-R; lanes 1-9: diseased tissue; lanes 10: healthy tissue; lanes 11: pear leaf scorch bacterium; lanes 12: distilled water.

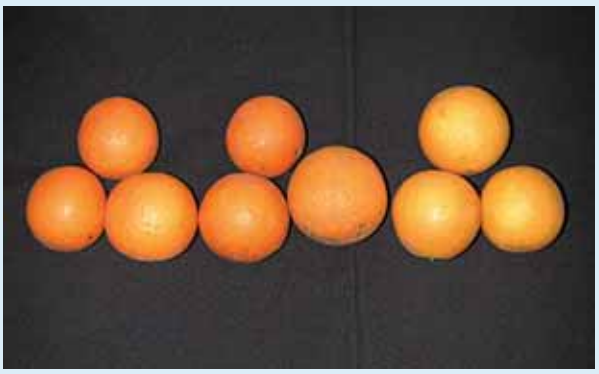


▲東方果實蠅旬平均密度之時間數列圖。
Time plot of 10-day mean density of oriental fruit fly.

病蟲害整合管理技術之探討

Development of Integrated Pest Management (IPM) techniques

▲ 撿拾落果進行堆肥化處理，以減少害物傳播源，為最有效之田間管理措施。
The valid measure of pest management to reduce the pests and inocula in the field is collecting the dropped fruits for compost processing.



▲ 柳橙整合管理採收之果實。整合管理園內生產之果實(左1及2)與對照組園內生產者(右)相較，除著色度不同外，果實糖度、酸度及平均粒重亦有不同。
Appearance, sugar content, acidity, and weight of citrus fruits from IPM orchards (first and second piles from left) in comparison with those from traditional management (first pile from right).

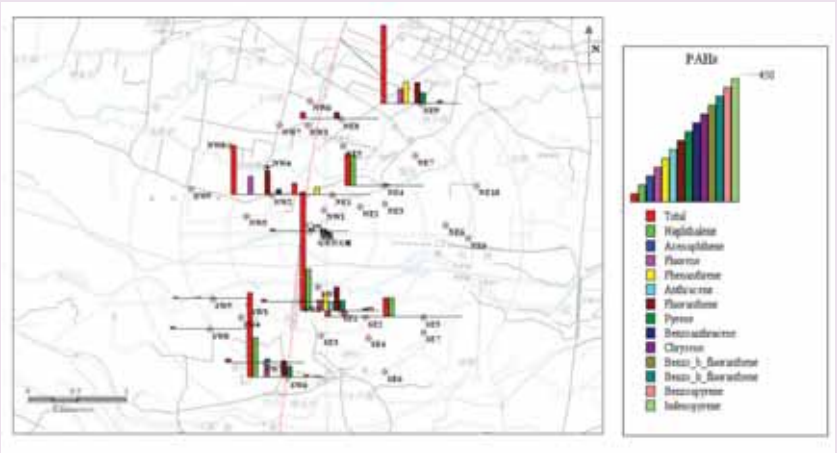
◀ 土壤蒸汽消毒可克服百合連作障礙，圖中右畦為蒸汽處理組(80℃、30分鐘)，左畦為對照組。
Solving lily monoculture problem by soil steam sterilization. Steam sterilization (80℃, 30 min., right row) and control treatment (left row).

公害防治組
DIVISION OF PLANT TOXICOLOGY

公害防治組之工作目標在探討公害污染、農藥不當使用及有害植物對農業之為害，並積極謀求改善及解決之方法，以保障作物生產及維護農業環境品質。設置有完善之溫室、生長箱、開頂式燻蒸箱、精密之分析及監測儀器，可支援現行及相關任務導向之研究。公害方面已展開工業區廢水監測，氟化物空氣污染對農作物及農業環境影響，低濃度臭氧及二氧化硫之慢性為害等研究。農藥藥害及除草劑生理研究涵蓋：藥害測定、農作物受害鑑定、除草劑選擇性及雜草抗藥性等研究。雜草及有害植物研究以進口農產品雜草檢疫、農地雜草調查、有害植物之防治及管理為重點。本組並對外提供如下領域之服務：研究用雜草種源供應，雜草管理及防治之指導，雜草、藥害及污染為害之鑑定，農藥藥害及除草劑之委託測試。

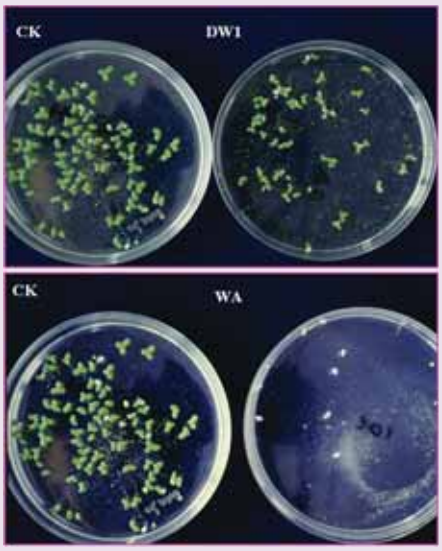
The Division develops and applies technologies to safeguard plants and the surrounding agricultural environment against pollutants, misuse of pesticides, weeds and other noxious plant species. Researchers have access to excellent facilities and instruments to explore plant responses to pesticides and pollutants at cellular and intact plant level. The Division has initiated the following programs related to pollution study: biomonitoring of industrial waste water, impact and monitoring of fluoride air pollutant in an agricultural environment, and chronic toxicity of ozone and sulfur dioxide on plants. Pesticide research in this Division emphasizes developing techniques to assess and diagnose phytotoxicity induced by agricultural chemicals. Included in the studies are herbicidal selectivity and plant resistance to herbicides. Weed research has established strong programs on quarantine, field survey, chemical control and weed management on turf and orchards. This Division also provides the following technical services: diagnosis of plant injuries caused by pesticides and pollutants, phytotoxicity tests of pesticides, weed seeds for research use, weed identification, and consultancy on how to control and manage weeds.

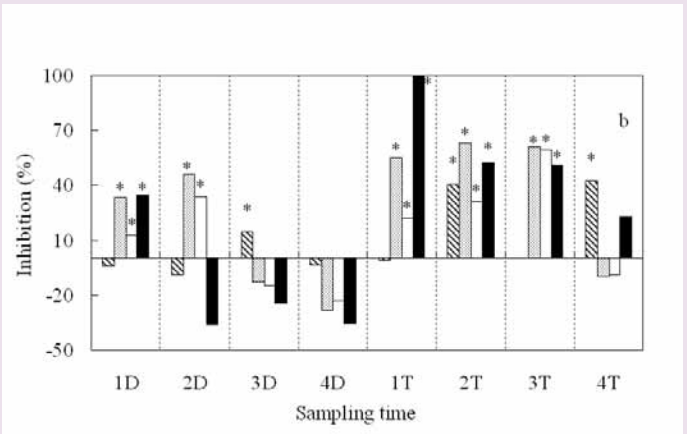
大氣中有機污染物生物監測指標之研究
Biomonitoring of organic air pollutants



▶ 垃圾焚化廠周邊不同樣點大花咸豐草植體中多環芳香族碳氫化合物(PAHs)之含量。
PAHs accumulation of *Bidens pilosa* L. var. *radiata* (Bl.) Sherff in the vicinity of an incinerator.

工業廢水對水生植物之毒性研究
Evaluation of the effluent toxicity using duckweed toxicity test





◀ 工業區周邊日間及夜間時段水質對青萍生長之影響。
Phytotoxicity test results of industrial effluent on *Lemna aequinoctialis* Welwitsch.(D:daytime ; T:nighttime).

植物受氟害之徵狀及氟累積量之研究
Fluoride accumulation and leaf injury of the plant

▲ 不同受害程度茶葉葉片之氟化物含量。
Fluoride accumulation in tea leaves of different necrosis levels.

Sampling Site [1]	Necrosis (%)	Number of samples	Leaf fluoride content (*mg/kg d.w.*) Mean ± SD	Range
SW	20 - 65	7	2463 ± 256	2060 - 2852
W	10 - 30	4	1693 ± 194	1484 - 1929
NE	- [2]	3	1086 ± 92	977 - 1224
CK	-	3	532 ± 15	518 - 548

1:SW (south west) is 50-200 m away from factory. W (west) is 30-100 m away from factory. NE (north east) is 30-100 m away from factory.
2:no visible injury symptom.

農藥植物毒理研究
Phytotoxicity research

▼藥害檢測。 Methods for diagnosing phytotoxicity.

模擬噴施。
Simulated application.

生物測定。
Bioassay.

檢體鏡檢。
Microscopic examination.

植體殘留藥劑測定。
Residual detection of suspected chemicals in plants.

▼藥害徵狀。 Abnormal symptoms associated with agricultural chemicals.

▼雜草抗藥性研究。 Herbicide resistance.

抗巴拉刈之野茼蒿。
paraquat-resistant biotypes of *Erigeron sumatrensis*.

抗禾草藥劑之牛筋草。
ACCase inhibiyors-resistant biotypes of *Eleusine indica*.

臺灣地區發生之雜草抗藥性
Occurrence of herbicide-resistant weeds in Taiwan

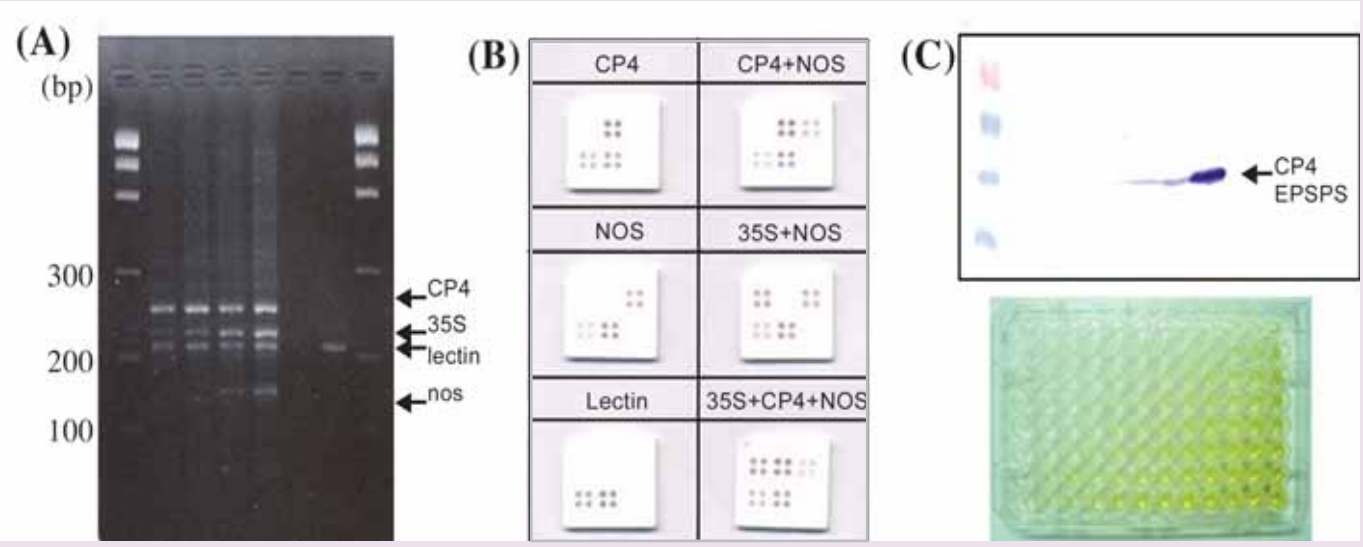
雜草 Weed	藥劑 Herbicide	抗感比 Resistant ratio	分布 Distribution
牛筋草 *Eleusine indica*	嘉磷塞 Glyphosate	>4	地區性 Regionalism
	禾草藥劑 Graminicide	5-40	地區性 Regionalism
野茼蒿 *Conyza sumatrensis*	嘉磷塞 Glyphosate	>5	普遍 Universality
	巴拉刈 Paraquat	10	普遍 Universality
華九頭獅子草 *Dicliptera chinensis*	嘉磷塞 Glyphosate	---	地區性 Regionalism

耐嘉磷塞之華九頭獅子草。
glyphosate-tolerant biotypes of *Dicliptera chinensis*.

抗嘉磷塞之牛筋草。
glyphosate-resistant biotypes of *Eleusine indica*.

抗除草劑基改作物檢驗方法之研發

Technique development: for detection of herbicide tolerant gene in genetically modified crops



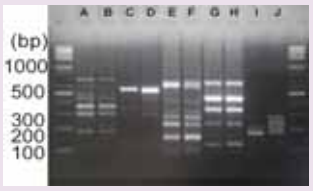
▲抗嘉磷塞大豆3種檢驗方法－(A) multiplex PCR，(B)生物晶片，(C)免疫檢測。
Detection of Roundup Ready soybean by 3 methods: (A) multiplex PCR, (B) bio-chip, (C) ELISA.

植物分子標記之研究

Study of plant molecular markers

菟絲子屬植物 (*Cuscuta*)-ISSR marker.

蒲公英屬植物 (*Taraxacum*)-SNPs marker.



小花蔓澤蘭屬植物 (*Mikania*)-RAPD marker.

大花咸豐草族群 (*Bidens pilosa* var. *radiata*)-PCR RFLP marker.

農地雜草調查及管理
Weeds: survey and management

1980年初期後台灣中部水田雜草之消長
Change of paddy weed flora in central Taiwan during 1981-2002

雜草Weed	1981-82	1992	2002
稗　草 (*Echinochlora crus-galli*)	+++	++	-
鴨舌草 (*Monochoria vaginalis*)	+++++	+++	+++
水　虱 (*Fimbristylis miliacea*)	+++	++++	+++
牛毛氈 (*Eleocharis acicularis*)	+++	-	-
螢　蘭 (*Scirpus juncoides*)	++	+	+
紅骨草 (*Rotala indica*)	++++	+++	+
野茨菰 (*Sagittaria trifolia*)	+	-	-

發生頻率(Frequency)：
-：0-2.5%, +：2.5-5%, ++：5-10%, +++：10-20%, ++++：20-40%, +++++：>40%

雜草檢疫、外來植物調查及風險評估
Monitoring, survey and risk assessment of non-indigenous plants

低海拔主要外來植物
Major alien plants in low land Taiwan

發生頻率 Frequency of occurrence(%)	種數 Number of specie	代表性外來植物 Representative of alien plants
>30(70)	1	大花咸豐草 *(Bidens pilosa. var. radiata)*
20-30	4	巴拉草 *(Brachiaria mutica)*、紅毛草 *(Rhynchelytrum repens)*、象草 *(Pennisetum purpureum)*、田菁 *(Sesbania cannabiana)*
10-20	7	掃帚菊 *(Aster subulatus)*、星草 *(Cynodon plectostachyum)*、馬唐 *(Digitariasanguinalis)*、含羞草 *(Mimosa pudica)*等
5-10	10	野茼蒿 *(Conyza sumatrensis)*、孟仁草 *(Chloris barbata)*、蓖麻 *(Ricinus communis)*、美洲含羞草 *(Mimosa diplotricha)*等
2-5	21	銀膠菊 *(Parthenium argentatum)*、小花蔓澤蘭 *(Mikania micratha)*、馬櫻丹 *(Lantana camara)*等
1-2	27	豬草 *(Ambrosia artemisiifolia)*、布袋蓮 *(Eichhornia crassipes)*、牧地狼尾草 *(Pennisetum setosum)* 等
<1	55	小米菊 *(Galinsoga parviflora)*、毛蓮子草 *(Alternanthera bettzickiana)*、平伏莖白花菜 *(Cleome rutidosperma)*等

對外服務
Services and publications

雜草管理諮詢
Weed management consultation
藥害鑑定及糾紛處理
Diagnosis of plant injuries caused by pesticides
污染鑑定及糾紛處理
Diagnosis of plant injuries caused by pollutants
農藥登記委託試驗
Tests for herbicide registration

技術服務組
DIVISION OF TECHNICAL SERVICE

技術服務組之工作目標在整合、管理本所研究成果，收集農藥、害物最新資訊，以支援決策，並提供對農民及其他研究、推廣機構之諮詢服務，提供台灣農藥登記單一窗口服務亦是主要工作之一。在研究成果彙整及推廣傳播方面之工作，包括有：研究成果之技術推廣與授權移轉，研究性及推廣性刊物彙編出版，視聽錄影帶製作，圖書館資訊服務，推廣人員、農藥從業人員及農民等之教育訓練。資訊蒐集及系統建立方面涵蓋有：台灣登記農藥及害物防治資訊、農藥資料審查資訊、教育訓練資源資訊及圖書期刊資訊等，以及農藥及植物保護資訊系統、農藥標示查詢管理系統、農藥登記單一窗口審查系統、圖書館自動化系統等之建立。資訊體系規劃及管理方面則已建立全所之區域網路及連外之網際網路，提供自動化辦公室及電子化圖書館之環境，並以全球資訊網（WWW）開放網站資訊及諮詢服務之管道，此外，並協助所內及主管單位規劃及建立相關之資訊系統。未來工作重點包括：科技研發成果落實管理與運用、資訊體系之加強及系統整合、提供更有效之農藥登記單一窗口化服務，以及加強辦理各項教育訓練等。

The main functions of the Division of Technical Service include integration of the research findings of the Institute, and collection of the new information related to pesticides and pests for distribution to farmers, researchers, and extension workers. The Division also offers portal service for pesticide registration in Taiwan. In terms of integration and extension of research findings, the Division is responsible for technology licensing, publishing annual reports, newsletters and handbooks, producing research and educational videotapes, and providing a library information service and training programs for farmers, extension workers and pesticide retailers. The data accumulation and establishment of information system by the Division include agrochemical and pest control-related information system in Taiwan, the pesticide toxicology information system, automatic library information and management system, and an information management system for education and training programs. In the area of information system planning and management, the Division uses pc-based servers and network facilities to automate administrative work, thereby allowing us to offer information and service through the World Wide Web (WWW) and also assists other Divisions in establishing their own information systems. In the near future, the Division will intensify its efforts to manage the intellectual properties, accelerate network transmission speed, integrate the information system, establish one-window service, coordinate training programs and exchange information with other organizations.

研究成果彙整及推廣傳播

Integration and extension of research findings

▲ 研究及推廣刊物編輯出版。
Publication of research and extension bulletins.

▲ 得獎之農業錄影帶作品。
Award winning videotapes on agriculture.

▲ 影片製作-田間攝影。 Producing extension films.

▲ 研究及推廣教學錄影帶製作—攝影、剪輯、配音及配樂。
Production of research and educational video-tapes: photographing, editing and dubbing.

▲ 數位學習教材製作。
Production of teaching materials for e-learning program.

▲ 展示室一角。
Exhibition room.

▲ 推廣影片-網路隨選視訊。
Video on demand.

▲ 教育訓練-課堂講授。
Education and training program: lecture.

▲ 教育訓練-電腦課程。
Education and training program: computer lesson.

▲ 教育訓練-誘捕器製造實習。
Education and training program: practice of making traps.

▲ 教育訓練-農藥配製現場解說。
Education and training program: demonstration of emulsion stability test.

資訊蒐集及系統建立

Data accumulation and establishment of information systems

▲ 農藥標示查詢系統。
Information retrieval system of pesticide labels.

▲ 農藥登記單一窗口審查系統。
Portal service for pesticide registration.

▲ 農藥資訊系統。
Pesticide information system.

▲ 圖書館自動化查詢系統。
Automated library integrated system.

▲ 農藥登記文件影像管理系統。 Filing system of pesticide documents.

資訊體系規劃及管理

Planning and managing information system

▲本所全球資訊網首頁。
World Wide Web home page of TACTRI.

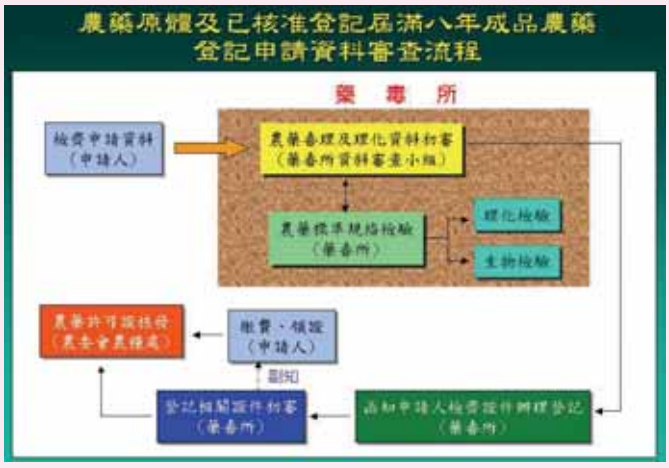
▲ 本所Intranet所內網路首頁。
Home page of intranet of TACTRI.

▲利用工作站執行網路監控與管理作業。
Network control and management at workstations.

▲ 全球資訊網建置「植物保護手冊」電子版首頁。
Electronic version of "Plant Protection Manual" on World Wide Web.

農藥登記單一窗口服務

Portal service for pesticide registration



▲登記審查作業流程。 Procedure of pesticide registration.

▲農藥田間委託試驗結果討論。 Pesticide effect investigation.

▲農藥登記前，人畜及環境安全資料審查。 Pesticide safety investigation.

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