

**EXPLORATION OF BIOCONTROL AGENTS
FOR BACTERIAL WILT DISEASE (*Ralstonia solanacearum*)
OF TOMATO IN JAVA**

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ABSTRACT

Based on the isolation and laboratory examination in first step, two isolates with the highest level of inhibition to *R. solanacearum* were selected. They are *Pseudomonas fluorescens* Gi-19 and an isolate of *Bacillus subtilis*. Furthermore they were examined to control the bacterial wilt disease of tomato under field conditions. The treatments were arranged as a factorial experiment in a randomized complete block design with two factors and three replications. The first factor is the kind of biocontrol (*P. fluorescens* Gi-19, *B. subtilis*, and *Trichoderma viride*) and streptomycin sulphate 20% and the second factor is time of applications (seed treatment, seedling treatment, and both seed and seedling treatment). All of the biocontrol agents, individually and in combination, significantly reduced the disease intensity. Six weeks after planting, blocks treated with combination of *P. fluorescens* Gi-19 + *B. subtilis* had the lowest disease intensity (7.8%); meanwhile disease intensity in the control block was 37.0% and in the blocks treated with streptomycin sulphate, 17.8%. Application of biocontrol agents twice, both as seed and seedling treatment, caused the lowest disease intensity.

Keywords: biocontrol agents, *Ralstonia solanacearum*, tomato

**FIELD SURVEY OF CUCUMBER MOSAIC VIRUS
SATTELITE RNA IN TOMATO PLANTS IN INDONESIA**

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ABSTRACT

Field survey of *Cucumber mosaic virus* (CMV) infected tomato plants was conducted during February 2002 to March 2003 in Indonesia. About 19% of 413 tomato samples collected from several tomato growing areas in four districts (Bogor, Sukabumi, Cianjur, and Bandung) of West Java were found to be infected by CMV. The CMV isolates were considered to be mild strains because they did produce no or very mild symptoms in naturally infected tomato plants. Among the CMVs collected, four isolates were found to associate with satRNAs having different nucleotide length. Four satRNAs, S3 satRNA, Mpl satRNA, Mp2 satRNA and Nl satRNA were estimated to be about 300, 390, 390, and 320 nucleotides (nt) long, respectively. Further research will be needed to characterize the nature of Indonesian satRNAs and understand their potential as biological control agents.

Keywords: *Cucumber mosaic virus*, satellite RNA, tomato plant

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**APPROACHES TO CONTROL TOMATO VIRUS DISEASES BY PLANT
VACCINES IN BALI, INDONESIA**

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ABSTRACT

To study the effect of plant vaccines to *Cucumber mosaic virus* (CMV) in Indonesia, two Japanese CMV plant vaccines, CMV-K03 and CMV-NDM1 were inoculated on tomato seedlings and followed by challenge inoculation with 4 Indonesian CMV isolates. Two plant vaccines protected tomato plants from CMV infection evaluating from plant height and concentration of CMV. As these plant vaccines, which contain satellite RNAs with specific nucleotide sequences, were originally obtained among from naturally CMV-infected tomatoes with no or very mild symptoms, they seem to be safe and useful biological-agents in CMV protection in Indonesia as well as in Japan under proper farming management.

Keywords: attenuated virus, biological control, *Cucumber mosaic virus* (CMV), Indonesian CMV, tomato

**BACTERIAL ROT, A NEW DISEASE OCCURRED
ON THE PUMPKIN SEEDLING USING AS A ROOTSTOCK FOR
CULTIVATION OF CUCUMBER CAUSED BY
*Pseudomonas aeruginosa***

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ABSTRACT

In August 1999, a new bacterial rot disease was found on hypocotyls and leaves of pumpkin seedling (*Cucurbita* spp.) using as a rootstock for cultivation of cucumber in Hiratsuka, Japan. The bacterium isolated from the lesions of the hypocotyls and leaves was pathogenic to pumpkin, cucumber, watermelon, melon seedlings and developed the soft rot symptoms, but any symptom appeared on bitter melon seedling. Severe soft rot symptoms were appeared on pumpkin seedlings kept in the condition of high moisture and temperature over 30°C, however, lesions were still small and not elongated in the condition of high moisture and under 25°C by artificial inoculation. It was considered that the condition of vinyl tunnel in summer time promoted the growth of causal agent rapidly and produced severe soft rot symptoms. Causal bacterium was identified as *Pseudomonas aeruginosa* (Schroeter 1872) Migula1900 according to its bacteriological characteristics. The symptoms of pumpkin seedling were similar to bacterial rot of pumpkin caused by *Erwinia chrysanthemi*, we proposed the same name on this disease and add *P.aeruginosa* as a new pathogen.

Keywords: bacterial rot, pumpkin, rootstock, cucumber, *Pseudomonas aeruginosa*

**METHODS OF PHYSICAL CONTROL OF INSECT DAMAGE BY SCARAB
BEETLES AND MOLE CRICKETS
TO POTATO TUBERS IN BALI, INDONESIA**

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ABSTRACT

In order to establish physical control of insect damage for potato production in the tropical highland, we conducted cultivation experiment, using polyester sheet (root-proof sheet). Four experiments were carried out from April 2001 to June 2002 at 1,450m alt. In Bali, Indonesia, with the following results: 1) With the use of root-proof sheet, potato yield increased and small tubers decreased in the first and third experiments. However, total yield decreased under severe dry condition in the second and fourth experiments; 2) While the average number of tubers from one hill was almost the same among the plots with and without sheet, injured tubers attacked by insects numbered more in the plot without sheet in the third experiment; 3) Total number of scarab beetles and mole crickets in 1 m² with 0.3 m depth was counted for the respective plots in the third experiment. Much smaller number of mole crickets was confirmed for the plot with sheet than those without sheet. Therefore, root-proof sheet was considered effective for controlling damage of potato tubers attacked by insects and increasing yield in the rainy season.

Keywords: mole crickets, physical control, tropical highland, potato, Indonesia

**ANTIFEEDANT ACTIVITY OF MAHOGANI (MELIACEAE) EXTRACT
AGAINST THE DIAMONDSACK MOTH**

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ABSTRACT

Swietenia mahogani Jacq. (Meliaceae) seeds were extracted with methanol. The crude extract completely inhibited feeding activity of third instar larvae of the diamondback moth, *Plutella xylostella* (Lepidoptera: Yponomeutidae) by choice and no-choice leaf disc methods. No feeding activity occurred when cabbage leaf discs were treated with *S. mahogani* crude extract solution at 5%. Fractionation conducted by combination of counter-current distribution method, silica gel column chromatography and preparative TLC resulted in one fraction which strongly inhibited *P. xylostella* larval feeding activity by 98.3% at 0.2%.

Keywords: antifeedant, *Plutella xylostella*, *Swietenia mahogani*

**POTENTIAL OF WATER-SOLUBLE EXTRACTS FROM
MEDICINAL PLANT MATERIALS
FOR CONTROLLING LETTUCE BROWN SPOT**

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ABSTRACT

A new disease, leaf brown spot caused by *Acremonium lactucum*, has become a serious problem in organic farming in Taiwan during recent years. Disease control experiments were attempted by use of water-soluble extracts of 103 different medicinal plants. Eleven plant materials were effective in inhibiting conidial germination of the pathogen at 1 % (w/v) on the slide culture, and among them seven showed complete inhibition at 0.25% (w/v). When these plant extracts were applied respectively together with conidial suspensions (10^5 spores/ml) of the pathogen onto lettuce plants, the ones from *Raphanus sativus* (radish seed meal) and *Rheum palmatum* showed great efficacy of disease control by reducing the disease severity by more than 50%. In the laboratory and greenhouse trials, the effect of the extract from 0.5% (w/v) radish seed meal on the disease suppression was stable when the extract was sprayed onto lettuce plants three days before or two days after inoculation. However, the disease severity of lettuce brown spot was significantly reduced when the plants were continuously sprayed three times with the extracts once per week. In future, it is necessary to determine the process suppressing the disease development and the method of applying the extract in order to control the disease in the fields.

Keywords: *acremonium lactucum*, botanical pesticides, lettuce brown spot, medicinal plant materials, radish seed meal

**LABORATORY STUDY ON THE HOST RANGE
OF *Cotesia plutellae* (HYMENOPTERA: BRACONIDAE),
A LARVAL PARASITOID WASP
OF THE DIAMONDBACK MOTH**

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ABSTRACT

Host range of *Cotesia plutellae*, one of the major larval endoparasitoid wasps of the diamondback moth, *Plutella xylostella*, was examined in the laboratory. Female wasps laid eggs into all lepidopteran host species examined (5 families and 12 species), and from 7 species of them, including a lycaenid butterfly, adults emerged. On the other hand, female wasps failed to parasitize *Spodoptera litura*, *Mamestra brassicae*, and *Pieris rapae* (no adult emerged), and at least in *S. litura* unsuccessful parasitization was due to defense reaction of the host. These results suggest that this wasp can parasitize species of wide range potentially in Japan.

Keywords: *Cotesia plutellae*, diamondback moth, parasitoid wasp, host range

**CHARACTERIZATION OF DEFECTIVE VIRAL DNA
ISOLATED FROM TOMATO PLANTS INFECTED
WITH *Tobacco leaf curl virus* IN JAPAN**

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ABSTRACT

Defective DNA of *Tobacco leaf curl virus* (TLCV) have been cloned from TLCV-infected tomato plants which were maintained by only grafting for approximately ten years and characterized by sequence analysis. Defective DNA is derived from TLCV-Jp2 genomic DNA by large deletion and is approximately half the size of TLCV-Jp2 genomic DNA. One defective DNA (pTLD22) contains Intergenic region between CI and VI, and 5' terminuses of CI, V2 and VI. The other defective DNA (pTLSG2) contains the intergenic region between C3 and VI, and 3' terminuses of C3 and VI in addition to the region of pTLD22. There were no possible protein coding regions in defective DNA. Such defective DNA was encapsidated in virus particles.

Keywords: geminivirus, *Tobacco leaf curl virus*, defective DNA, *Begomovirus*, *Geminiviridae*

**THE STRATEGY FOR THE PEST CONTROL OF HIGHLAND
VEGETABLES BY CONSERVATION OF NATURAL ENEMIES
IN CANDIKUNING, BALI, INDONESIA**

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ABSTRACT

Insect pests of the highland vegetables, their natural enemies, and their population dynamics were investigated from July, 2001 to December, 2002 in Candikuning, Bali, Indonesia. It was considered that *Spodoptera litura* on various vegetables, *Helicoverpa armigera* on tomato fruit and leek, *Crociodolomia binotalis*, and *Plutella xylostella* on cruciferous crops were key pests. The population of these pests decreased in the rainy season and increased in the dry season. *Liriomyza huidobrensis*, *Thrips palmi*, *T. tabaci*, and *Bemisia tabaci* were not dominant, and the damage caused by these pests was not severe. A parasitoid *Diadegma semiclausum* and some predators especially ground-dwelling spiders seemed to control the population of *P. xylostella* and *H. armigera* respectively. The high parasitic rate of *Opius* spp., a parasitoid of *L. huidobrensis*, was observed in a potato field treated with less pesticides. For *S. litura*, mating disruption using sex pheromone was effective to decrease the population. From these results, it seems possible that *S. litura* is controlled by application of pheromone, and *P. xylostella* and *H. armigera* by conservation of natural enemies.

Keywords: vegetable pest, natural enemy, biological pest control, population dynamics

FACTORS AFFECTING FARMERS IN ADOPTING
LOW-INPUT RICE FARMING SYSTEM IN TEMPURAN
SUB-DISTRICT, KARAWANG, INDONESIA

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ABSTRACT

The objectives of this study are to compare the economic performance of low-input and conventional rice farming systems and to identify and analyze the factors affecting the farmers engaged in low-input rice production systems in Tempuran Sub-district, Karawang, West Java Province, Indonesia. Thirty-one farmers of each category of conventional and low-input rice production systems were surveyed.

Results of this study indicate that, first, low-input rice farming system results in a 20% lower yield and uses 43% to 95% lower inputs than those of conventional farming system. However, net incomes resulting from this system are not significantly different than those of conventional one. Second, both the probit and logit models consistently indicate that total costs of labor, land area and IPM courses, are the most important factors in affecting farmers' decisions to adopt low-input rice farming system. The results also indicate that, due to unavailability of cash funds, the rice farming system which implies the least total costs of labor will be the first to be selected by the farmers.

Keywords: conventional and low-input rice systems, income analysis, adoption, binary-choice models, linear probability, probit and logit models

**CULTURAL PRACTICES AND ECONOMIC ANALYSIS
OF ORGANIC AND CONVENTIONAL VEGETABLE
FARMING IN BALI, INDONESIA**

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ABSTRACT

One-year monitoring survey on highland vegetable cultivation in 10 plots conducted in Bali in 2001 revealed that organic farming was characterized by low external inputs, intensive capital investment and recycling process of natural resources. Plastic houses, organic fertilizer, biopesticides, and EM5 were intensively used in organic farming. Most of the produce were marketed directly to customers by a contract system. In contrast, conventional vegetable cultivation heavily depended on external inputs such as synthetic chemical fertilizer and pesticides, and the produce was sold to the wholesalers.

Economic analysis showed characteristics of three types of vegetable producers, company-based organic farm, family-based organic farm, and conventional farm. The company-based organic farm was economically most feasible. The family-based organic farms would need further improvement in their economic sustainability. The conventional farming system is economically feasible; however, the use of synthetic chemicals may bring environmental problem.

Keywords: organic farming, biopesticide, sustainable agriculture, monitoring survey

**FARM MANAGEMENT ANALYSIS OF RICE AND
VEGETABLE GROWING IN VAN NOI COMMUNE, HANOI**

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ABSTRACT

This paper presents an orthodox farm management analysis, based on data obtained from a questionnaire survey of 100 farmers in a commune characterized by the adoption of clean vegetable cultivation. A special focus was given to the clarification of land tenure, cropping patterns, production of rice and vegetables, and farm business analysis. Four major cropping patterns were identified in this commune: rice double-cropping, rice double-cropping followed by vegetable growing during the winter, rice single-cropping in spring followed by vegetable growing in the rest of the year, and all-year round vegetable growing. The most common pattern was the planting of spring rice - summer rice - vegetables, followed by the planting of vegetables throughout the year. Rice was grown almost exclusively for home consumption, while clean vegetables and hog-raising provided cash income. The average agricultural income per household amounted to 7,874 thousand dong, of which 83.6% was from cropping, 15.1% from livestock, and 1.3% from aquaculture. Income function analysis revealed that farm size and material inputs were important determinants of agricultural income. Furthermore, pest control rather than fertilization appeared to be the major constraint, providing an economic rationale for the farmers to depend heavily on synthetic chemical pesticide. It is therefore necessary to develop and diffuse better and environmentally friendly pest control methods, if a sustainable farming system is to be firmly established in this commune.

Keywords: clean vegetables, cropping patterns, farm business analysis, income function

**EVALUATION OF THE CHARACTERISTICS
OF RESOURCE RECYCLING TYPE
FARMING SYSTEMS AND FARMER'S CONSCIOUSNESS
IN THE MEKONG DELTA, VIETNAM**

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ABSTRACT

This study has tried to clarify the following subjects by the investigation of 21 farm households in the Mekong Delta, Vietnam; 1) actual conditions of resources recycling in VACR system, 2) characteristics of farmer's consciousness on resources recycling and environmental conservation, and 3) affecting factors regulating the economy and resources usage of VACR system. As the results of this study, we clarified the following facts. The income of agriculture production is low: a maximum of 2400 US dollar and 792 US dollars on the average. There are many problems in improving the efficiency of resource use because the technology which supports such a farming system is not sufficiently developed. The farmer's consciousness concerning resources use and environmental conservation have been affected by the difference of age and the type of farming system. The rice yield will increase by the increase of nitrogen and agriculture chemicals input, and when the farmer's age is younger. The amount of use of agricultural chemicals has been positively affected by the amount of herbicide input, and nitrogen input and the number of pigs.

Keywords: resource recycling, farming systems, Mekong Delta, VACR system

**LOW INPUT RICE FARMING AT THE CROSSROADS:
ECONOMIC AND TECHNICAL CONSIDERATIONS OF THE CASE
OF ATSUSHIO-KANO VILLAGE, FUKUSHIMA, JAPAN**

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ABSTRACT

Based on a series of interviews and a questionnaire survey of 33 farmers in one of the main organic rice growing areas in Northern Japan, this paper clarified the development process of such alternative farming and issues currently facing the farmers. It documented the gradual growth of low pesticide and organic farming and economic analysis was conducted on different cultivation methods. It was clarified that the profitability of low pesticide farming was rather low, giving incentives for farmers to return to conventional farming. In order to promote organic farming, which would enjoy highest profitability, there were technological problems to be solved, and this paper specially focused on weeding and the use of organic fertilizer.

Keywords: low pesticide farming, organic rice, weeding, organic fertilizer, profitability

**A BUSINESS MODEL OF PROGRESSIVE ORGANIC
FARMING MANAGEMENT**

The Case of Nagasaki Nanbu Production Cooperative Corporation

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ABSTRACT

As consumers' concern about safety food and organic farming is increasing, a supply of safe food is being realized through the cooperation of consumer and producer. This paper surveyed the history of the organic farming movement in Japan, and researched the case of NAGASAKI NANBU Production Cooperative Corporation which was developed by a cooperation with the consumers. The business model of the organic farming development of the cooperative based on systematic correspondence is presented by analysis with the "Value chain".

NAGASAKI NANBU Production Cooperative Corporation is a shipping cooperative which was established 30 years ago. While the cooperative realizes the production of safety food, its regular supply to dealers and consumers is also met, and the system of the production plan and price setting has been explained well to the consumer. An original certification system is then developed, and the consumer's trust is secured. Organization ability of NAGASAKI NANBU Production Cooperative Corporation contributed greatly to primary activities and support activities by analyzing Value Chain organizational activities.

Keywords: business model, certification, organic agricultural products, original inspection system, value chain

**PRESENT CONDITION OF THE ORGANIC AGRICULTURAL
PRODUCTS AUTHENTICATION SYSTEM IN THAILAND**

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ABSTRACT

At present, there are two methods of authentication of organic agricultural products in Thailand, both of which were established based on the standard of foreign countries. A local standard called the ACT traditional method was made based on the foundation standard of IFOAM. On the other hand, the Thailand Institute of Scientific and Technological Research (TISTR), in cooperation with the Ministry of Agriculture and Cooperatives, Department of Agriculture (DOA), and the Ministry of Commerce, Department of Export Promotion (DOEP), created a guideline based on the fundamental standards of IFOAM, Organic Food Product Act (OFPA) of the United States, and rules of the Codex Alimentarius of Europe. Although both methods are currently undergoing approval accreditation, their standard is not unified and does not have legal regulatory power. Based on the authorization results of both methods, ACT summarized 327 households doing organic farming with a total land area of 5892 rai, and 5 companies as dealers and traders (*). The latter method has only 7 food companies handling, dealing and exporting organic agricultural products. There is also no current authorized farm involved in organic farming under the Agriculture Office.

A survey on organic product awareness in Bangkok, Thailand was done and the consumers were asked which of the two methods should be authorized; 57% of the respondents think that a third party should decide the authorization and 38% said it relies on the decision of an administrative party. The legalization of Thai organic agricultural products was also surveyed, where 84% replied that it should become law, 6% was against the legalization, and 10% of the respondents could not decide.

With the high consumer awareness in Bangkok, it is necessary to have a standard authentication process, authorization by a third party and legal regulatory power to maintain the authentication system for the future of organic farming.

Keywords: ACT, IFOAM, codex alimentarius, legalization, certification for organic products

**ORGANIC RICE INDUSTRY IN CALIFORNIA
UNDER THE FINAL NATIONAL ORGANIC STANDARDS RULE**

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ABSTRACT

The modern agricultural farming system in the 20th century achieved a significant increase in agricultural productivity through development in biochemical technology and technology of agricultural machinery and equipment primarily in developed nations. On the other hand, it left a negative legacy against environment and human health, such as soil and water pollution and residual pesticides in farm products because of large input of chemical fertilizer and chemical pesticides. We are engaged in a project which aims to develop technologies in new farming systems in the 21st century.

This project has set its sights on the development of organic farming. The increase in concern about food safety does not only occur among Japanese people, but also globally. In the case of the United States, which is the main focus area of this paper, the Food Security Act of 1985 proposed environmentally sound agriculture, and the national standards for organic farm products were established in the Food Agriculture, Conservation, and Trade Act of 1990. Furthermore, USDA established the final national organic standards rule, which is stricter than the one it replaces, effective from December 21st, 2000.

This paper considers the reality and problem of organic rice industry in California, USA, under the national organic standards rule of the United States.

Keywords: organic farm products, certification system, national standards, organic rice farming, California

**THE INFILTRATION OF ORGANIC FARMING
TECHNOLOGIES INTO THE FARMERS' FIELDS
A Case Study in Peru, Cuba and California, USA**

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ABSTRACT

The infiltration of organic farming technologies was examined in Peru, Cuba and California, USA. The technologies were more easily accepted by poor farmers, if they could be supplied cheaply by some means, because they usually were far from accessing modern technologies. On the other hand, for the commercialized farmers in the suburbs, more production and more profit by using modern technologies seemed to be a matter of high interest. However, when the organic farm products were certified and sold by higher prices than the ordinary ones, even the big commercial growers tended to adopt the technologies, as in the case of California.

Keywords: fertilizers, pest control, planting pattern, rotation system, farm situation