

Summary of presentation

Screening of citrus rootstock tolerance for Phytophthora disease of some potential cultivars for pomelo in the southeast region

Nguyen Thi Thuy Binh and Le Thi Thu Hong

SUMMARY

Phytophthora disease is an important pest on pomelo. Screening for its rootstock resistant of pomelo were conducted in 2007 in the southeast region of Vietnam. Eighteen isolates of Phytophthora spp. were collected on citrus (pomelo, lime, lemon, and mandarin) in which 3 isolates were identified Phytophthora parasitica. Isolate Phytophthora parasitica marked PbBD07-2 was used for screening the resistance of pomelo rootstocks. By using bioassay method, 9 rootstock exotic and local cultivars were tested including Duong la cam, Le Pomelo, Oi, Nakon, Volkamericana, Da lang, Nam roi, Da xanh, and Chua. The result showed that Le Pomelo and Chua were the least susceptible while Oi, Duong da lang, Duong la cam, Nam roi and Da xanh were the medium susceptible.

Effect of cutting methods and NAA treatment on the rooting and vegetative growth of some pomelo rootstock

Vo Huu Thoai, Nguyen Vu Son and Bui Thi My Hong

SUMMARY

Experiments were carried out from 22/5 to 22/9/2007 at glass- house of Southern Fruit Research Institute.

Experiment 1: The experiment was designed as RBD with 4 treatments of method of cutting and 5 replications. The results showed that there was no significant difference among the methods of cutting but the method of 90° basal cutting had more number of new roots and distributed evenly around the basal of the cutting.

Experiments 2: Experiment was designed as RBD with 2 factors in which, factor A was of 3 doses of NAA: 500, 1000, 1500 ppm and the factor B was of varieties of rootstock. B ng, ng H ng, H ng ng, Lông C Cò pomelo with 3 replications. The results revealed that treated the cutting of B ng pomelo with NAA 1000 ppm was the most effective as compared to other doses of NAA in term of the percentage of new vegetative growth and the number of roots as well. The treating of the cuttings with NAA 1500 ppm was found effective with other varieties of the trial.

Result of the controls some of main pests and mites on da xanh pomelo

Do Hong Tuan, Le Quoc Dien and Nguyen Van Hoa

SUMMARY

Insects, mites are common problems to the Mekong Delta homeowner with a dooryard planting of citrus. Frequently, more harm than good comes from an attempt to control these pests with pesticides. To be successful, the right material should be applied at the right time

using the right amount in the right manner. If any of these conditions cannot be met, it is usually better not to spray at all.

In order to acquaint the home citrus grower with insects, mites and their control, the subjects are discussed in the following order "The prevention some of pests and mite on da xanh pomelo" from 11/2006 to 12/2007 at SOFRI.

Result showed that psyllids, aphids could move at altitude from 0,1m to 3,2m and psyllids settled several populations at 1,3m high by using yellow sticky trap to set up at several different altitudes. With mealy bugs, 1 day after spraying insecticides, the effect of Alpha 800 WG and Move 150 OD on them were dead 100%. Systemic insecticides had effect on psyllids up to 60 days after applying. Abamectin gave high result on control of mite damage on da xanh fruits if we applied abamectin from unblown flowers.

Investigation on the present markets of pummelo in Mekong Delta

Ta Minh Tuan and Doan Huu Tien

SUMMARY

Mekong Delta is the largest production area of pomelo in Vietnam. There were 3 main area of pomelo commodities in Tien Giang province, Vinh Long province and Ben Tre province with 3 main commercial varieties of "Long Co Co", "N m roi" and "Da xanh", respectively. Most of Pomelo production in Mekong Delta was consumed in inland market. "N m roi" pomelo was exported to China, however its production was very small. The demand of consumers was increasing, however producing pomelo did not meet the demand because of the size of pomelo was not uniform.

Effect of fertilizers application timings on the accumulation of nitrate in fruit of Queen pineapple

Nguyen Trinh Nhat Hang, Nguyen Phuong Thuy and Nguyen Minh Chau

SUMMARY

The present study effect of fertilizers application stage on the content of nitrate in Queen pineapple has been carried out at Tan Phuoc district. The results indicated that application of chemical fertilizer at stage 7 and 15 days before fruit harvesting were increased nitrate content in fruit over limiting standard. There were not significant differences in the fruit yield among stages of application such as 7, 15, 30, 40, 60 days before harvesting. High nitrogen rates were applied at stage 7 days before fruit harvesting due to increased nitrate residue on pineapple fruit.

Effect of Boron on fruit set of “Xuong com vang” longan

Bui Thi My Hong and Nguyen Vu Son

SUMMARY

The present work was carried out in Tien Giang province, from January, 2006 to September, 2007. The purpose of the study was to verify the effect of Boron on fruit set of longan cv. Xuong com vang. The experiment was composed of seven treatments. The result showed that Borax at 2g/l sprayed on leaves at stage of inflorescence 10cm in length gave the best result in increasing fruit set and yield.

Host range, population and control of Eriophyes litchii and its effects on longan

Nguyen Thi Kim Thoa, Le Quoc Dien and Nguyen Van Hoa

SUMMARY

Mite (Eriophyes litchii) was determined as a vector of Witches broom on Longan (Thoa et al, 2007), which is a very serious disease on Longan with unknown causal organism. In this study, we carried out experiments to observe the host range and population of Eriophyes litchii from time to time in the year and also tried some chemicals to control this mite under laboratory conditions. The result from investigation shown that Sauropus androgynous (L.) Merr, Securinega virosa (Willd.) Pox & Hoff, were identified as host of Eriophyes litchii, they presented on young and tender leaves and even mature leaves.

More population of Eriophyes litchii presented on young shoot in the periods of April, May and October, November, December of the year.

In the lab conditions, Ortus 5SC (15ml/10 liter of water); Kuraba WP (10g/10 liter of water) and SK-Enspray 99EC (75ml/10 liter of water) showed best killed Eriophyes litchii (100%) after 72 hour treated, Kumulus 80DF (30g/10 liter of water) gave 100% Eriophyes litchii killed after 48 hour treated.

In demonstrated plots, a combination of heavy prune of diseased branches and follow with chemical application, the result shown that the Ortus 5SC (15ml/10 liter of water) showed good potential in control of Eriophyes litchii on longan when spray at stage of leaf, bud, young fruit. On control plot, with heavy prune of diseased branches and no chemical treatment, witches broom diseased symptoms developed at each stage of flush.

Investigating on the adaption of longan in South Vietnam for export demand to China market

Ta Minh Tuan and Doan Huu Tien

SUMMARY

There was big production area of longan in South Vietnam. The season of longan in South Vietnam are all year that is strong for fresh longan to export. Longan in Mekong Delta has high

rate for export. China was the main market for export of longan, but Vietnamese longan has competed with Thailand longan in trade. Choosing the good variety and improving the cultivation is necessary for Vietnamese longan to compete against longan from Thailand in China market. To hold production of longan against in group of farm or co-operative to reduce cost price and increase the ability of competing of Vietnam longan product.

Investigation on the capacity of fresh mango in Mekong Delta for China market

Doan Huu Tien and Ta Minh Tuan

SUMMARY

Mekong Delta is the largest production area of mango in Vietnam. Fresh mango in Mekong Delta was exported to China in many years; however it has reduced greatly the export production in 2 recent years. The result of study showed that there was only 0.1% of 99.692 tonnes of fresh mango in Mekong Delta exported to China in 2007. The high spending of transportation and post harvest were the elements increasing the cost price and reducing competing of commercial fresh mango with other countries in China market. After China was the member of WTO, the border policy of China do not encourage export that has been reducing the ability export of small mango exporters in Vietnam.

Preliminary of study on some asexual propagation of sweetsop in the Southeast region

Nguyen Van Thu, Mai Van Tri and Bui Xuan Khoi

SUMMARY

*Sweetsop (*Annona squamosa*) is high-income fruit crops for the problem soils in the southeast region of Vietnam. Seed propagation has been used popularly in sweetsop production. Development of asexual propagation methods to produce true-to-type plants was essential to promote sweetsop production in the region. Two trials on grafting method and rootstock age were conducted in the SEFRC's experiment unit during 2006-07. The results showed that methods of H-budding and splice grafting gave the highest success rate and the suitable age of rootstock for grafting was from 12-14 months.*

Effect of training and pruning practices on yield of jackfruit (*Artocarpus heterophyllus* Lamk) in the Southeast region of Vietnam

Nguyen An De, Mai Van Tri and Bui Xuan Khoi

SUMMARY

*Training and pruning are important practices in intensive cultivation to promote yield of jackfruit (*Artocarpus heterophyllus* Lamk). A field trial on techniques of training and level of pruning was conducted in Dong nai province during 2006-07. The trial of 7 treatments included of two training techniques in combination to 3 levels of branch pruning. The result showed that training shape of spherical crown canopy in combination to pruning ineffective branches near trunk (40% inside) gave a higher yield of jackfruit as compared with control.*

Ant control in GAP for dragon fruit

*Huynh Thanh Loc, Le Quoc Dien, Nguyen Huu Hoang,
Nguyen Van Hoa, Vo Huu Thoai and Nguyen Minh Chau*

SUMMARY

Some batches of dragon-fruit goods for exporting were detected pesticide residue recently. The objective of this study is to improve IPM strategy to keep ecological equilibration on dragon-fruit orchard, improve fruit's quality, and increase fruit's yield and also to be safe for the customers.

The preliminary result of applying of Chlorine 4% on dragon-fruit branch show that 45,7% pulp of branch was died.

We also carried out the experiment on applying SOFRI-TR KI N on dragon-fruit orchard had high effect to control ants.

Beside, we built insect pest identify handbook for dragon-fruit tree.

Supply, demand and study on suggested policy for export dragon fruit

Ta Minh Tuan and Doan Huu Tien

SUMMARY

To assert that dragon fruit is the important fruit for exportation in Vietnam. Vietnamese dragon fruit was exported into more 20 markets in the world. Hongkong, Taiwan, Singapore and China were the important export market. There were the gathering production areas of dragon fruit for export in Binh Thuan Province, Tien Giang Province, Long An Province. These areas have produced by GAP (Good Agricultural Practices) to meet demand of consumers in international market with WTO standard. Distribution of dragon fruit output all year is necessary to keep export market with high price.

Study on ability of fresh rambutan in Mekong Delta to meet export demand to China market

Doan Huu Tien and Ta Minh Tuan

SUMMARY

The result of study showed that there were only 11.8% of 32.651 tones of fresh rambutan in Mekong Delta exported to China in 2007. The high spending of transportation and packing were the element increasing the cost price and reducing competing of commercial rambutan with other countries in China market. After China was the member of WTO, the border policy of China do not encourage export that has been reducing the ability export of small exporters in Vietnam.

Study on ability of “Gia” banana in Mekong Delta to meet export demand to China market

Doan Huu Tien and Ta Minh Tuan

SUMMARY

Mekong Delta is the largest production area of banana in Vietnam. “Gia” banana in Mekong Delta was exported to China in many years; however it has reduced the export production in 2 recent years. The result of study showed that there was only 3.8% of 129.054 tonnes of “Gia” banana in Mekong Delta exported to China in 2007. The high spending of transportation and the organization of gathering and exporting were not good that were the elements increasing the cost price and reducing competing of commercial “Gia” banana in China market. After China was the member of WTO, the border policy of China do not encourage export that has been reducing the ability export of small banana exporters in Vietnam.

Effects of fertilizers dosage and cutting-off plant tips on yield and pod quality of French bean

Le Thi Huong Van, Le Truong Sinh, Huynh Vu Son and Tran Kim Cuong

SUMMARY

A trial included eleven fertilizer treatments and a control was carried out in 2006. The best treatment obtained and the control in 2006 were continued to evaluated in 2007 with another control as the another farmer’s field. The result obtained from two trials showed that applying 330 kg NPK 15:15:15 (50 kg N : 50 kg P₂O₅ : 50 kg K₂O)/ha combined with bio-organic fertilizer of 600-1000 kg/ha was appropriate to safe French bean production. This dose gave high yield, economic value but low nitrogen contends in the pods while pod size and brix of the juice were not affected.

Cutting-off tip of plant when plant had 5-7 true leaves increased yield of pod by 12% and number of the stems, reduced height of the stems as compared to non-cutting control but did not affect pod size.

Effects of row cover and dose of fertilizers on pak-choi growth

Le Thi Huong Van, Le Truong Sinh, Nguyen Thanh Hieu and Tran Kim Cuong

SUMMARY

The study was conducted for two aims. The first was to find out a dose of fertilizer which could give high yield and low content of nitrogen in the leaf of pak-choi. And the second aim was to find out an appropriate size of net for row cover which could reduce pest visit but positively affect growth of pak-choi.

The fertilizer trial had eight treatments including a control. The result showed that the best treatment for safe pak-choi production was 85 kg urea + 63 kg super phosphate + 35 kg KCl/ha (40 kg N + 10 kg P₂O₅ + 20 kg K₂O/ha) combined with 200 kg bio-organic fertilizer ‘VK’. This treatment and the control had similarities in high yield and high economic value. However,

content of nitrogen in leaf grown on the above-mentioned treatment was reduced as compared to the control by 38%.

Row cover reduced injury caused by pest on the leaves of pak-choi. However, using the net with 6 holes/cm² gave positive effect on yield while net size of 64 holes/cm² reduced yield as compared to the non-cover control. This reduction was due to high air temperature and humidity under net of 64 holes/cm² that enhanced leaf-rot disease.

Effect of different fertilizer doses and effect of prevention from *Plutella xylostella* of some microbiopesticides and biopesticides on water cress

Le Truong Sinh, Le Thi Huong Van, Huynh Vu Son and Tran Kim Cuong

SUMMARY

*The purpose of the trial “Effect of different fertilizer doses and effect of prevention from *Plutella xylostella* of some microbiopesticides and biopesticides on water cress” is to find out which fertilizer dose can bring about economical effectiveness as well as which pesticides can both help prevent *Plutella xylostella* effectively and do no harm on the users and protect the environment.*

*The result of the trial shows that the fertilizer dose: 30 kg Ure + 500 kg Super lan + 250 kg 16-16-8 + 250 kg fertilizers shrimp and the dose: 50 kg Ure + 200 kg 16-6-8 + 50 kg KCl can bring about the highest economical effectiveness. Treatment T9 (microbiopesticides + a small quantity of biopesticides...) and T10 (biopesticides Hetsau 0.4 EC sprayed at the early stage and microbiopesticides Bitadin WP at the late stage) can bring about high effectiveness of prevention from *Plutella xylostella* on water cress.*

Yield and quality trials of Dong tien flowers varieties (by TC plantlets) in Tien Giang province

Nguyen Thi Huong Lan, Lam Van Thong and Le Nguyen Lan Thanh

SUMMARY

*Evaluation on adjusted potential, growth and flowering of eleven varieties of *Gerbera (Gerbera jamesonii)* micro-propagation plantlets. The experiment was carried out at two location of Tien Giang province. Results of experiment showed that the best varieties were DT02, Q11 as compared to other varieties for pot growing production, because of higher adjustment, vigour growth and good flower quality.*

Package in-vitro techniques for *Chrysanthemum* “Indo tim” multiplications

Le Nguyen Lan Thanh, Lam Van Thong and Nguyen Thi Huong Lan

SUMMARY

**Chrysanthemum* “Indo tim” variety was collected from local area, is having many prospected characteristics. However, it was grown by cutting and used for production many years. But now its production is facing up to main difficult that is lack of uniform seedlings with adequate quality, etc. Hence; we have developed completely procedure multiplication of this variety by in vitro techniques. The results of procedure*

multiplication are given below: The best medium for shoot multiplication is MS + 0,5 mg/l BA. The best medium for rooting is MS/2 + 20-30 g/l sugar + 7g/l Agar + 0,25 mg/l Atonik under 7.000 - 9.000 lux light condition and 33-37°C temperature. Rice husk: coco peat: sand: humix (2:2:1:1 ratio) is the best medium for hardening in greenhouse condition

Effect of local cutting, Dalat cutting and in vitro cutting on quality and yield of Chrysanthemum 'Vang he' flower production

Nguyen Thi Huong Lan and Le Nguyen Lan Thanh

SUMMARY

Evaluation on potential produce of three type of cutting plant viz., local cutting, Dalat cutting and in vitro cutting in Chrysanthemum 'Vang He' variety. Results showed local cutting and Dalat cutting could not attain five times cutting, while in vitro cutting could cut/produce five times and produced good quality of cutting plants. Out of three types of cutting plant, in vitro cutting also gave/recorded/observed good quality of flower.

Growth and development of fifteen cultivars of Chrysanthemum in My Tho, Tien Giang

Le Nguyen Lan Thanh, Lam Van Thong and Nguyen Thi Huong Lan

SUMMARY

Fifteen varieties of chrysanthemum were collected and were grown in open condition at My Tho, Tien Giang. Growth and development of these varieties were recorded. The results showed that almost varieties could grow and develop well in open condition at My Tho, Tien Giang; especially, these varieties name Tho do mini, CO52 (Mai trang nhuy xanh), Nut vang, Nut trang, TNX and, Vang farm have beautiful flowers. Out of fifteen varieties, three varieties viz., CO51, Bin bin tim and Bin bin vang are not flowering well under tropical condition in My Tho, Tien Giang.

Preliminary results on the mutagenesis of Dendrobium udomsri in- vitro by colchicine and gamma rays

Lam Van Thong¹, Duong Thi Minh Phung², Nguyen Van Ay³,

Nguyen Quoc Hoi³, Le Van Hoa³

1: Viện Cây n qu m n Nam; 2: Viện Nghiên c u và phát tri n CNSH, i h c C n Th ; 3: Khoa Nông Nghi p và Sinh h c ng d ng, i h c C n Th

SUMMARY

To induce artificially a source of genetic diversity of orchid materials needed for cut flower breeding and/or selection and use of mutation induction effectively, one requirement is the analysis of mutagenesis ability of explants following colchicines and gamma rays treatments, the thesis "Preliminary results of identification of the mutagenesis ability of Dendrobium udomsri in vitro following colchicines and gamma rays treatments" was carried out at the Plant Tissue culture Lab.,

Plant Physiology and Biochemistry, College of Agriculture & Applied Biology, Can Tho University, from August 2007 to October 2008.

Dendrobium udomsri shoots which the height of 0.4-0.6 cm, were used for colchicines treatments or gamma rays irradiation. The results showed that gamma rays (Co^{60}) irradiation and colchicines treatments affected to the growth and morphology of *Dendrobium udomsri*. Survival percentage of shoots was decreased at high dose of gamma ray; while the frequency of leaves variation increased. The shoot survival rate was from 35-45% when they were treated with 100-200 Gy. The gamma dose of 100-200 Gy could produce a genetic variation in *Dendrobium udomsri*. Colchicine treatments with high concentrations and long time were the cause of reducing survival rate of shoots were decreased; while leaves variation (change in the shape of leaves) increased. Colchicine concentrations of 0.1-0.2% treated for 4-6 days led to genetic diversity for micropropagated *Dendrobium udomsri*.

In order to identify genotypic variations of potential mutants following colchicine and gamma rays treatment, morphological and molecular studies should be conducted such as the growth of orchids after acclimatization and flowering stage, root-tip chromosome counting and flow cytometry analysis further confirmed their ploidy polymorphism and especially, Amplified Fragment Length Polymorphism (AFLP) which is capable of detection of high level of polymorphism.

Progress reports on the collection, conservation, evaluation and usage genetics germplasm of fruit trees of SOFRI

(From April 1994 to December 2007 in the South of Vietnam)

Dao Thi Be Bay, Nguyen Ngoc Thi, Tran Thi Oanh Yen, Tran Thi My Hanh, Nguyen Nhat Truong, Nguyen Thi Ngoc Diem, Nguyen Phuong Thuy, Nguyen Van Hung, Pham Ngoc Lieu, Nguyen Minh Chau et al..

SUMMARY

From April 1994 to December 2007 in the South of Vietnam, we have collected total of 766 varieties or clones of 49 kinds of tropical and subtropical fruit trees with 368 local and 398 foreign ones. In 2007, we evaluated some kinds of fruit such as: Jackfruit, Dragon fruit, Durian, Sweetsop and Longan. Preliminary selection on some promising varieties for trial is D ng Linh Jackfruit, Hoang Nam Durian and D175 Durian.

Preliminary finding on isolation of useful microorganism on the agricultural soil in the Mekong Delta and its effect on the growth of plants

Nguyen Thi Ngoc Truc and Le Thi Thu Hong

SUMMARY

By the enrichment method, nitrogen fixing bacteria, phosphate solubilizing bacteria and phytohormon releasing bacteria were isolated. Effect of SOFRI.AZO.1 on rice was

shown the positive results while it was shown the negative on the growth of pea. It was alarmed for the use of suitable population of useful microorganism on pea. The combination of PSM and Rhizobium as well as PSM and NPK were the best of all the treatments.

Comparison of the two sets of bacterium on longan and orange fruits of GAP pilot and no GAP model

Pham Hong iep and Nguyen Van Hoa

SUMMARY

Safety King mandarin and Tieu Da Bo longan models have been established in Cai Be, Cai Lay in Tien Giang Province. This study is aimed to determine and compare unsafe microbacteriums on King mandarin, Tieu Da Bo longan in Cai Be, Cai Lay of Tien Giang Province which performing safety producing model after one year. Results were obtained as follow: Salmonella, Clostridium perfringens, Staphylococcus aureus, Escherichia.coli which did not appear on King mandarin and Tieu Da Bo longan. Coliforms appeared with huge quantities on King mandarin (64% in Cai Be and 56% Cai Lay) and Tieu Da Bo longan in Cai Be (48%) in 2006, however, when farmers perform safety producing model and Coliforms appeared less than 2006 (52% in Cai Be and 28% in Cai Lay on King mandarin; 41,67% on Tieu Da Bo logan in Cai Be).

Effect of plant extract from marigold plant to mortality of Meloidogyne incognita (root-knot nematode)

Dang Thi Kim Uyen and Nguyen Van Hoa

SUMMARY

*Extract from leaves and roots of marigold plant were tested to find out their toxic effect on mortality of root-knot nematode in laboratory condition at various dilutions viz., (i) 1V:1V; (ii) 10^{-1} ; (iii) 10^{-2} ; (iv) 10^{-3} and water was used as control one. The results shown that among different dilutions from leaf, cent per cent mortality was observed after 48 hrs in stock concentration and at 10^{-1} the mortality was almost 50% at 72 hrs and at the dilution of 10^{-3} , there was no significant different with the control one. And the extract from root of marigold shown similar result but less effective to *M. incognita* than that from leaf extract*

Summaries of Thesis Conducted by SOFRI staff from 2005-2008.

INTEGRATED MANAGEMENT OF SCLEROTINIA ROT (*Sclerotinia sclerotiorum* (Lib.) de Bary) OF INDIAN MUSTARD (*Brassica juncea* L.) CZERN & COSS

Nguyen Thanh Hieu

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(MSc. thesis in Plant Pathology in India, 2005-2007)*

Sclerotinia sclerotiorum (Lib.) de Bary is one of the most devastating and cosmopolitan plant pathogen. The pathogen causing stem rot of Indian mustard has been identified as *Sclerotinia sclerotiorum*. The extracts of *Bougainvillea spectabilis* (Bougainvillea), *Azadirachta indica* (Neem) and *Allium sativum* (Garlic) were significantly effective in checking mycelial growth and sclerotia formation at 50 per cent concentration. Bougainvillea and Garlic extracts were also quite effective in reducing the mycelial growth and sclerotia formation even at 37.5 and 25.0 per cent concentration as compared to control. Optimum irrigation on every 7th day and flooding once in week were significantly better as these treatment produce 4.17 and 4.33 per cent pre and post-emergence damping-off as compared to controls (no irrigation and covered/ no irrigation and un-covered). Optimum irrigation on every 3rd day was best in reducing post-emergence damping-off (15 per cent). Flooding for two consecutive days in a week and optimum irrigation on every 7th day were most effective produce apothecia 18.50 and 19.67/pot, respectively. Minimum lesion length (2.27 cm), disease intensity (41.39 per cent), and disease incidence (48.03 per cent) have been recorded in the treatment where flooding once in a week was provided. Out of three soil types, sandy soil recorded least pre-emergence, post-emergence damping-off, number of apothecia/pot, disease intensity and disease incidence as compared to clay and sandy loam soil. Soil amendment with Bougainvillea and Mehndi leaf were able to reduce the number of apothecia appearance, lesion length and disease intensity. Bougainvillea, Eucalyptus and Jamun leaf amendments were better treatments and contracted disease incidence 36.67, 36.67, and 40.0 per cent, respectively, as compared to control. All cakes/organic manures were significantly reduced number of apothecia production in pots. Poultry manure was most effective and significantly better in reducing lesion length and disease intensity. Isolates of *Trichoderma harzianum*-3, *T. harzianum*-4 and *Bacillus subtilis* were most potent in decreasing the linear growth and number of apothecia production in *in vitro* conditions. *T. harzianum* was quite effective in reducing lesion length and disease intensity when applied simultaneously and seven days prior to the pathogen. Antagonist @ 15 g wheat bran/kg soil was better in reducing damping-off, lesion length and disease intensity as compared to 5 g and 10 g. The interaction i.e. attachment, coiling, penetrated and degradation of host wall of the pathogen between antagonists and pathogen was observed under microscope. INA, SA seed treatment or spray @ 100 ppm could reduce seedling mortality, lesion length, disease intensity and disease incidence.

RESPONSE OF GERBERA (*Gerbera jamesonii* Bolus) VARIETIES TO MICROPROPAGATION

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University of Agricultural Sciences, Dharwad, Karnataka, India.

(MSc. thesis in Horticulture in India, 2005-2008)

The studies on response of Gerbera (*Gerbera jamesonii* Bolus) varieties to micropropagation were conducted in the Tissue Culture Laboratory of the Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Dharwad during 2006-2007. Three varieties namely, Arianna, Bonnie and Tobia were used to find out suitable explant for culture establishment,

best concentration of growth regulator for shoot multiplication, rooting of *in vitro* shoots and to standardize suitable hardening media.

Different explants were used for culture establishment. The flower bud was found to be best explant for culture establishment. MS medium supplemented with 3 mg l⁻¹ BAP + 0.1 mg l⁻¹ IAA was best medium for culture establishment because it produced more number of shoots per explant. Bonnie variety showed best response for shoot regeneration.

More number of shoots was produced on MS medium supplemented with 3 mg l⁻¹ BAP + 0.1 mg l⁻¹ NAA in shortest time. Bonnie was also the best variety with respect to shoot multiplication. The same treatment resulted in higher fresh weight and dry weight of shoots.

Various levels of NAA (0.5, 1 and 2 mg l⁻¹) were tried for root initiation. MS medium supplemented with 2 mg l⁻¹ NAA was found to be the best medium for rooting of *in vitro* shoots because it showed highest per cent rooting, earlier rooting and more number of roots. Bonnie variety was again better than other varieties.

Three different hardening media, viz. vermiculite, vermiculite + coco peat (1:1, v/v) and sand + coco peat (1:1, v/v) were tried for hardening of plantlets. In vermiculite medium survival percentage was maximum with better plant vigour resulting as the best medium for hardening. The highest survival rate was observed in Bonnie variety.

STUDIES ON INSECT POLLINATORS OF CUCUMBER (*Cucumis sativus* L.)

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(MSc. thesis in Entomology in India, 2006-2008)

A field study was conducted to investigate the aspects of insect pollinators of cucumber, *Cucumis sativus* L., at Research Farm of the Department of Plant Pathology, CCS Haryana Agricultural University, Hisar. In total 24 insect species visited cucumber flowers, which constituted 12 Hymenopterans, 6 Lepidopterans, 3 Dipterans, 2 Hemipterans and 1 Coleopteran. Among these, *Halictus* sp., *Ceratina sexmaculata* and *Apis dorsata* were found to be the most abundant.

The abundance of *C. sexmaculata* (2.79 bee/m²/5 min.) was highest followed by *Halictus* sp. (2.69 bee/m²/5 min.) and *A. dorsata* (0.78 bee/m²/5 min.). The population irrespective of their species was maximum at 0800-1000 h of the day. Foragers of *C. sexmaculata*, *Halictus* sp. and *A. dorsata* commenced their activity at 0600, 0630 and 0700 h, respectively with peak period at 0800-1000 h and ceased their activity at 1800 h (*Halictus* sp. and *C. sexmaculata*) and at 1730 h (*A. dorsata*). Out of the total foragers of the day, 16.54 per cent were pollen and 83.46 per cent were

nectar collectors in case of *Halictus* sp., 14.62 per cent were pollen and 85.38 per cent were nectar collectors in case of *C. sexmaculata*, while in case of *A. dorsata*, 27.87 per cent were the pollen and 72.13 per cent were nectar collectors. *Halictus* sp. spent maximum time 10.84 seconds/flower. However, *A. dorsata* spent least time 4.94 seconds/flower but visited maximum (8.63) flowers/minute. Based on loose pollen grains sticking on the body and abundance, pollination index was calculated. *Halictus* sp. was the most efficient pollinator of *C. sativus* with pollination index of 126537.60 followed by *C. sexmaculata* with pollination index 121699.80 and *A. dorsata* with pollination index 888678.20 under agro-ecological conditions of Hisar (Haryana).

Effect of different modes of pollination on yield parameters of cucumber showed that maximum fruit set (76.67%) was observed under Open-pollination + hand-pollination treatment, while it was minimum (16.67%) under Self-pollination treatment. Average fruit length, fruit weight and fruit diameter was observed maximum (13.82 cm, 159.62 g and 3.78 cm, respectively) under Open-pollination + hand-pollination, while these were observed minimum (4.97 cm, 21.10 g and 0.71 cm, respectively) under Self-pollination treatment.

DEVELOPMENT OF TECHNOLOGY FOR PRODUCTION OF VALUE ADDED β -CAROTENE RICH MANGO POWDER

Nguyen Van Phong

Indian Agricultural Research Institute (IARI), New Delhi (India)

(PhD. thesis in Post Harvest Technology in India, 2005-2007)

An experiment entitled “**Development of technology for production of value added β -carotene rich mango powder**” was conducted at the Division of Post Harvest Technology, IARI, New Delhi during 2005-2007. Three mango varieties namely, cv. *Langra*, *Dashehari* and *Banganpalli* and two carrot varieties, namely, cv. *Nantes* (yellow) and *Pusa Kesar* (red) were selected to conduct the experiment.

To standardize the mango and carrot pulp blend for high β -carotene content, the blend of (50:50) *Langra* and *Dashehari* was blended with yellow and red carrot pulp in the proportion of 50:50:0, 45:45:10, 40:40:20, 35:35:30, 30:30:40. The proportion of 40:40:20 was selected as best for both yellow and red carrot pulp blends as it contain high β -carotene content and good colour without change of mango flavour and taste in the blend.

To optimize the pretreatments for retaining high amount of β -carotene and functional properties of powder, the blends of mango and carrot pulp was treated with different treatments of 0.1 % CA, 0.1 % KMS, 0.05 % BHA, 0.1 % CA + 0.1 % KMS and 0.1 % CA + 0.05 % BHA, then dried at 60 ± 2 °C in a cabinet dryer, up to 4-5 % moisture content and it was converted into powder form. On the basis of nutritional quality assessment, the treatment 0.1 % CA + 0.05 % BHA was found to be good as compared to other treatments. Further to find out the best combinations of TP and MD for reducing levels of stickiness, degree of caking, hygroscopicity, and free flow-ability of the powder, the treatment of 1.5 % TP + 2.5 % MD for yellow carrot pulp and 1.5 % TP + 5 % MD for red carrot pulp was found to be better as compared to the other treatments and control.

To find out the most appropriate drying conditions, the treated blends of mango and carrot pulp was subjected for drying in three drying conditions i.e. cabinet dryer, solar dryer and low temperature dryer. Among them, cabinet dryer was found more suitable as it took less time to dry the material to a low moisture content at which powder could easily be prepared and also retained high amount of ascorbic acid and β -carotene content in the powder as compared to others.

Out of three layers of thickness i.e. 1.6 mm, 2.4mm and 3.2 mm tried for faster drying of mango and carrot blends, the thickness of 2.4 mm was found to be most suitable for drying these blends in comparison of less and more thickness as less thickness (1.6 mm) was not found economically viable and more (3.2 mm) thickness took more time to dry the product.

With regard to packaging materials, used for the storage study of value added β -carotene rich mango powders. ALPE260g pouches packed with either atmosphere or nitrogen gas followed by storage at low temperature was found to be the best for retaining better quality of β -carotene rich mango powder during storage, among the other packaging material of ALPE260g, HDPE200g, LDPE200g and LDPE400g pouches. The total carotenoids/ β -carotene, ascorbic acid, total sugars, total phenol, antioxidant powder and sensory score decreased with an advancement of storage period while moisture, acidity, reducing sugars and NEB increased for the same period. Ascorbic acid and β -carotene degradation during storage in the powder were found to be followed in 1st-order reaction.