

## Summary of presentation

### BIOTECHNOLOGY

#### IN VITRO PROPAGATION OF DURIAN TREE (*DURIO ZIBETHINUS* MURR.)

*Pham Viet Hai, Nguyen Thanh Thuy and Mai Van Tri*

##### SUMMARY

*In vitro* germination of Durian embryos showed best result on the media contained half-strength basal medium MS and 20g/l sucrose with germination rate was 100%. Germinated embryos were cultured on the same media generated more plantlets than other treatments. Plantlets developing on ½ MS + 20g/l sucrose were more uniform and healthy growth. Different type of explants containing segments of shoot and nodal stem explants were collected from the *in vitro* grown mature plant were used for followed by culture experiments. In shoot multiplication experiment, nodal stem explants showed good development on WPM + 1,0 mg/l BA + 1,0 mg/l Kin. Nodal stem explants showed better respond with more survival and shoot formation.

**Keywords:** Durian (*Durio zibethinus* Murr.), Germinated embryos, tissue culture, Micro-propagation.

### FRUIT SELECTION AND BREEDING

#### COLLECTION OF NEW ACCESSIONS AND EVALUATION ON AGRONOMIC CHARACTERISTICS OF DRAGON FRUIT (*HYLOCEREUS* SPP.) AND CACTUS PEAR (*OPUNTIA FICUS-INDICA*)

*Tran Thi Thao Nh , Huynh Van Chanh, Nguyen Ngoc Thi, Tran Thi Oanh Yen and Nguyen Minh Chau*

##### SUMMARY

Twenty-six dragon fruit varieties (*Hylocereus* spp.) and sixteen cactus pear varieties (*Opuntia ficus-indica*) were collected, evaluated and preserved at the SOFRI's farm. On dragon fruit, morphological characteristics of branches, flowers and fruits as well as fruit quality were described and evaluated. From results of evaluation, we suggested that some varieties could be used as parents for hybridization, they are Red flesh dragon fruit, B1 dragon fruit, White flesh Binh Thuan, Red flesh Long Dinh 1, Red flesh Taiwan, Yellow peel dragon fruit and VN dragon fruit.

#### ASSESSMENT OF GENETIC DIVERSITY ON DRAGON FRUIT AND CACTUS PEAR ACCESSIONS FROM CACTACEAE GERMPLASM USING SIMPLE SEQUENCE REPEAT (SSR) AND INTER SIMPLE SEQUENCE REPEAT (ISSR) MARKERS

*Nguyen Phuong Thuy, Tran Thi Thao Nhu, Le Thi Cam Tu and Tran Thi Oanh Yen*

##### SUMMARY

*In this study, microsatellite (SSR) and inter simple sequence repeat (ISSR) markers were used for analysis genetic variability of 18 dragon fruit and 15 cactus pear accessions from Cactaceae germplasm. Twenty SSR primers, and 19 ISSR primers were individually amplified to allow the differentiation of the materials. Three*

*optimal clusters were inferred by the structure program from the SSR or ISSR data on dragon fruit varieties. The phylogenetic analysis grouped the 15 cactus pear accessions into two main clusters from the SSR data, and 3 clusters from the ISSR data. The results showed that SSR and ISSR markers having a high efficiency to differentiate the varieties in germplasm studies, analysis on genetic diversity and to identify and select the varieties or genotypes used as parents in dragon fruit breeding program.*

### **IMPROVEMENT OF RED FLESH DRAGON FRUIT LONG DINH 1 AND PINK PURPLE FLESH L 5 ON SOME FRUIT TRAITS BY TREATING GAMMA RAYS ON BUD WOODS**

*Tran Thi Thao Nhu, Huynh Van Chanh and Tran Thi Oanh Yen*

#### **SUMMARY**

*One thousand one hundred and twenty-five individuals of red flesh Long Dinh 1 (DFLD1) and one hundred and forty-six individuals of Pink purple LD5 (DFLD5) treated by gamma rays were grown for fast evaluation in the field. One year after growing, 750 mutation DFLD1 and 146 mutation DFLD5 were evaluated for fruit characteristics. Preliminarily selection for fruit shape and quality, 10 mutation DFLD1 coded as: RDL1-1.5-71-1.5-116 RDL1, RDL1-1.5-190, RDL1-1.5-193, RDL1-1.75-20, RDL1-1.75-153, RDL1-2.0-25, RDL1-2.0-28, RDL1-2.0-38, RDL1 2.25-6 were selected for trials, they had green and firm bracts and sweet flavour in comparison with the control (DFLD1) and 3 mutation dragon fruit LD5 coded as: DFLD5-1.5-5, DFLD5-1.5-24, DFLD5-2.0-6, these had weight and flesh color are better than those of DFLD5.*

### **VCU TRIAL OF POTENTIAL HYBRID INDIVIDUALS AT TIEN GIANG** *Huynh Van Chanh, Tran Thi Thao Nhu and Tran Thi Oanh Yen*

#### **SUMMARY**

*The VCU trial on 20 potential hybrid individuals selected from seven dragon fruit crosses has been conducted at SOFRI's farm-Tien Giang province from May 2012. Up to December, 2013 preliminary results showed that 20 hybrids having vigour growth, flowering and setting fruit naturally. Three of them coded as L11, L21, L23 gave good characteristics on fruit quality and yield.*

### **BREEDING ON CAT HOA LOC MANGO FOR INCREASING PEEL THICKNESS BY TRADITIONAL HYBRIDIZATION AND TREATING GAMMA RAYS ON BUDWOODS**

*ao Thi Be Bay, Ho Thi Ngoc Hai, Tran Thi Oanh Yen and Nguyen Minh Chau*

#### **SUMMARY**

*Cat Hoa Loc mango is one of the best quality mango cultivars in Vietnam. However, it has thin peel and low yield. To improve these characteristics, two methods were used including traditional hybridization and inducing mutation by gamma irradiation on cat Hoa Loc bud woods.*

*In hybridization, four crosses between 'cat Hoa Loc' (as male parent) and 'Vandyke', 'Tommy Atkin', 'Irwin' and 'Amparali' (as female parent) were conducted during 2001-*

2009 at SOFRI's farm. As results, 102 individuals were evaluated in fruit quality. Among them, nine hybrid individuals showed thick peel >1.5 mm and good quality, especially, two clones coding XL-049 and XL-034, were the best.

In inducing mutation by gamma rays, buds from a mature 'cat Hoa Loc' mango tree were treated by gamma irradiation with dosages such as 3.0, 3.5, 4.0, 4.5 và 5.0 kilorad (kr). The irradiated buds were grafted in the nursery and grown in the field after 6 months of grafting. The preliminary results, after 7 years of growth, showed change in some characteristics such as fruit complexion, size and thickness of skin. Clones with fruits having thick peel and good quality are 4.5 - 15 và 4.5 - 23.

**Keywords:** Cat Hoa Loc mango, gamma irradiation.

## **RESULTS ON IMPROVING OF HOA LOC MANGO BY TREATING GAMMA RAYS ON SCIONS AND TRADITIONAL HYBRIDIZATION**

*Ho Thi Ngoc Hai, ao Thi Be Bay and Tran Thi Oanh Yen*

### **SUMMARY**

Cat Hoa loc mango is one of the best mango cultivars in fruit quality in Vietnam. However, it has thin fruit skin and low yield. To improve these characteristics, two ways were applied, including: traditional hybridization and inducing mutants by gamma rays. First case, 609 hybrid individuals were produced. In 2013, 28 individuals were evaluated in fruit quality. Only one hybrid XL-049 showed thick fruit skin obtained 1.5 mm and good quality during 3 years of survey. Second case, buds from a mature 'cat Hoa Loc' mango tree were exposed to 3.0, 3.5, 4.0, 4.5 and 5.0 kilorad (kr) of gamma irradiation. As results, 31 individuals were evaluated in fruit quality, showed not change in some characteristics such as fruit complexion, size and thickness of skin, mango clone 4.0-6.0 only have the thickest skin (1,3 mm).

## **ASSESSMENT OF GENETIC DIVERSITY IN ACCESSIONS OF POMELO (*CITRUS MAXIMA* (BURM.) MERR.) IN VIETNAM BY UTILIZING SIMPLE SEQUENCE REPEAT (SSR) AND RADOM AMPLIFIED POLYMORPHIC DNA (RAPD) MARKERS**

*Nguyen Phuong Thuy, o Thi Ngoc Ha, Tran Thi Thao Nhu, Tran Thi Oanh Yen and ao Thi Be Bay*

### **SUMMARY**

Genetic relationships among 15 pomelo (*Citrus maxima* (Burm.) Merr.) accessions were collected from different areas of Vietnam was investigated by using two different DNA based techniques, random amplified polymorphic DNA (RAPD) and simple sequence repeat (SSR) markers. A total of 25 RAPD primers, and 18 SSR primers were individually amplified to allow the differentiation of the material. The polymorphism (65,22%) was obtained with simple sequence repeat (SSR) and randomly amplified polimorfic DNA (RAPD) markers (60,98%). Mean polymorphic information content (PIC) for each of these marker systems (0,45 for RAPD, and 0,44 for SSR markers) suggested that all the marker systems were effective in determining polymorphisms. The UPGMA dendrogram constructed using data of tow marker systems separated the genotypes into four main clusters. These results supported that germplasm studies indicated considerable genetic diversity.

## **IMPROVEMENT OF DUONG LA CAM AND OI PUMMELO ON NUMBER OF SEEDS PER FRUIT BY TREATING GAMMA RAYS**

*Pham Thi Muoi and Tran Thi Oanh Yen*

### **SUMMARY**

*To improve Duong la cam and Oi pummelo on number of seeds per fruit, gamma rays with dosages as 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 and 6.0 krad were used for this purpose. Results showed that some treated pummelo individuals had decreased in number of seeds per fruit after 7 years of observation such as BDLC 3.5 (13.55 seeds/fruit) and BO 3.5 krad (14.66 seeds/fruit) in comparison with untreated individuals (52,44 seeds/fruit) and these treated individuals in well growing. After irradiation treatment have not been selected 'Duong la cam' and 'Oi' pummelo individuals seedless.*

## **IDENTIFICATION OF DOSAGE AND TIME TREATING COLCHICINE ON EMBRYOS AND BUDS OF DA XANH AND RED FLESH PUMMELO**

*Nguyen Thi Nga, ao Thi Be Bay and Tran Thi Oanh Yen*

### **SUMMARY**

*One of the methods to have seedless pummelo varieties is crossing between tetraploid pummelo individuals and diploid pummelo individuals. To have tetraploid pummelo individuals, colchicine will be treated on young cells and tissues in stage of cell division. In this study, embryo and buds were selected for treating Colchicine. Identification of time and dosage of Colchicine for treating on different samples is necessary, results showed that Colchicine affected to survive ratio and growth ability of embryos and buds of Da xanh and Red flesh pummelo. On Da xanh embryos, dosage and time for treating Colchicine were 0.03% in 12 hours and 0.01% in 24 hours; on Red flesh pummelo embryos, dosage and time for treating Colchicine were 0.03% during 18 hours and 0.01% during 24 hours. On buds of Da xanh and Red flesh pummelo, time and dosage for treating Colchicine were 0.05% during 24 hours and 0.03% during 30 hours.*

## **SEEDLESS ORANGE AND PUMMELO BREEDING BY TREATING GAMMA RAYS ON BUD WOODS OF SOAN ORANGE AND NAM ROI PUMMELO**

*Pham Thanh Chul, Nguyen Nhat Truong and Tran Thi Oanh Yen*

### **SUMMARY**

*Bud woods from free-disease Soan orange and Nam roi pummelo trees were treated by gamma rays in dosage levels as 0,0; 4,0; 4,5 5,0; 5,5; 6,0 krad at Dalat nuclear research institute. The treated buds of Soan orange were grafted on volkameriana rootstocks and treated Nam roi pummelo bud woods were grafted on Long Co Co pummelo rootstocks and taken care in net house. After 6 - 12 months of grafting, the treated trees were transplanted to field at SOFRI farm for evaluation in January, 2011. A total of 124 mutation individuals of Soan orange and 95 mutation individuals of Nam roi pummelo were evaluated on fruit quality characteristics. From results of evaluation, five promising mutation individuals of Soan orange with coding as CS 4.5-76, CS 5.5-28, CS 5.5-49, CS 5.5-63, CS 5.5-71 were selected; they had fruit weight*

130 - 216 g; Brix: 11 - 12% with number of seeds per fruit less than 4 seeds and four mutation individuals of Nam roi pummelo with coding as BNR 4.0-111, BNR 4.0 - 114, BNR 6.0-8, BNR 6.0 - 11 selected; having fruit weight 650 - 1,050 g, high Brix (11 - 12%) and seedless per fruit.

## **LONGAN BREEDING FOR INCREASING ON FRUIT SIZE AND FLESH THICKNESS**

*ao Thi Be Bay, Ho Thi Ngoc Hai and Tran Thi Oanh Yen*

### **SUMMARY**

*In Vietnam, there is a diversity on source of longan germplasm with conserved 30 varieties. Some commercial varieties such as Xuong com vang, Tieu da bo,... have some good characteristics, besides, some characteristics are in improvement. Xuong com vang variety has good fruit quality, big size, but high fruit dropping ratio. Tieu da bo variety has high yield, but small fruit, big seed, thin flesh. To improve these longan varieties, a total of 1719 hybrids had obtained from four combinations of Tieu da bo longan x Xuong com vang longan (1224 hybrids), Xuong com vang x Tieu da bo (340 hybrids), Sai Gon x Tieu da bo (11 hybrids), Long longan x Tieu da bo (65 hybrids), Vung Tau longan x Tieu da bo (79 hybrids) were grown for fast evaluation. Preliminary results, we selected four hybrids (coded as: T-138, X-148, T-87 và T-104) showed good characteristics such as fruit weigh (> 11,0 g), thick flesh (> 6,0 mm) and high brix value (> 23%).*

## **EVALUATION OF PINEAPPLE HYBRIDS OF TWO HYBRIDIZATIONS BETWEEN CAYENNE LONG DINH 2 X QUEEN GU044 (MARITIUS), CAYENNE LONG DINH 2 X QUEEN C D.DUAQUEEN-12.55.02**

*Nguyen Thi Ngoc Diem and Nguyen Phuong Thuy*

### **SUMMARY**

*Hybridization programme on pineapple has been started since 2010 at SOFRI. Main objectives are fruit shape (cylindrical), fruit quality (brix 17%, itamin C 15 mg/100 ml), deep yellow flesh, shallow eyes.... Results on evaluation of 540 hybrids from reciprocal crosses between: Long Dinh 2 (Cayenne) x Mauritius (GU044 Queen) and Long Dinh 2 (Cayenne) x C D.DUAQUEEN-12.55.02 (Queen) selected six promising hybrid individuals coded such as: I-201, I-204, I-207, I-214, I-208 và II-252. They have fruit weight from 1,060 - 1,360 g, cylindrical fruit shape with high fruit quality (brix 17% and vitamin C 15 mg/100 ml).*

## **FRUIT PRODUCTION**

### **THE EFFECT OF CHEMICAL SUBTANCES TO INDUCE FLOWERING AND YIELD OF QUEEN PINEAPPLE GU044**

*Nguyen Trinh Nhat Hang, Nguyen Ngoc Long and Nguyen Minh Chau*

### **SUMMARY**

*Pineapple (Ananas comosus) is an important tropical fruit of Vietnam as it has a high demand for local and export market. In Vietnam, the pineapple of Queen variety has been cultivated for long time in the acid sulfate soil of Mekong River Delta, the area and production were approximately of 38,854 hectares and 533,384 tones (FAO, 2011). Flowering of pineapple relation to several chemical substances and concentration which*

were involved the vegetative growth of plant, inducing flowering and yield of fruit. The present study was conducted in Tan Phuoc district, Tien Giang province from the year 2012-2013. There were different doses of Calcium carbide (5, 10, 15 g/l) and Ethephon (30 and 50 ml/l) to induce flowering of pineapple were discussed. The results showed that application of ethephon 30 ml/l reduced weight of fruit crown, number of slip per fruit and increased flowering rate (96,1%), yield (45,7 tonnes/ha) when compared to control.

### **PROPAGATION OF GU044 PINEAPPLE BY MECHANIC REMOVAL OF THE SHOOT APEX OF PLANTLETS**

*Le Anh Nhu Quynh, Nguyen Trinh Nhat Hang and Nguyen Minh Chau*

#### **SUMMARY**

The present study was carried out in SOFRI from the year 2012 to December 2013. The experiment was arranged by randomized complete block design (RCBD), four treatments and five replications which growing plants were 10 leaves, 15 leaves, 20 leaves, and 25 leaves (control), respectively. The result showed that removal of the shoot apex of plantlets having 10 leaves released earliness axillary bud (26 days) and highest number of axillary bud (9,7 shoot) at four week after first axillary bud inducing when compared to control (31,4 day and 5,6 shoot).

### **THE EFFECT OF CHEMICAL SUBSTANCES TO INDUCE FLOWERING ON OFF-SEASON OF “LIMCA” SEEDLESS LEMON**

*Nguyen Vu Son and Vo Huu Thoai*

#### **SUMMARY**

The study effect of chemical substances to induce flowering on off-season of “Limca” seedless lemon was conducted at Long An province. The experiment was arranged in randomized completely block design 2 factors: A factor was (0.5% MKP + 0.15% Bloom plus) and (Paclobutrazol 0.1% + 0.25% MKP + 0.25% Bloom plus), B factor as 7 concentrations Ca(NO<sub>3</sub>)<sub>2</sub> 2%, Ca(NO<sub>3</sub>)<sub>2</sub> 3%, Ure 7.5%, Ure 10%, Fofex 1.5%, Fofex 2% and Fofex 2.5%, respectively. The result showed that application of Paclobutrazol 0.1% + 0.25% MKP + 0.25% Bloom plus increased number of flower-shoot and Fofex 0.15% combination with (Paclobutrazol 0.1% + 0.25% MKP + 0.25% Bloom plus) were highest number of flower-shoot, number of flower per shoot, percentage of fruit set and fruit yield of “Limca” seedless lemon.

### **EFFECT OF FRUIT COVER BAG MATERIALS ON QUALITY AND FRUIT YIELD OF “CAT CHU” MANGO**

*oan Thi Cam Hong and Nguyen Trinh Nhat Hang*

#### **SUMMARY**

The present study was conducted in Cao Lanh district, Dong Thap province from the year 2013. The experiment was 5 types of fruit cover bag such as covering fruit with two layer bags made in Thailand (TL), glossy paper made in Taiwan (TW), Bikoo bag made in Japan (Ja), nylon bag (PE) and non covering (control), respectively. The result showed that covering fruit at 35 days after fruit set with TL, TW, Bikoo bags were reduced the rate of fruit drop, increased fruit yield (43,05 - 47,85 kg/tree) and brightness of fruit skin when compared to control. However, covering fruit of “cat Chu” with TL, TW, Bikoo bags did not cause any impact on fruit quality.

**EARLY FRUIT PRODUCTION FOR MANGO ‘BUOI’ TO IMPROVE GROWERS  
INCOME IN THE AREAS OF WATER SCARCITY IN THE SOUTHEASTERN  
REGION OF VIETNAM**

*Bui Xuan Khoi, Le Thi Chung, Mai Van Tri and Nguyen An e*

**SUMMARY**

*The experiment was aimed to develop practices package for early production to promote the income of mango growers in the areas of water scarcity of the Southeastern Vietnam. Forty healthy ten-year-old mango trees c.v. ‘Bui’ were selected and laid out in a RCB design with five treatments, four replications and eight trees per each treatment. PBZ was soil drenched as the young leaf reached the 15-day; 30-day; 45-day and 60-day stages and compared to untreated trees as the control. The results revealed that application of PBZ promoted earlier flowering 80 days than as compared to the untreated trees. Additionally, number of flower cluster per tree; number of fruit per tree, fruit weight and yield increased significantly as compared to the control. PBZ application at 45-day-old young leaf was the best in term of economical profit.*

**RESULTS OF EVALUATING THE SCION-ROOTSTOCK COMBINATIONS OF  
DA XANH AND NAM ROI PUMELO AND THE LOCAL PUMELO (C. MAXIMA  
(BURM.) MERR.) WITH DROUGHT TOLERANCE UNDER THE TRIAL FIELD  
LOCATED AT TRI TON - AN GIANG**

*Le Thi Khoe*

**SUMMARY**

*In the year 4<sup>th</sup> after growing under the trial field located at Tri Ton-An Giang, the results of evaluating the scion-rootstock combinations of the pomelo trees grafted on the local pomelo rootstocks tolerant to drought conditions revealed that Nam roi pomelo scions grafted on Chua (Dong Nai) and Do pomelo rootstock were the better growth of the tree height, the trunk diameter and the canopy volume. Meanwhile, the ratio of the trunk diameters above and below the grafting point was not significantly affected. The number of the harvested fruits, the fruit weight and diameter, the number of the fruit segments and seeds, the percentage of fruit peel weight depended on the specific scion-rootstock combinations. Furthermore, significant difference in the total soluble solids of juice, fruit peel thickness were not found. The observations also showed that the Da xanh pomelo scions grafted on Chua (Dong Nai) pomelo rootstock gave the outstanding combination based on the fruit number, the fruit weight and diameter, the low seed number and the low percentage of the fruit peel weight. While the fruit shape, the color of peel and pulp and the juice flavor were not affected as compared to the specific variety characteristics of Da xanh and Nam roi pomelo.*

**Keywords:** Drought tolerant, scion-rootstock combination, pomelo.

**THE ASSESSMENT POSSIBILITY OF DROUGHT TOLERANCE OF GRAFTED  
PLANT BETWEEN SELECTED CITRUS ROOTSTOCK AND DUONG LA CAM  
POMELO SCION UNDER NET-HOUSE AND FIELD**

*Le Thi Van and Nguyen Thi Thuy Binh*

**SUMMARY**

*The experiment was studied from 6/2009 to 12/2010 at the net-house and field in SEHORT. In the net-house, the good combination of Duong la cam pomelo scion occurred with those rootstocks: Duong da coc pomelo, DLC pomelo, Chua MB pomelo. In the field, the good combination of DLC pomelo scion occurred with those rootstocks: Oi pomelo, Xiem pomelo,*

*Duong la cam pomelo, Duong hong pomelo, Hong huong pomelo, Chua MB pomelo, Chua DN pomelo, Polo pomelo, Duong da coc pomelo, Long pomelo. The worst combination was DLC scion and Son pomelo rootstock in both case above. The drought tolerance of grafted plants both in net-house and field condition indicated that good drought tolerance occurred with rootstocks as Chua MB pomelo, Chua DN pomelo, Xiem pomelo, Polo pomelo, Long pomelo among 14 rootstocks collected.*

**RESULTS OF EVALUATING THE SCION-ROOTSTOCK COMBINATIONS OF CITRUS (CITRUS SP.) AND TRUC (CITRUS HYTRIX), CARRIZO (C.SINENSIS OSB.X P. TRIFOLIATA L. RAF.) UNDER THE FIELD LOCATED AT TRI TON - AN GIANG**

*Le Thi Khoe*

**SUMMARY**

*Results of evaluating the scion-rootstock combinations of citrus species and Truc (Citrus hytrix), Carrizo (C. sinensis Osb. x P. trifoliata L. Raf.) with drought tolerance, under the trial field located at Tri Ton-An Giang, in the fourth year after planting, revealed that the grafted trees of seedless Mat orange and Sanh orange grafted on Truc rootstock were the more vigorous growth based on tree height, canopy volume, trunk diameter and the ratio of scion and rootstock diameter as compared to that grafted on Carrizo rootstock. The higher fruit number was obtained from the combinations of citrus varieties grafted on Truc; the seedless Mat orange grafted on Truc was the highest fruit number and followed by Sanh orange grafted on Truc. The fruits of seedless Mat orange were the thinner fruit peel, the seedy fruit and the lower total soluble solid content; In contrast, Sanh orange grafted on Truc gave the fruits with the larger size, the higher total soluble solid content and the better flavor.*

**Keywords:** Citrus, drought tolerance, scion-rootstock combinations.

**RESEARCH RESULT SOME KINDS OF FRUIT PACKING ON ARTOCARPUS (M 06 CULTIVAR) IN THE SOUTHEAST REGION OF VIETNAM**

*Phan Van Dung, Nguyen An e and Bui Xuan Khoi*

**SUMMARY**

*Experiment “Research result some kinds of fruit packing on Artocarpus (M 06 cultivar)” was implemented from February 2010 to September 2011 in Dong Nai province. A Randomized Complete Block experiment was designed with 4 treatments (as 4 kinds fruit packing: P.E, oil-paper, burlap and non enclose as a control), 5 replications, 2 trees per plot. The results showed that P.E packing and oil-paper packing gave the good result, make reduce significantly difference level of pests and disease on fruit compared to control.*

**STUDY ON APPROPRIATE LEVEL OF FRUIT THINNING FOR SWEETSOP (ANNONA SQUAMOSA L.) GROWN UNDER RAINFED CONDITION IN THE SOUTHEAST REGION OF VIET NAM**

*Bui Xuan Khoi, Vu Thi Ha, Nguyen Van Thu, Nguyen An e and Mai Van Tri*

**SUMMARY**



*The experiment was conducted to define the appropriate level of fruit thinning for sweetsop (Annona squamosa L.) grown on grey soil (acrisols) under rainfed condition in the southeast region of Vietnam during two crops of 2009 and 2010. The 5-year sweetsop trees with spacings of 3 x 4 m were fruit-thinned and leaved amount of 60; 50; 40; 30; and 20 fruits per tree and compared with the control non-fruit thinning. Small, damaged or malformed fruits on clusters were thinned to leave one fruit per each. The result revealed that fruit thinning increased significantly size, weight and flesh proportion of fruit. Thinning and leaving amount of 50 fruits per tree was the best in term of the economical profit.*

## **EFFECT OF GROWTH REGULATOR TREATMENTS NAA, IBA IN CUTTING PROPAGATION OF DURIAN**

*Chu Thi An, Le Thi Chung and Mai Van Tri*

### **SUMMARY**

*Objectives of the research were to determine most appropriate growth regulator chemical and its concentration and rooting media in cutting propagation of durian. Growth regulator treatments NAA, IBA at concentration of 1,000 ppm; 2,000 ppm; 3,000 ppm; 4,000 ppm; 5,000 ppm and 6,000 ppm were used. The growth regulator treatments were prepared in charcoal-base powder form and applied to the base of the cutting. Tested rooting media were cleaned coarse river sand and coir.*

*There were significant differences either between NAA concentration on coir and IBA concentration on cleaned sand media in rooting ability. After 90 days in the coir, rooting percentage of cuttings treated with 4,000 ppm NAA powder gave highest percentage (10,00%).*

## **FRUIT PROTECTION**

### **PINEAPPLE PINK DISEASE - CAUSAL AGENT, ITS CHARACTERISTICS AND THE PRELIMINARY TEST RESULTS OF CHEMICALS ON IT**

*ang Thi Kim Uyen, Nguyen Thanh Hieu and Nguyen Van Hoa*

### **SUMMARY**

*Pink disease of pineapple fruit is one of the major constraints on processed canned product, the symptoms normally hard to be seen under field conditions or processing stage, but when it come to the customers. In this investigation, the causal organism was identified as an Enterobacteriaceae, genus Pantoea based on its characters. The favorable medium for Pantoea sp. culture was identified as YDC<sub>6</sub>. Its suitable temperature for growth was from 20<sup>o</sup>C to 35<sup>o</sup>C, and optimum at 30<sup>o</sup>C. It could grow well in the range of pH from 5.0 to 7.0, but most suitable at pH 6.0. The preliminary result on the chemical test was indicated that Poner 40B, Starner 20WP, Avalon 8WP could inhibit well the growth of Pantoea sp. on the petri disks under Lab. conditions.*

**Keywords:** Pineapple pink disease, *Pantoea*, canned product.

### **STUDY ON BLACK FRUIT ROT ON PINEAPPLE AND PRIMARY RESULTS OF ITS MANAGEMENT**

*ang Thuy Linh, Trinh Hoai Tam, Nguyen Huy Cong, Le Thi Tuong, Nguyen Thanh Hieu and Nguyen Van Hoa*

## SUMMARY

Pineapple (*Ananas comosus*) is an important economic crop in tropical areas. Pre and post-harvest diseases are big problems for farmers because of productivity losses. Principal symptoms are blackening of flesh of pineapple fruit. The fungus was isolated, inoculated and produced the same black rot disease. Its colony on PDA plate was white in early stage but became black one or two days later. This fungus produced two asexual spores. They were hyaline to mid-brown, cylindrical to somewhat oval and thick-walled when mature. And chlamyospore formed in short chains from the specialized hyphal tip, oval, black. According these characteristics, this fungus was identified as *Thielaviopsis* sp. The optimum temperature for hyphal growth of this fungus was 25 - 30°C. It can grow in wide pH range from 4 to 8.

In *in vitro* conditions, the many chemicals as active ingredients Probenazole+ Difenconazole (Tilt), Difenconazole (Score), Hexaconazole (Anvil) and Cyproconazole (Bonanza) were able to inhibit the growth of the fungus *Thielaviopsis* sp. from 84.9% to 93.8% at the right level of 50 ppm while Metalaxyl + Mancozeb (Ridomyl) was only effective at the right level of 150 ppm. Out of the six different botanicals tested, the highest percentage inhibition of 51.38% (5% of concentration) and 57% (7.5% of concentration) was obtained with the use of *Datura metel* extract on *Thielaviopsis* sp.

**Keywords:** *Ananas comosus*, *Thielaviopsis* sp., *Datura metel*.

## INVESTIGATIONS ON INSECTICIDAL ACTIVITIES OF SOME PLANTS AND SOFT CHEMICAL INSECTICIDES TO PINEAPPLE SCALE *DIASPIS* SP. (HEMIPTERA: DIASPIDIDAE)

*Huynh Thanh Loc, Luong Thi Duyen, Nguyen Duong Tuyen*

## SUMMARY

Pineapples are infected by variety of insect pests. Some pests that affect pineapple plants are mealy bugs, scale insects, thrips, fruits borer, bub moths, midgits, fruit flies, white grubs, beetles, weevils, termites and mites. The pineapple scale, belong to order: Hemiptera, family: Diaspididae, *Diaspis* sp., is likely to be found on upper leaf surfaces of pineapple leaves and fruits worldwide.

The toxicity of 3 plant methanol, acetic acid and aqueous extracts and 3 soft chemical insecticides were investigated for insecticidal properties against first nymph scale *Diaspis* sp. under laboratory conditions. They are tobacco leaf (*Nicotiana tabacum* L.), visha-tinduka (*Strychnos nux-vomica*), neem seed (*Azadirachta indica* A. Juss), Padan 50 SP (Cartap), Confidor 100 SL (Imidacloprid) and Movento 150 OD (Spirotetramat). In bioassay with the nymphs scale, tobacco water leaf extract (5% concentration) was the most toxic (74.17% mortality at three days after treated), followed by neem methanol seed extract (70.42% mortality) at 5% concentration, visha-tinduka acetic acid seed extract (60.00%) at 1% concentration, Confidor 100 SL (65.97 %) at 1.5 ml/l, then Padan 50 SP (42.92%) at 2 ml/l and Movento 150 OD (42.22%) at 1.25 ml/l.

**Keywords:** Pineapple, scale, *Diaspis* sp., toxicity.

## STUDIES ON MORPHO- BIOLOGICAL CHARACTERISTICS OF PINEAPPLE SCALE *DIASPIS* SP. (HEMIPTERA: DIASPIDIDAE) AND IT'S NATURAL ENEMIES COMPONENTS

*Nguyen Thi Kim Thoa, Nguyen Duong Tuyen, Tran Thi My Hanh and Nguyen Thanh Hieu*

## SUMMARY

Pineapple (*Ananas comosus*) is one of tropical fruit crop which occupied more than 41,000 ha in Vietnam. The pineapple scale (*Diaspis* sp.) is known as the new emerged threat pest which attacked and caused problem in reducing plant growth and fruit quality of pineapple in the Mekong Delta. The studies on morpho-biological characteristics of scale revealed that the life-cycle of females and males were completed at  $34,08 \pm 4,16$  days and  $27,95 \pm 3,45$  days respectively. Each female laid  $66.20 \pm 18.24$  eggs in cluster and eggs hatched upto  $5,04 \pm 0,61$  days. Egg color depended upon maturity and ranged from yellowish to yellow and finally orange. The larvals of female and male grown through three stages and two stages respectively. The pupal stage of male was completed in  $4,82 \pm 0,60$  days. Among adults, the males were in preponderance than females with the ratio of 3 : 1. Five species of insect and mites recorded as natural enemies of pineapple scale in the field conditions. *Coccidencyrtus* sp. was known as parasite and four predators such as *Hemisarcoptes* sp., *Cheyletus* sp., *Tyrophagus* sp., *Typhlodromus* sp. it is new recorded in pineapple and, out of these four species, *Hemisarcoptes* sp. and *Cheyletus* sp. presented at farms with high population as compared to others in this investigation.

**Keywords:** Pineapple, scale, parasite, predator, life-cycle.

## THE INVESTIGATION RESULTS OF INSECTS AND DISEASES COMPONENT ON PINEAPPLE SELECTION AND HYBRID

*Nguyen Huy Cuong, Nguyen Ngoc Anh Thu, Nguyen Thi Kim Thoa, Huynh Thanh Loc, Luong Thi Duyen and Nguyen Thanh Hieu*

### SUMMARY

Pineapple (*Ananas comosus*) is one of the special fruit which occupied more than 20,000 hecta in Mekong Delta. Most of local varieties are facing with many problems from pests and diseases i.e Wilt, *Phytophthora* root rot, mealy bug, scale etc. To evaluate the tolerant or resistant ability of pineapple germplasm, collected materials to pests will help breeders. Results of the survey insects and diseases showed that Wilt and root rot diseases were commonly appeared on both hybrid groups and germplasms from Oct. 2012 to Dec. 2013 at SOFRI farm station. Similarly, mealy bug and scale were majority attacked to them in the same survey.

**Keywords:** Pineapple, mealy bug, scale, root rot, etc.

## IDENTIFICATION, MORPHOLOGICAL AND BIOLOGICAL CHARACTERIZATIONS OF NEOSCYTALIDIUM DIMIDIATUM CAUSING CANKER ON DRAGON FRUIT

*Nguyen Ngoc Anh Thu, Nguyen Thanh Hieu and Nguyen Van Hoa*

### SUMMARY

Dragon fruit (*Pitaya*) (*Hylocereus undatus*) is one of special fruit crop which occupies more than 27,000 ha in Southern of Vietnam at the moment. Unfortunately, stem canker (*Neoscytalidium dimiatum*) is known as “white spot”, “brown spot” disease which attacked severely at different stages of plant and caused serious problem in reducing yield (30 to 70%) from year of 2011. Initial symptoms are appears by many small circular of pin prick on surface of cladodes or fruits, later they turn to white spot, yellowish/reddish brown canker. Finally, the spots may coalesce to cover large areas of cladode and infection may cause rot under favour conditions. This study was conducted to isolate, indentify and characterize the fungal pathogen base on morphology and molecular characteristics, pathogenicity test and evaluation of temperatures and pH effects to fungal growth rate under in vitro conditions. A total of 56 isolates of samples (both cladode and fruit) were isolated and identified as *Neoscytalidium dimiatum*. For pathogenicity test, all isolates of *N. dimidiatum* were pathogenic causing stem canker on white flesh variety as the same symptoms appear in the field conditions. Several enviromental factors including

temperature, pH were investigated on fungal pathogen. The obtained results showed that optimal temperature of fungal growth ranging from 30°C - 40°C and similarly, pH level from 4,5-8,0 un-effected mycelium growth of *N. dimidiatum*.

**Keywords:** Stem canker, *Neoscytalidium dimidiatum*, *Hylocereus undatus*.

**THE EVALUATION OF SOME AGROCHEMICALS AGAINST CANKER  
(NEOSCYTALIDIUM DIMIDIATUM) ON DRAGON FRUIT CROP (HYLOCEREUS  
UNDATUS)**

*Nguyen Thanh Hieu, Nguyen Ngoc Anh Thu, Nguyen Huy Cuong and Nguyen Van Hoa*

**SUMMARY**

*Pitaya or dragon fruit (Hylocereus undatus L.) is widely distributed in Binh Thuan, Tien Giang, Long An and some other regions in the South of Vietnam with approx. 28,000 ha and exporting to many countries in the world i.e China, South East Asia, America and Europe, etc. Unfortunately, canker (Neoscytalidium dimidiatum) is known as “white spot”, “brown spot” disease which attacks severely at different stages of plant growth and causes serious problems in reducing yield and growers income from 2011. At this time, the disease is increasing its distribution and severity and it is becoming a major threat to the dragon fruit production in Vietnam.*

*The efficacy of these agro-chemicals was evaluated by using both an in vitro assay and field checking. The results revealed that out of twenty-two fungicides, Saipora (Carbendazim + Hexaconazole), Ridomil gold (Metalaxyl-M +Mancozeb), Dithan (Mancozeb) and Vicarben (Carbendazim) were the best treatments and completely inhibited mycelium growth of Neoscytalidium dimidiatum and reduced disease incidence, disease severity as compared with control and other fungicides.*

**Keywords:** *Neoscytalidium dimidiatum*, stem canker, *Hylocereus undatus*,...

**MAKING THE DERIVED TYPE AND SUBMISSION IPM PROCESS OF MANGO  
IN SOUTHERN EAST AREA**

*Le Thi Van and Nguyen Thi Thuy Binh*

**SUMMARY**

*The derived type IPM on mango was carried out at Toc Tien - Tan Thanh - Ba Ria Vung Tau, applying for 6 years plant and 2,000 m<sup>2</sup> area. After experiment from 4/2009 to 11/2009, the derived type applied IPM methods, insect rate is infected lower than the control significantly. Applying the derived type IPM, can get a great dimension fruit rate higher than the control. Differential benefit with control is 6,806,600 /2000 m<sup>2</sup>. Through researched results and reference, IPM process of mango in Southern East was submitted.*

**EFFECT OF THE ORCHARD MANAGERMENTS ON REINFECTION OF  
GREENING DISEASE**

*o Hong Tuan*

**SUMMARY**

*The research was conducted during the time of November 2010 to December 2012, at SOFRI farm in order to reduce the reinfection of Greening disease in King mandarin orchards by (1) selecting the planting date of the free-disease seedlings, (2) applicable prevention of *Diaphorina citri* Kuwayama and thinning for management of uniform flushes. Applying of agronomy and plant protection practiced on citrus. Results showed that the*

*psyllids population at treatment King mandarin intercropping with Xa ly guava was lower than other treatment. To combine King mandarin intercropping with seedless guava or King mandarin intercropping with Xá L guava and applying systemic insecticide by watering Confidor 100SL (imidacloprid) of trade name solution in the area of 10 cm around the tree base by turns of two months and thinning for management of uniform flushes. Two demonstrations were done in starting of November 2010 and trees in both treatments after planting 26 months and the infection of the Greening disease was from 3.17 to 7.94 percent. Insect pests, red mite and nematode damaged to two varieties of guava weren't damage to King mandarin to nowadays. This application was high effect when applying to citrus orchard was planted by free-disease seedlings in severely infested areas to prevent infectious disease after planting. As a result, applying was practiced on both treatments could recommend and apply on citrus farm to reduce infestation Greening disease after planting.*

**Keywords:** Greening disease, *Diaphorina citri* Kuwayama, free-disease seedlings, infestation, intercropping.

## **RESULTS OF INVESTIGATION AND IDENTIFICATION OF THE CAUSAL AGENT OF ROOT ROT ON PUMELO AND COLLECTING CITRUS CULTIVARS IN THE SOUTHEASTERN REGION OF VIETNAM**

*Nguyen Thi Thuy Binh, Mai Van Tri and Nguyen Van Hoa*

### **SUMMARY**

*Results from the investigation showed that root rot diseases on Pumelo in the Southeastern region of Vietnam was low. The highest incidence were recorded in Binh Duong province while the lowest were respectively recorded in Ba Ria Vung Tau in the year of 2009 and c.v. Duong la cam was more susceptible than c.v. Duong da lang. We had collected and identified 8 isolates fungus from tissue root rot symptoms on pumelo. Phytophthora sp. were causal agents of root rot disease on pumelo in the Southeastern region of Vietnam. We collected 29 spices citrus. Using bioassay for fast screening host resistance, the result indicated that 19 cultivars tested were susceptible to Phytophthora sp. isolates. The severe mild susceptible were Chua mien Bac, Long and Lee pumelo; the other cultivars were medium susceptible.*

## **INVESTIGATION AND IDENTIFICATION OF THE CAUSAL AGENT OF ROOT ROT ON PUMELO AND ISOLATION OF FUNGUS ANTAGONISTIC ON FUNGI CAUSING THE ROOT ROT**

*Nguyen Thi Thuy Binh, Mai Van Tri and Nguyêen Van Hoa*

### **SUMMARY**

*Investigation of pumelo root rot in the Southeast region was carried out in 2010. The results of the investigation and identification of the causal agents of root rot on pumelo was Phytophthora sp. In this year, three isolates of fungi were collected from tissue root rot symptoms on pumelo. Phytophthora was causal agents of root rot disease of pumelo in the Southeast region of Vietnam. Isolated 9 clones Trichoderma sp. were fungus antagonistic on causing root rot on pumelo. Result of antagonistic effects of Trichoderma sp. on Phytophthora sp. causing the root rot disease of pumelo in Southeast region collected 1 clone Trichoderma 7 has antagonistic highest. We collected 19 clones citrus for study resistance root rot disease. Screening for host resistance of these 19 clones of citrus, result showed that 3 clones were mild susceptible: Chua Bac, Long and Le pumelo; the other clones were medium susceptible.*

**RESULTS OF INVESTIGATION AND IDENTIFICATION OF THE CAUSAL AGENT OF ROOT ROT ON DURIAN AND COLLECTING DURIAN CULTIVARS IN THE SOUTHEASTERN REGION OF VIETNAM**

*Nguyen Thi Thuy Binh, Mai V n Tri and Nguyen Van Hoa*

**SUMMARY**

*Root rot is an important disease in durian at the Southeast of Vietnam. The causal agent of this disease is *Phytophthora* sp. Results from the investigation and identification of the causal agent of root rot on durian was *Phytophthora* sp. and *Pythium* sp. Between two common fungus, the incidence were recorded *Phytophthora* sp. more than *Pythium* sp. in the year of 2009. We had collected and identified with 13 isolates was *Phytophthora* sp. and 3 isolates was *Pythium* sp. from tissue root rot symptoms on durian in the Southeast of Vietnam. We was collected 14 spices durian. Using bioassay for fast screening host resistance, the result indicated that 8 cultivars tested were susceptible to *Phytophthora* sp. isolates. The severe susceptible were Hat lep Ben Tre; medium susceptible Chanee, 46H; and mild susceptible Kho qua xanh.*

**INVESTIGATION AND IDENTIFICATION OF THE CAUSAL AGENT OF ROOT ROT ON DURIAN AND ISOLATION OF FUNGUS ANTAGONISTIC ON FUNGI CAUSING THE ROOT ROT**

*Nguyen Thi Thuy Binh, Mai V n Tri and Nguyen Van Hoa*

**SUMMARY**

*The results of the investigation and identification of the causal agents of root rot on durian were *Phytophthora* sp. and *Pythium* sp. The incidence of *Phytophthora* sp. lower than *Pythium* sp. In this year, we identified 3 isolates of fungi, in which 1 isolate was *Phytophthora* sp., 2 isolates were *Pythium* sp. collected from symptoms of root rot on durian. Isolated 4 clones *Trichoderma* sp. was fungus antagonistic on causing root rot. Result of antagonistic effects of *Trichoderma* sp. on *Phytophthora* sp. and *Pythium* sp. causing the root rot disease of durian in Southeast region collected 1 clone *Trichoderma* T2 has antagonistic highest. We collected 9 clones durian for study resistance root rot disease. Screening for host resistance of these 9 clones of durian, result showed that 1 clone was very susceptible: Hat lep Ben Tre, medium susceptible: Chanee and durian local; and mild susceptible: Kho qua xanh.*

**DISTRIBUTION, HOSTS AND NATURAL ENEMIES OF THE MITE ERIOPHYES DIMOCARPI KUANG (ERIOPHYIDAE, ACARI) DAMAGING LONGAN IN TIEN GIANG**

*Tran Thi My Hanh, Nguyen Duong Tuyen, Nguyen Thanh Hieu and Nguyen Van Hoa*

**SUMMARY**

*Longan witches' broom is a very serious disease in Mekong Delta and it is difficult for management. Long Nhung mite *Eriophyes dimocarpi* is proven for associating with longan witches' broom disease. This is a species which has a small size, and its population increases rapidly in a year. However, there were few studies that had been done before. Therefore, studying on ecology of *E. dimocarpi* such as distribution, host range and natural enemies is needed.*

*The result of study showed that *E. dimocarpi* mite was uniformly distribution according to directions of branches on longan trees, they appeared on unfinished maturity leaves (28,08 mite/ leaflets), mature leaves (19,10 mite/ leaflets), and young leaves (2,79 mite/ leaflets). At dry season (1<sup>st</sup> survey) Long Nhung mite appeared the most popular on Tieu Da Bo variety, and it appeared popular on Ido, Long Hung Yen, Long, Super, Vung Tau, Xuong Com Trang, rambutan *Nephelium lappaceum* (Sapindaceae). However, it was the least popular on Cui,*

*Xuong com vang, NL19 and cassava Manihot esculenta (Euphorbiaceae). At rainy season (2nd survey) Long Nhung mite appeared on longan varieties, rambutan and cassava same in the dry season, except Super and Long varieties. The result of the survey of natural enemies of E. dimocarpi on Tieu da bo longan orchards in the Mekong delta recorded that larvae Arthrocnodax sp. (Cecidomyiidae, Diptera) was an predator of E. dimocarpi. Arthrocnodax sp. appeared in low frequency (10%, 2012 and 20%, 2013) on investigated whole gardens.*

**Keywords:** Distribution, host plant, natural enemies, Long Nhung mite *Eriophyes dimocarp*i, longan witches' broom.

## POSTHARVEST TECHNOLOGY

### STUDY ON EFFECTS OF LOW-DOSE AND PACKAGING TO QUALITY AND STORAGE CAPACITY OF JAVA RAMBUTAN

*Nguyen Van Phong, Nguyen Thuy Khanh and Nguyen Thanh Tung*

#### SUMMARY

*Followed by the dragon fruit, Vietnamese rambutan fruit has permitted to enter USA market since 2011 and of course the irradiation is required as one of compulsory conditions for fresh produces before entering to USA market. At present, irradiation dose for rambutan fruits for USA market is imposed at 400 Gy and it has not seen any survey of irradiation on rambutan fruit quality grown in Vietnam conditions. With this reason, an investigation on impacts of the permitting low-dose irradiation (from 200Gy to 500Gy) and packaging (carton or carton + holed PE bags) on quality of rambutan fruit "Java" grown from GAP in Vietnam was conducted. Results indicated that at dose of 300 Gy improved the better color of rambutan fruit pericarp as compared to control (unirradiated) and other low doses including at 400 Gy during storage at  $13\pm 1^{\circ}\text{C}$ . In a condition of packing such as packed in holed PE bag and put in 2kg carton box, the quality of rambutan fruit in terms of evaluated properties such as browning index, color index, weight loss, it showed that packing rambutan fruits in holed PE bag and put in carton box would be improved better in pericarp color and weight loss of irradiated rambutan fruit during storage at  $13\pm 1^{\circ}\text{C}$ .*

**Keywords:** Rambutan, low-dose irradiation, pericarp color.

### EFFECT OF NEAR HARVEST TREATMENT WITH CALCIUM SALTS, POTASSIUM SORBATE AND CHITOSAN ON THE QUALITY AND STORABILITY OF 'JAVA' RAMBUTAN AT POSTHARVEST

*Nguyen Thanh Tung, o Van On and Nguyen Van Phong*

#### SUMMARY

*Deteriorations associated with rot diseases, transpiration and browning of the pericarp have been known as main agents resulting in a limited storage life of rambutan fruit and it is very hard if only used of postharvest approaches to control these incidences. In order to examine potential of near harvest treatments, an investigation titled: Effect of near harvest treatment with calcium salts, potassium sorbate and chitosan on the quality and storability of 'Java' rambutan at postharvest was carried out. This study was concluded by three experiments and designed to determine the optimum chemical concentration and the periods of spray for near harvest treatment of rambutan fruit. The 1<sup>st</sup> experiment of the sprayed concentrations of  $\text{CaCl}_2$  at 0.4; 0.8; 1.2; 1.6 and 2.0% and chitosan at 0.05; 0.1; 0.15; 0.2; 0.25 and 0.3%*

respectively on rambutan fruit at the 15<sup>th</sup> stage before harvest allowed to select out a suitable concentration of the spraying chemicals. Followed the 1<sup>st</sup> experiment, a survey of the spraying periods before harvest at 20<sup>th</sup>; 10<sup>th</sup> and 5<sup>th</sup> was taken place and finally the combinations established by using umikai (0.2; 0.25; 0.3 and 0.35%) or potassium sorbate (0.25; 0.5; 0.75 and 1%) with the selected chemical of chitosan/CaCl<sub>2</sub> in the selected spraying regime were carried out. The results of the study recorded spraying of chitosan 0.25% twice at 10<sup>th</sup> and 5<sup>th</sup> before harvest gave positive effects in delaying colour change of the pericarp and reducing postharvest diseases and better maintaining the quality of rambutan fruit after harvest. Combination chitosan 0.25% with umikai 0.2% at the spraying time of the 7<sup>th</sup> before harvest resulted in an effective inhibition of postharvest diseases on rambutan fruits.

**Keywords:** Chitosan, postharvest disease, rambutan, before harvest, spray, near harvest treatment.

## **STUDY ON HARVESTING MATURITY OF THREE CULTIVARS RAMBUTAN (JAVA, NHAN, RONGRIENG) OVER SEASONS GROWN IN THE MEKONG RIVER DELTA**

*Duong Thi Cam Nhung, Nguyen Thanh Tung, o Van On and Nguyen Van Phong*

### **SUMMARY**

*To determine proper harvesting maturity indices of three cultivars rambutan (Java, Nhan, Rongrien), the surveys were conducted in the main and off season on rambutan orchards being grown these cultivars at various provinces belonging to Mekong River Delta (ie. Tien Giang, Ben Tre, Vinh Long). The hanging cards were used by hanging up rambutan bunches on the trees, which were being flowering and fruit set and the fruits were harvested at six various harvesting stages, namely for Java, fruits were harvested at 92, 97, 102, 107, 112 and 117 days of flowering and fruit setting; Nhan rambutan at 92, 99, 106, 113, 120 and 127 days; Rongrien at 85, 92, 99, 106, 113, and 120 days. Fruits after harvesting were brought to the lab to evaluate the physico-chemical properties and storage ability to select the most suitable harvesting index.*

*The results showed that the harvesting maturity of rambutan fruit would be recognised by changing pericarp color. For Java rambutan cultivar was harvested at the stage of 102-107 days (after fruit setting) when fruit was reddish orange with a slight yellow or red colour; for Nhan cultivar, it was 106-113 days when their colour was pinkish-orange or reddish orange and red or dark red with a green spintern a range of 99-106 days for Rongrieng cultivar.*

*Along with these indices, the physico-chemical properties of rambutan fruit with the harvesting stages of three rambutan cultivars at two seasons (main and off-season) were recorded (see appendix 3).*

**Keywords:** Rambutan, indice, quality, storage.

## **EFFICACY OF ROT DISEASE CONTROL OF LACTOBACILLUS BACTERIA ISOLATED FROM FRUIT/VEGETABLE AND FERMENTED PRODUCTS ON RAMBUTAN FRUIT DURING STORAGE**

*Nguyen Thi Ngoc Truc, Phan Thi My Dung, Thach Thi Ngoc Yen, Nguyen Van Phong*

### **SUMMARY**

*The study was conducted to isolate and select Lactobacillus bacteria from fresh fruits and fermented products. The results showed that in total 70 isolated strains of lactic acid*



bacteria, there were 3 *Lactobacillus* strains that had highest antifungal activity *L. fermentum* DC2 (7.6167 cm), *L. plantarum* CC6 (7.0833 cm) and *L. fermentum* DG2 (6.25 cm). By spraying *L. fermentum* DC2 on rambutan postharvest and preserved at 13°C had reduced the rate of postharvest disease on the rambutan pericarp from 4.67% to 3.65% after 14 days. *L. plantarum* CC6 had the highest colony density in rambutan pericarp and reduced water loss in preservative process compared with *L. fermentum* DC2 and *L. fermentum* DG2.

## THE EFFECT OF HOT WATER COMBINED WITH VARIOUS CHEMICALS ON THE POST-HARVEST QUALITY OF RAMBUTAN FRUITS CV. JAVA (*NEPHELIUM LAPPACEUM* L.)

ang Linh Man, Nguyen Khanh Ngoc and Nguyen Van Phong

### SUMMARY

Rambutan (*Nephelium lappaceum* L.) is one of the important tropical fruits in Viet Nam. A study was performed on fruit quality changes in rambutan fruit following different postharvest treatments. Fruit of uniform maturity and without defects were treated with by dipping in hot water (43°C) for six minutes followed by dip in water combined with a range of chemicals (HCl, acid lactic, acid salicylic, sodium metabisulfite, CaCl<sub>2</sub>, Acid citric) for either three or six minutes for varying times. Fruits were then packed in polyethylene (PE) bags and stored at 13°C. Changes of pericarp color and browning, percent fruit with disease, soluble solids content, total acidity, vitamin C content and weight loss were recorded and analyzed. The results indicated that among the 8 treatments, the treatment of dipping in hot water at 43°C for 6 minutes followed by a cold dip in a solution of CaCl<sub>2</sub>0.4% + sodium metabisulfite 0.1% for 3 minutes had the greatest effect in maintaining the quality of rambutan fruits. That treatment minimized changes in: pericarp color ( $L^* = 38.59; 31.21; 29.05$  at 8, 12 and 16 days storage, respectively;  $a^* = 13.32$  at 16 days storage); percent disease index (3.33% and 35.83% at 8 and 12 days storage, respectively); electrolyte leakage (33.59%; 37.32% and 48.55% at 8, 12 and 16 days storage, respectively). It also minimized weight loss (4.81%, 7.06% and 8.44% at 8, 12 and 16, respectively) and delayed changes of pericarp browning during the storage period. There was almost no change in soluble solids, citric acid and vitamin C contents during the 16 days of storage. Two other treatments (43°C in 6 min followed by acid lactic; 43°C in 6 min followed by acid salicylic) were also effective in minimizing postharvest changes though not as effective the treatment of calcium chloride and sodium metabisulphite.

**Keywords:** Rambutan, storage, quality, temperature, HCl, acid lactic, acid salicylic, sodium metabisulfite, CaCl<sub>2</sub>, Acid citric.

## EFFECT OF STORAGE TEMPERATURES ON POSTHARVEST DISEASES OF DRAGON FRUIT (*HYLOCEREUS UNDATUS* HAW.)

Nguyen Khanh Ngoc, Pham Thi My An, Nguyen Van Phong and Bob Fullerton

### SUMMARY

This study was conducted to determine the effects of different storage temperatures and storage durations on post harvest diseases of dragon fruit. Dragon fruit of uniform maturity and without defects were collected from 2 growers in Long An and Tien Giang provinces and stored at 0°C, 5°C, 10°C for 21 and 26 days followed by storage at 20°C for 3 days to simulate shelf life in the market. Other fruits were harvested and held at 20°C for 7 and 12 days as a non-stored control. The percent fruit with rots and changes in bract appearance, skin colour were recorded and analyzed. The results indicated that among 16 treatments, those fruits at 0°C, 10°C (for both 21 - 26 days), and those held at 20°C (3 days) and 20°C (7 - 12 days)

*sustained the most damage. The most common disorders in those fruits were rots, wilting and colour change of the bracts. Fruits stored for 21 - 26 days at 5°C remained fresh in appearance and had significantly fewer rots. Fungal decay of fruit was the most important disorder of the stored fruit. Preliminary identifications of the main fungi associated with spoiled fruit were Colletotrichum spp., Fusarium spp., Alternaria spp., Rhizopus sp., Bipolaris sp., Cladosporium sp., Aspergillus sp., Neoscytalidium dimidiatum, Mucor sp., Geotrichum candidum.*

**Keywords:** Dragon fruit, post harvest diseases, quality, storage, temperature.

## **SURVEY OF THE TEMPERATURE MANAGEMENT AND POSTHARVEST QUALITY OF DRAGON FRUITS SEAFREIGHTED FROM VIETNAM TO HOLLAND**

*Nguyen Van Phong, Allan Woolf and Nguyen Minh Chau*

### **SUMMARY**

*In order to improve the postharvest management of dragon fruit exported from Vietnam to Holland, a survey was conducted on the quality and temperature of dragon fruits from two seafreight containers. Dragon fruit harvested from one commercial orchard were packed in a commercial packhouse in Binh Thuan, Vietnam. Fruit in 5 kg boxes were pre-cooled by placing in a commercial coldstore in a high air-flow position was cooled to approx 14°C in approx 18 hours and loaded into one container and another was not pre-cooled. After loading, both containers were exported by sea from Vietnam to an importer in Rotterdam, Holland. Delivery air temperatures were set at 5°C, and the voyage took 25 days. Along with fruit and air temperature observations, interviews with the managers for the exporting and importers companies were carried out.*

*Temperatures for the containers showed that boxes of dragon fruit pre-cooled before loading in the container resulted in better quality in terms of freshly green color of bracts and a lower incidence of rots compared to the non-precooled fruit. Temperature of fruit recorded by dataloggers set at various locations in the non-precooled container indicated that temperature did not achieve the set temperature (5°C) and only reached 7°C after 5 - 7 days of loading, while in the precooled container, the temperature of fruit achieved 6°C in only 1 - 2 days of loading.*

*Result of the interviews showed that the present postharvest management practices (no precooling) would be acceptable in the dry season (mid November-beginning May), however, it would result in problems due to high rot incidence in the wet season when precooling is recommended.*

**Keywords:** Dragon fruit, postharvest, temperature, packhouse, pre-cooled.

## **FRUIT MARKETING**

### **SUPPLY CHAIN OF RAMBUTAN TO CHINA MARKET**

*Luong Ngoc Trung Lap and Nguyen Van Phong*

### **SUMMARY**

*Rambutan export markets are expanding and having successfully entered hard markets such as the USA, Europe, Japan and South Korea... However, China is still major exported market for Vietnam's rambutan. Study on supply chain of rambutan*

*to China market to define essential actors in supply chain and to evaluate roles of particular players in the chain.*

*The key findings of rambutan supply chain to China market are following: i) The main actors in the supply chain are producers (growers), collectors, local wholesalers, packing agents, exporters, exterior wholesalers (at border), importers, retailers and consumers. There are two main channels of rambutan. ii) Collectors play an important role in the chain, accounting about 87.0% of total rambutan production in the supply chain to the China market. iii) The relationships between the actors in the rambutan supply chain to the China market are low rate of strength. It showed that the unfrequent information exchange levels and their evaluation. An actor in the supply chain only exchanged the information with other actor which related directly.*

## **ANALYSIS OF MANGO VALUE CHAIN IN THE SOUTH CENTRAL COAST VIETNAM**

*Luong Ngoc Trung Lap and Nguyen Minh Chau*

### **SUMMARY**

*The study on analysis of mango value chain in the South Central Coast-Vietnam is activities of component 1 “Value chain analysis for sustainable and profitable for South Central Coastal of the Project SMCN/2007/109 to offer appropriate solutions to improve competitiveness of the mango production in the South Central Coast region.*

*The key findings of mango value chain in the South Central Coast -Vietnam are following: i) The soil and climate conditions in the provinces of South Central Coast region are favorable for development of mango production. Seasonal harvesting is competitive advantage to supply of mango for market in the season-off; ii) The number of fruits traders are less and linkages between mango growers to collectors, wholesalers and retailers is still limited; iii) Growers of mango contributed mostly to create added value in the chain so the majority of profits from the chain is reasonable.*

## **VEGETABLES**

### **GENETIC DIVERSITY OF CHILLI GENOTYPES BASED ON MICROSATELLITE (SSR) MARKER**

*Tran Kim Cuong and Nguyen Thi Lang*

#### **SUMMARY**

*In this study, 80 chilli samples which preserved by SOFRI were evaluated genetic diversity using 7 SSR markers. All of the primers used gave the high polymorphism, the size polymorphisms ranged from 200 - 230bp, an average of 2 alleles/1 primer. The Polymorphic Information Content (PIC) values ranged from 0.41 - 0.50. Tree diagram analysis results showed that the genetic diversity coefficient of 80 chilli varieties/pure lines ranged from 0,003 to 0.8. At similarity value of 0.67, they are classified into four main groups with many small groups. These results facilitate the selection of best parents for heterosis.*

**Keywords:** Genetic diversity, chilli, SSR.

### **PRELIMINARY RESULTS ON EVALUATION AND SELECTION OF PROSPECT ERECT FRUIT HOT PEPPER HYBRID COMBINATIONS**

*Nguyen Ngoc Vu, Nguyen Ngoc Anh Thu and Tran Kim Cuong*

## SUMMARY

*The hybridization was made between 9 erect fruit hot pepper lines having good agronomic traits and 2 anthracnose resistance lines, and 18 hybrid combinations have been produced. The selection of prospect combination has been done at the experimental field, some agronomic traits and anthracnose resistant ability were recorded. The result of the first crop season trial at autumn-winter 2013 showed that most of combinations had soon flowering and harvesting, and there were 6 hybrid combinations include CT17×CT27, CT20×CT71, CT21×CT71, CT45×CT2, CT50×CT27 and CT58×CT27 having high yield (265-519 g/plant), strong growth and moderate resistance to anthracnose disease. These hybrid combinations should be continue evaluated at next crop season.*

**Keywords:** Hot pepper, selection, prospect combinations.

## GENERAL COMBINING ABILITY OF DECLINING FRUIT HOT PEPPER LINES

*Huynh Thi Phuong Lien and Tran Kim Cuong*

### SUMMARY

*In this study, 26 declining fruit hot pepper lines were evaluated general combining ability through top crossing with local variety Ba Tri. Twenty six hybrid combinations produced from this crossing and 2 F1 commercial varieties were planted in the experimental field, some agronomic traits and anthracnose resistant ability were recorded. The result determined 13 lines such as C 1, C 3, C 4, C 5, C 6, C 8, C 11, C 18, C 19, C 21, C 23, C 24 and C 25 having high general combining ability, should be used to test specific combining ability. The result of this study also showed that there were 8 prospect hybrid combinations include BT x C 25, BT x C 6, BT x C 1, BT x C 5, BT x C 18, BT x C 11, BT x C 23 and BT x C 24 having high yield, good quality of fruit and resistant to anthracnose disease. These 8 prospect hybrid combinations should be tested again to select the best one for production.*

**Keywords:** Hot pepper, general combining ability, combinations, anthracnose

## THE PRELIMINARY RESULTS OF EVALUATION SOME DECLINING FRUIT HOT PEPPER HYBRID COMBINATIONS

*Huynh Thi Phuong Lien, Nguyen Ngoc Anh Thu and Tran Kim Cuong*

### SUMMARY

*To select the outstanding F1 hybrid of declining fruit hot pepper, 17 hybrid combinations which created from crossing between 6 good agronomic traits lines and 3 anthracnose resistance lines, and 2 F1 commercial varieties were grown in field trial at autumn-winter 2013, 30 plants/plot; some agronomic traits and anthracnose - resistant ability were recorded. The results showed that there were 8 hybrid combinations including C 17 x C 12, C 27 x C 17, C 2 x C 17, C 6 x C 11, C 6 x C 17, C 25 x C 12, C 25 x C 17 and C 27 x C 11 having high yield, attractive fruit, specially two combinations C 17 x C 12 and C 27 x C 17 having high anthracnose- resistant capacity. These 8 prospect hybrid combinations should be continue evaluated at next crop season to select the best one for production.*

**Keywords:** Hot pepper, select, prospect combinations.

## RESULTS ON EVALUATION OF GENERAL COMBINING ABILITY OF SOME ERECT FRUIT HOT PEPPER LINES

*Nguyen Ngoc Vu, Huynh Vu Son and Tran Kim Cuong*

### SUMMARY

A total of 97 erect fruit hot pepper hybrid combinations which have been created through top crossing method, was grown at the experimental field to select the parent lines having high general combining ability based on value of yield; other agronomic traits and anthracnose resistant ability were also recorded. The result determined 9 lines include CT16, CT19, CT30, CT37, CT39, CT47, CT57, CT76 and CT83 having high general combining ability, should be used in future breeding; and 5 hybrid combinations consist of CT80×CT18, CT80×CT32, CT80×CT37, CT80×CT76 and C80×CT83 had some good traits such as: highest values of yield, early flowering and early harvesting, high number of fruits per plant. However, these five hybrid combinations remained low quality of fruit and anthracnose resistant capacity, therefore couldn't be used as commercial varieties.

**Keywords:** Hot pepper, general combining ability, combinations, anthracnose.

## **PRELIMINARY RESULTS ON BITTER GOURD BREEDING**

*Nguyen Viet Thanh and Tran Kim Cuong*

### **SUMMARY**

This study was conducted on 97 bitter gourd inbred lines which conserved at SOFRI. All these lines were tested general combining ability (GCA) through top crossing with local variety Kho qua Mo, 8 hybrid combinations having good characters and 11 lines possessing high values of GCA have been selected. These 11 lines were diallel crossed together and 110 new hybrid combinations were evaluated. The result of first trial showed that among 110 evaluated hybrid combinations, there are 9 combinations including 2x9, 7x9, 7x11, 8x9, 9x4, 9x5, 9x6, 10x8 and 10x9 having some good traits, specially two combinations 9x4 and 9x5 have longest fruit, combination 10x8 have highest number of fruit/plant and combination 8x9 have highest yield. These 17 outstanding hybrid combinations should be tested again to select the best one for production.

**Keywords:** Bitter gourd, general combining ability, diallel crossing

## **AGRONOMIC TRAITS OF SOME NEW CUCUMBER LINES**

*Huynh Vu Son and Tran Kim Cuong*

### **SUMMARY**

A total of 54 new cucumber lines which extracted by SOFRI using pedigree method were planted at the experimental field to select good lines for future breeding and 21 traits were recorded. The results show that this cucumber germplasm exhibited a wide range in diversity for many traits. All the traits were classified into suitable groups and some superior lines were also identified, such as C5, C6, C7, C8, O1, O3, O9, R2, R9, P1, Q1, Q6 and Q8 having high yield, many female flowers, many branches/plant, high rate of gynoeocious sex. Beside that, the result of phenotype grouping using NTSYS 2.1 software has divided the germplasm into five major groups. The information found in this study may be useful for cucumber hybridization.

**Keywords:** Cucumber germplasm, superior lines, hybridization.

## **FLOWERS**

### **OBSERVATION ON GROWTH AND DEVELOPMENT OF SIX GLOXINIA (SINNINGIA SPECIOSA) VARIETIES FROM IN VITRO IN TIEN GIANG PROVINCE**

#### SUMMARY

*The growth and development of six gloxinia (*Sinningia speciosa*) varieties (G1, G2, G3, G5, G7 and G11) from in vitro genetic resources were observed at Tien Giang province. Results showed that all of varieties could be grown and developed for pot flower production. Among them, there were two potentiality gloxinia varieties for pot flower production with many good characteristics as compare to other variety. The G5 variety had red double flowers, short flowering time (57.3 days), 6.1 cm in flower diameter, 8.1 flowers/plant, 18.9 cm in plant diameter, flower longevity 5.3 days. The G11 variety had white purple double flowers, short flowering time (62.3 days), 6.2 cm in flower diameter, 8.5 flowers/plant, 16.8 cm in plant diameter, flower longevity 5.7 days.*

**Keywords:** Growth, flower, *in vitro*, observation, *Sinningia speciosa*, varieties.

#### **EFFECT OF SOME PLANT GROWTH REGULATORS BA, IBA AND NAA TO SHOOT MULTIPLICATION AND ROOTING OF THREE GERBERA VARIETIES IN VITRO**

*Le Nguyen Lan Thanh, Le Thi Kieu Loan, Nguyen Thi Huong Lan, Nguyen Thi Van Anh and Nguyen Van Son*

#### SUMMARY

*The research on effect of some plant growth regulations BA, IBA and NAA to shoot multiplication and rooting of three gerbera varieties in vitro were conducted in the Tissue culture Laboratory of the Division of Floriculture at SOFRI from March to July, 2013, three experiments two factors designed, 3 replications. The purpose of this study was to determine the best medium for shoot mutiplication of three gerbera varieties in vitro (Sarinad, Esmara and Violent varieties - beautiful and good quality flowers to develop well in tropical condition, imported and selected by the Division of Floriculture at SOFRI). Result showed that the best medium for shoot mutiplication of three gerbera varieties was MS + 0.5 mg/l BA but shoot quality was not best. The best medium for shoot multiplication and quality was MS + 0.5 mg/l BA + 0.3 mg/l IBA. This medium, Esmara variety had highest shoot multiplication (9.52), Sarinad (8.87) and Violent has 4.00. In rooting medium, NAA 0.5 - 2.0 mg/l were not more better than MS/2 medium.*

**Keywords:** BA, IBA, NAA, gerbera, *in vitro*, mutiplication, varieties.

#### **PRIMARY IMPROVED GROWTH AND QUALITY OF GERBERA JAMESONII PLANTLETS USING PLANTIMA® TEMPORARY IMMERSION SYSTEM**

*Le Nguyen Lan Thanh, Nguyen Thi Van Anh, Nguyen Thi Huong Lan and Nguyen Van Son*

#### SUMMARY

*The effects of temporary immersion system (TIS) culture on the growth and quality of *Gerbera jamesonii* plantlets were investigated. Results indicate that TIS promoted the growth and quality of the plantlets. Proliferation rate, healthy plants rate and improved morphological characteristics were significantly ( $P \leq 0.05$ ) higher in the*

*TIS than in gelled medium, respectively. The healthy plantlets obtained in the TIS would probably have positive effects on transplanting in large-scale commercial production.*

**Keywords:** *Gerbera jamesonii*, TIS, culture system, plantlets.

## **VEGETABLES AND FRUIT AGRICULTURAL SUSTAINABLE**

### **RESULTS OF COLLECTION, CONSERVATION AND EVALUATION OF FRUIT TREE GENETIC RESOURCES AT SOFRI**

*ao Thi Be Bay, Huynh Van Chanh, Tran Thi Oanh Yen and Pham Thi Muoi*

#### **SUMMARY**

*In 2013, we have conserved 644 varieties or clones of 37 kinds of tropical and subtropical fruit trees with 420 local and 224 foreign ones. We evaluated and described 150 germplasms such as: 09 pummelo varieties, 50 mango varieties, 21 dragon varieties, 10 longan varieties, 20 banana, 20 pineapple, 10 durian, 10 avocado. Used M N06 jackfruit, Monthong durian, Rong Rieng rambutan germplasm to produce fruit.*