Development of An Automatic Tomato Grading Machine Based on Visual Evaluation

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ABSTRACT. Tomato is hugely popular horticultural product with diverse market. Grading is a necessity in order that every consumer could get tomato with desired quality. Currently, tomato grading process is mainly conducted manually based on visual evaluation. This method requires highly skillful labor. Nevertheless, it may results inconsistently. Therefore, it is necessary to devise a new method which can grade tomato fastly and accurately. The objective of this research is to design an automatic tomato grading machine based on visual evaluation. Most tomato grading schemes are conducted based on the weight and maturity of tomato. In this research, both variables were predicted from captured tomato image and then processed with image processing algorithms. Developed image processing program successfully classified tomato with an accuracy of 95.5%. Based on this, a prototype machine with mechanical feeder was designed and fabricated. Test results showed that it has a capacity of 1200 tomato/hour. However, rough handling during processing lead to mechanical bruise on 4% of processed tomatoes.

Keywords: Tomato; Automatic grading machine; Image processing

Antimicrobial Peptides and Its Potential Use for Organic Agriculture

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ABSTRACT. Antimicrobial peptide (AMP) is a polypeptide encodes by genes which has less than 100 amino acid and showed antimicrobial activity. Their antimicrobial activity is related to their amphipathic structure that allows them to interact with membrane which results in membrane disruption leading to death of the pathogen. Organic agriculture relies on biological control agents and plant innate immunity for protection against pest or pathogen. In plant innate immunity, antimicrobial peptides play a role either as an induced or preformed defense mechanism. Therefore, AMPs may have more potential role on this system of agriculture. This paper aims to present the diversity of AMPs in plants, their mode of actions, their application and further potential use especially in organic agriculture.

Keywords: Antimicrobial peptide; Defense mechanism; Organic agriculture
The Formulations of Soybeans With Cowpea, Peanuts and Red Beans to Produce of Tofu The Highest Quality

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ABSTRACT. The purpose of this research is determining the formulations of soy beans with cowpea, soybeans with peanuts and soy beans with red beans to produce tofu the highest quality. Research methodology consist of two stages, namely: the selection of local beans selected based on results of organoleptic, where the results are processed and sampled most panelist favored based on colour, aroma and violence with the larges average value, as well as the determination of the local nut additions optimizations formula elected on the idea of making tofu. The main research includes the manufacture of the raw materials tofu of soybeans substituted locally using a linear program. Tofu who produced further testing consisting of chemical analysis, cost analysis and organoleptic test by using linear program. The result showed the optimum formulation was selected by using a linear program is to know the formula (60% : 40%) with the lowest price. The results tofu of chemical analysis showed the formula has a protein content of at least 9%, at least 0.5% fat, 1.0% ash minimal and maximal fiber 0.1%.

Influence Concentration of Microorganism’s Starting Point and Fermentation’s Duration on Characteristic of The Modified Taro Flour

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ABSTRACT. The purpose of this research is to learn the concentration of microorganism’s starting points and different durations of the fermentation process on the modified taro flour’s characteristic by fermentation. The benefit of this research is to inform and recommended the society in general and the food industry workers in particular about the making of the modified taro flour and to give an alternative substitute for the use of flour. The design of the experiment used in this research is the Split-Plot Design with the 3x3 factorial. The chemical analysis was done to water, ash, crude, fiber, starch, amylose, and amylopectin level and also the organoleptic test including white-coloured sample using the scoring test. Data analysis’s result showed that the factor of fermentation’s duration influenced the water, ash, crude fiber, starch, amylose, and amylopectin level of the modified tatro flour. The factor of microorganism’s concentration influenced the amylose level, and there was
also an interaction between fermentation’s duration and microorganism’s concentration, and also with the amylose level of the modified taro flour.

Keyword: Taro; Taro flour’s; Modified of starch

Putting Theories Into Practices: Community Based Biodiversity Management on Podang Urang (*Mangifera Indica*) in Kediri, East Java

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**ABSTRACT.** Podang Urang (*Mangifera indica*), is one of the mango species which is cultivated by farmers in Kediri, East Java. Podang Urang has high economic value, especially to meet the consumer preferences in Korea, Japan and Singapore. The problems faced in the development of Podang Urang are the mango land conversion to any other uses and tendency of farmers to sell the mangoes as fresh fruits instead of processing the mangoes into various refined products. By giving the value added, the economic value of the mangoes will increase. Furthermore, it can contribute to increase the farmer’s welfare. Strategic plans based on community empowerment to preserve Podang Urang trees and develop the Podang Urang products are urgently required. The strategic plans should be able to preserve the sustainability of the trees and increase the value added of the product, so the socio-economics welfare of the Podang Urang farmers will increase too. The approaches of conducting this study are survey and literature review. Based on the problems above, the aims of this study are to analyze the pattern of the community-based biodiversity management of Podang Urang that support conservation and development of potential mangoes in East Java and also to measure the intangible value of the conservation activities. The methodologies used in this study are 1) diversity assessment using the FCA and the RRA; (2) determination of the Elite Materials; (3) mango seed multiplication; (3) development of fruit catalogues; (4) capacity building and institutional development through the preservation of local knowledge through good practices on diversity (GPD), Custodian Farmers, processing products; (5) ex-situ conservation (forest gene banks) and in situ (diversity block); and (6) marketing assessment. The results of this study showed that community based biodiversity management (CBM) in Podang Urang mangoes development can support conservation of these products in East Java, and, the sustainability of this commodity can be realized. According to these results of the intangible value measurement, it has been notified that in the long term, conservation activities are profitable, mainly because of Podang Urang’s high economic value.

Keywords : Podang Urang; Mango; Sustainability; Community; Biodiversity
Good Practices on Farm Conservation of Tropical Fruits Trees in East Java

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ABSTRACT. Tropical fruit trees are important components of multi-crop systems such as home gardens and agro-forestry systems, which are characteristic features in many Indonesian rural landscapes, as well as for single crop systems such as orchards. The sustainable management of locally developed fruit tree species (farmer varieties), together with associated wild relatives, by farmers or communities within traditional agricultural (on-farm), horticultural (orchards) or agro-silvicultural (home gardens) systems has been defined as on-farm conservation. The purpose of this study was to identify the good practices conducted by the communities to conserve their rich genetic resources of fruit trees. The study aimed to identify the techniques and methods of managing the diversity of the community, so that the richness of the plant genetic resources remains protected. The data were collected by conducting in depth interviews and FGDs at Kaligayam (Kediri) and Bibis (Magetan) which is the center of the mango and citrus genetic resources in East Java. The study carried out from January to March 2011 by involved the leaders and farmers’ group members, in the two communities studied. The results of the study show that the traditional multiplication method of mango varieties, integrated fruit trees-livestock system in the home garden, social/profit share system between the forestry service and the community, as well as activities to give value addition to the local fruit that has been developed by most of the farmers were recognized as the main factors of the tropical fruit conservation in the studied areas in East Java.

Keywords: Good practices; Plant conservation; Mango, Citrus; East Java

Ethnobotanical Study In Lembak Ethnic, Sukarami Village, Sub District Selebar, Bengkulu City

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ABSTRACT. Lembak tribe is local people inhabiting the major part of Bengkulu city such as in Sukarami village, Subdistrict Selebar. Today they have been using plants for medication purposes, however the available data is still limited. The research aimed to
find out plants utilized and preparation method applied for medicine by Lembak tribe. This study was carried out from April to June 2011 applying purpsose sampling and snowball sampling methods. The steps of the study were observation, interviews, collection of medicinal plants, (documentation, specimen and herbarium collection) and data analysis. The results recorded 50 plant species from 34 families utilized as medicine. Those were *Alpinia galanga* L., *Curcuma domestica* Vahl., *Kaemferia galanga* L. and *Zingiber officinale* Rosc.. Plant parts used were leaves (26 species), fruits (9 species), rhizomes (4 species), flowers (3 species), roots (2 species) and seeds (2 species), sap (1 species), bark (1 species) and the whole parts of plants (1 species). The most popular species used was *Carica papaya* Linn. Malaria was the most common disease and usually treated by *Tinospora crispa* (L.) Miers.), *Momordica charantia* L., *Carica papaya* Linn. *Andrograpis paniculata* Ness.. The following species were used for fever, *Capsicum fructescens* L., *Crescentia conjute* L., *Cordilne terminalis* L., and *Peronema canascens* Jack. *Lansium domesticum* Jack., *Citrus hystrix* L., and *Andropogon nardus* L. was used for post-birth treatment. The preparation commonly used for medication by Lembak tribe was boiling (9 species), grinding, withering, freshly consumed or as vegetables.

Keywords : Sukarami Village; Lembak Ethnic; Medicinal plant

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**Characterization of Mango Hybrids Derived From Crossing of Arumanis-143 With Saigon Using Morphological Traits**

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**ABSTRACT.** In order to improve the character of mango cv Arumanis-143 that has green fruit skin color to become red/attractive, Indonesian Tropical Fruits Research Institute Solok had main activities i.e. crossings between Arumanis-143 with red-mango clones from 2002 to 2004, which one among them was Saigon. The objective of this research was to characterize mango hybrids from crossing of Arumanis-143 with Saigon based on morphological traits. The research was conducted at Cukurgondang Experimental Field, Pasuruan, East Java, which started from June 2011 to December 2012. Two hybrids and their parents i.e. Arumanis-143 and Saigon were characterized based on vegetative and fruit characters. The results indicated that based on vegetative character, the two hybrids i.e. F1-45 and F1-49 was resembled to Saigon. F1-45 had smaller size of plant than that of F1-49 and indicated dwarf character. Based on fruit characters, they indicated that the fruits shapes of two hybrids were elliptic, the fruit weight of F1-45 and F1-49 were smaller than that of Arumanis-143 i.e. 141 g, 232 g, and 429 g, respectively. Fruit tastes of two hybrids were sweet, total soluble solids were 15-18 °Brix and 14-19 °Brix, respectively. F1-45 also had short juvenility, early-ripening and high productivity, and the fruit skin color was yellowish-red. Therefore, this hybrid will be promoted as a new superior variety
with characteristics of dwarf, early-ripening and high productivity, and the fruit skin color was attractive (yellowish-red).

Keywords: *Mangifera indica* L.; Characterization; Hybrid; Morphological character

**Varietal Improvement of Local Mango With Six Varieties of Comercial Red Mango Through Top Working Technique**

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**ABSTRACT.** Top working technique which has several advantages is inevitable need to spread out comercial red mango that recently develop as superior varieties in Indonesian mango production center. The research aimed to know the effect of top working on generative and vegetative characters of six red mango (Ken Layung, Marifta 01, Garifta Orange, Garifta Merah, Garifta Kuning and Garifta Gading) scion varieties on Arumanis 143 interstem and Madu rootstock was observed at Cukurgondang Experimental Farm, Pasuruan, East Java, Indonesia. The research was done from January to December 2010. Randomized Blocked Design was used to arrange the experiment, followed by Analysis of variance and Least Significant Different (LSD) at p=0.05. The result showed that six red mango varieties were used as scion variety perform good vegetative growth. However, among those varieties only three varieties that capable to produce fruit. Variety of Garifta Kuning was produced the highes productivity 9,127 kg/tree, followed by Marifta 01 5,96 kg/tree and the last Kenlayung 0,97 kg/tree. Due to fruiting season was happened during rainy season the red color peel which must be trigerred by sun light was not emerge. However, all of the fruited trees were exhibited relatively high total soluble solid (TSS) i.e. Ken Layung (15,66° Brix), Garifta Kuning (14,0° Brix), and Marifta-01 (13,33° Brix).

Keywords: Red mango; Varietal improvement; Top working

**Evaluation of Qualitative and Quantitative Characters of Pineapple Hybrids Resulted from Crossing Between Cayenne and Queen**

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**ABSTRACT.** The aim of the research was to evaluate the qualitative and quantitative characters of pineapple hybrids from crossing between Cayenne x Queen and their
reciprocal. This research was conducted at the Indonesian Tropical Fruits Research Institute from June 2005 to December 2007. Genetic materials used were 75 hybrid plants from Cayenne x Queen crossing and 40 hybrid plants from Queen x Cayenne crossing. The qualitative and quantitative characters were observed on each of sampled plants. The results showed that the distribution of spines on the leaves and the shape of eyes were affected by female parents. The percentage of hybrid plants possessing spiny leaves was 14.3% lower on the Cayenne x Queen crossing than on the Queen x Cayenne crossing. Similarly, the percentage of plants bearing fruit ≥1019.5-g was 14.2% lower on the Cayenne x Queen crossing. In contrast, plants bearing fruit with broad eyes and sugar content ≥ 16° Brix were 23.8% and 6.7%, respectively, higher on the Cayenne x Queen hybrids than on the Queen x Cayenne hybrids. The hybrid plants possessing the combined characters of spineless or spiny at the leaf tip, fruit ≥ 1000 g, sugar content (TSS ≥ 16°Brix), and broad eyes are CQ-4, CQ-20, CQ-22, CQ-26, CQ-41 and QC-26. Except for the projected eyes, these characters are also possessed by the hybrids CQ-16, CQ-46, and QC-8. These results can potentially provide valuable information on the choice of female and male parents for the programs of pineapple variety improvement.

Keywords: *Ananas comosus*; Characters; Evaluation; Hybrids

**Resistance Strain Chili to Stress High Rainfall**

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**ABSTRACT.** Hotpepper is the important vegetable in Indonesia. Hotpepper price is fluctuated depending on moment and its availability. Hotpepper price usually rise in rainy season because a lot of diseases attacked, so hotpepper production declined. Global warming condition sweeping the world causing unpredictable climate, sometimes long dry season or discontinued rainfall. Therefore, need of hotpepper varieties that tolerant to high rainfall. The objective of this study was to find hotpepper lines that were resistant to high rainfall. The research was conducted in screenhouse of Indonesian Vegetables Research Institute Lembang from January to December 2011. Research used strip plot design with three rain treatments (15x, 7x, and 2x a day) and five (5) hotpepper lines. The observations were made on high plant, number of death plants and production. The results showed that line No. 5 was more resistant to high rainfall than others lines.

Keywords : Hotpepper; Line; High rainfall stress
Evaluation Six Varieties of Oyster Mushroom Two Different Season

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ABSTRACT. Oyster mushrooms is a prospective vegetable with high economical potential, but its yield at farmer level is still low. The objective of this research was to find out adapted and good quality of oyster mushroom varieties in Ciwidey, Bandung with high yield grewed all the year round. A randomized block design with four replications were set up in mushroom house during the dry and wet seasons. Six varieties of oyster mushroom: 1, 30, 37, 38 and 46 origined from IVEGRI’S collection and 41 from Ciwidey was used as control. Vegetative growth of mycelium inoculated on several kind of growth media, oyster mushroom yield, yield component and their qualities : storage resistance at room temperate, mushroom taste and water content. Data were analyzed by Anova P 0.05 and continued by Duncan multiple range test at P 0.05, in case there was a significant difference among the treatments. Yield 69.10, 52.81 and 50.48 tons per 1000 m² of mushroom house area, stable in dry and wet seasons. Storage resistance > two days at room temperate and water content. 90% of all oyster mushroom.

Keywords: Pleurotus ostreatus; Yield; Quality

Fruit and Seeds Development of Pingpong Longan (Dimocarpus longan Lour)

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ABSTRACT. In comparison to other longan varieties, Pingpong has several advantages which makes it suitable for cultivation. Those advantages are including large fruit size, reaches the size of table tennis balls (pingpong) of which the variety gets its name, on and its ability to grow on low land area, not like most longan varieties. However, the large fruit size also comes with large seed size which makes it less preferred by consumers. Information on longan fruit and seed development is needed as a basis for longan cultivation improvement to obtain small seed size Pingpong variety. The purpose of this study was to determine the development of longan fruit and seed of Pingpong. The research was conducted in July to
December 2012. The method used was descriptive quantitative. Fruit sampling was done once every ten days after anthesis in the field trial Banjarsari Probolinggo East Java. Number of fruit observed was 20/observations. Observations of fruit and seed development carried out in an integrated laboratory of Indonesian Citrus and Subtropical Fruit Institute. The results showed that the seed coat began to form at the age of 20 days after anthesis (DAA), embryo appeared at 40 DAA and completely formed at 60 DAA. Furthermore, the aril began to form at the perfect age 50 DAA and fully covered the seeds at 80 DAA. Fruits ripened at the age of 110 DAA. On average, fruits weight was 18.6525 grams, fruit diameter was 32.10 mm, seed weight was 3.5688 grams, seeds diameter was 15.37 mm, aril weight was 11.3188 grams and aril thickness was 5.8950 mm. Seed formation was occured earlier than that of aril resulted in the development of fast growing seeds.

Keywords: Longan pingpong; Fruit; Seeds; Aril; Anthesis

Optimization of PCR for Detection of Somaclonal Variation in Mangosteen (Garcinia mangostana L.) In Vitro

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ABSTRACT. Mangosteen plantlets derived from seed have been produced, however an investigation on the somaclonal variation among these plantlets has not been reported before. Detection of somaclonal variation among mangosteen plantlets using Randomly Amplified Polymorphic DNA marker requires the amplification of any DNA segment using short oligonucleotide primers of arbitrary nucleotide sequence and polymerase chain reaction procedures. The objectives of this study are to select primers that produce reproducible polymorphic bands and to optimize each polymerase chain reaction component. A total of 29 primers were screened and 21 of them amplified polymorphic bands. Of the 151 bands obtained, 102 were polymorphic bands and 49 were monomorphic bands ranging between 182 bp – 3320 bp. The percentage of monomorphic bands ranged between 0 - 77.8% whereas the polymorphic bands were between 22.2 - 100% for all primers tested. The highest number of scorable bands was produced using primer AP-20 while the lowest was by OPA-7. The highest percentage of polymorphic bands (100%) was generated by AB-16 whilst the lowest percentage (22.2%) was produced by OPA-5. The optimized of each PCR component for Randomly Amplified Polymorphic DNA is MgCl2 2 mM, Primer 4 µM,
dNTP-mix 0.4 mM, Taq polymerase 1.5U/µL, DNA template 40 ng/µL. Amplification reaction was run for 40 cycles following the cycle program i.e. initial denaturation at 94°C for 5 minutes, denaturation at 94°C for 30 seconds, annealing at 37-38°C for 1 minute, extension at 74°C for 2 minutes and final extension at 72°C for 5 minutes.

Keywords: Mangosteen; Somaclonal variation; In Vitro; PCR

**Fruit Productivity and Morphological Characters of Giant Corpse Flower (Amorphophallus titanum (Becc.) Becc. ex Arcang.)**

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**ABSTRACT.** *Amorphophallus titanum* (Becc.) Becc. ex Arcang (the giant corpse flower; titan arum) is a relative to Aroids (taro/talas-talasan) which belongs to Araceae family. The gigantic blooming inflorescences of these plant species have been iconic in Bogor Botanic Gardens. To date, these species have been promoted to be horticultural plants due to their functional-food potentials. The tubers of the titan arum contain more glucomannan than those of their relative, *Amorphophallus konjac*. *Glucomannan* is a dietary fiber that can be used as a dietary supplement to treat high cholesterol, constipation, obesity and diabetes. Therefore, studies on the hand pollination techniques, productivity and morphological characters of the fruit are essentials for cultivation practices in future. The bloom of *A. titanum* number VI.C.484 (origin: Lahat, South Sumatera) which opened on February 2nd 2012 was pollinated manually using (stored) pollen taken from the other flower number VI.C.485 (the same origin) which bloomed on November 29th 2011. The hand cross-pollination was successful and the first fruit (infructescence) to be produced here on March 7th 2012 marked the first success of manual pollination of the Titan Arum in Indonesia. The fruit began to develop after two months, five months later the fruit were ripened. The number of the fruit was 215 at first recording but only 110 fruitlet left to ripe (51.16% productivity). The fruit dimension were varied between three infructescence zonation; 2.43 ± 0.05 cm length ranged 0.77 to 3.41 cm (F(2, 214)=0.44, p = 0.65) and 1.71 ± 0.03 cm in diameter ranging from 0.64 to 2.29 cm (F(2, 214)=2.69, p=0.07). The other character variation such as weight and colour is discussed in the paper.

Keywords: *Amorphophallus titanum*; Corpse giant inflorescence; Fruit; Hand pollination
Factors Affecting the Development of Strawberry in Indonesia

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ABSTRACT. This study to capturing and collecting information opportunities and problems that exist in the development of strawberry in Indonesia. The study was conducted by analyzing descriptive primary and secondary data. Primary data obtained by performing an evaluation of germplasm strawberries characterization that have been conducted in 2010-2011 in Balitjestro, interviews with farmers and local governments in central strawberries (Java, Bali and Sumatra) and development efforts are being made in Balitjestro is by propagation in vitro. The results showed that (1) an increase in the consumption of strawberries that extends to the middle and lower segments not matched by availability of land and an adequate amount of fruit production; (2) depreciation strawberry planting areas in some central areas due to lack of availability of quality seeds. Strawberry seed quality is indicated by the genetic uniformity, high production and disease free; (3) efforts to improve the tourist market strawberries picking with the design needs to be balanced with adequate strawberry agribusiness so that farmers and communities can benefit directly and sustainable; (4) farmers need to gain the expertise to treat post-harvest strawberry fruit production so no results are discarded.

Keywords: Strawberry seeds; Agribusiness; Postharvest

Begonia Morphological Characterization as A Model for Technical Guidelines Development of Begonia Variety Protection in Indonesia

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ABSTRACT. Begonia (Begoniaceae) are characterized as erect or trailing herb, succulent stem, and asymmetrical leaves (bogoniifolia). Native Begonia species can be found in
the wild but exotic Begonia are widely known and cultivated. These two are potential to be developed as ornamental plants. Study on Begonia breeding are intended to get a novel variety of Begonia. This is expected to adding diversity and at the same time in its economical value. The legal protection on intellectual property rights in plant variety is among efforts to encourage plant breeding study and activity. This legal protection is known as Perlindungan Varietas Tanaman (PVT) or plant variety protection. The study was done through morphological observation on Begonia collections at Bali Botanic Gardens. Grouping of varieties will be discussed in this paper. In order to assess uniqueness, uniformity, and stability, a characteristic list from UPOV and ABS (American Begonia Society) was used. In the grouping varieties, it was recommended to employ 48 main characters, including stem (types: erect, rhizomatous, trailing, tuberous); leaf (blade type, leaf blade size, leaf thickness, leaf blade shape, colour); flower (inflorescense length, flower type, flower colour). It was expected that the character can be used to develop technical guidelines for overall Begonia varieties (Begonia spp. L.) for plant variety protection submission.

Characterization and Clustering of Some Guava Germplasm Collections Based on Leaf and Fruit Characters

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ABSTRACT. Guava has several different accessions. Guava diversity needs to be studied and evaluated in order to determine the next steps in the guava breeding. The objective of this research was to characterize and cluster of some guava germplasm collections. The study was conducted at Aripan and Subang experimental farm, Indonesian Tropical Fruit Research Institute from January 2012 to December 2012. Five fruits of each accession were randomly selected sampled and then characterized using UPOV guidelines. Obtained data were analyzed by NTSYS ver.2.1. The Similarity level of 19 accessions ranged from 70 – 90% or the genetic distance was between 0-20%. Dendogram obtained could be clustered into two different groups, namely group I (ARP9406, ARP9407, ARP8653, ARP8742, ARP10.2, JBT001, JBT002, ARP8740, JBT003 and JBT004), group II (ARP10.7, ARP10.6, ARP10.1, ARP10.12, ARP10.9, ARP10.11, ARP8744, ARP8741 and ARP8743). The result of this research can be used for guava breeding. Species diversity and genetic resources are very important to get new varieties. This study would be highly valuable in the future.

Keywords : Guava germplasm; Characterization; Clustering
Variability of *Fusarium oxysporum* f. sp. *Cubense* Isolates Based on Vegetative Compatibility Groups Test and Banana Varieties in West Java Province, Indonesia

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ABSTRACT. West Java Province is one of the center of banana diversity and banana production area in Indonesia. However, the province was highly threatened by Panama wilt caused by *Fusarium oxysporum* f. sp. *Cubense* (*Foc*). Research objected to know the variability of *Foc* isolates from West Java Province based on Vegetative Compatibility Group (VCG) test and to identify banana varieties infected. Samples from infected banana plants were collected in December 2006 and June 2008. Isolation, purification of isolates with single spore techniques and VCG test was done at Protection Laboratory of Indonesian Tropical Fruit Research Institute and Queensland Department of Primary Industry - Australia. Seventeen testers of VCG were used to identify the isolates. The result showed that 47 isolates of *Foc* have been found at all observed locations on 10 banana varieties, consisted of six varieties of dessert banana i.e., Pulo, Muli (AA), Ambon Kuning/Putih (AAA, Gros michel), Ambon Hijau (AAA, Cav.group), Raja Sere and Raja Bulu (AAB); and four varieties of cooking bananas i.e., Kepok, Siem/Awak (ABB), Nangka and Tanduk (AAB). Based on VCG test, 30 *Foc* isolates were grouped into 11 VCGs, while 17 isolates have not been identified. Nine isolates were VCG 01213/16 (TR4) found in four banana varieties, while other isolates were four isolates of VCG 0123, three isolates of VCG 01218, two isolates of VCG 0120/15, two isolates of VCG 0124/5/8, two isolates of VCG 01219, and respectively one isolate of VCG 0121, 0126, 0124/5 and 0124/5/20. *Foc* VCG 01213/16 (TR4) was the most prevalent, therefore management and preventive measures should be a concern.

Keywords: Banana; Vegetative Compatibility Groups; *Fusarium oxysporum* f. sp. *Cubense*; Variability; West Java

The Growth of Seedlings from Various Durian Crosses in The Nursery

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ABSTRACT. Durian is a high valuable commodity in Southeast Asia. Genetic diversity to assembly a new varieties is obtained by crossing. Determination of the seedling growth...
The diversity of Java Tea (*Orthosiphon* spp.) and its potential as an ornamental plant in the Bogor Botanic Gardens

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**ABSTRACT.** *Orthosiphon aristatus* (Blume) Miq. and *Orthosiphon* spp. or known well as cat’s Whiskers or Java Tea is a Mint Family (family Lamiaceae), potentially as a traditional medicine and as an ornamental plant. This research aimed to know the potential vegetation *Orthosiphon* spp. as an ornamental plant and its collection in Bogor Botanic Gardens, Bogor, West Java. Java Tea herb leaves is as a traditional medicine in preventing kidney stones and diabetes which is also has inflorescences white flowers on the terminal of the stem similar to all, Java tea (*Orthosiphon aristatus* (Blume) Miq.), the color purple (*Orthosiphon cf. aristatus* (Blume) Miq.), in addition there is also a white-leaved (*Orthosiphon cf. variegata* sp. nov.). On the characteristics of the morphology of Java Tea with a flowering white and purple are leaves similar just more dark and as outdoor ornamental plants on area sunny will grow many flowers. While the white-leaved will look beautiful for the plant fence because it looks white and white-flowered. These easy-care herb i.e. can grow in dry land and against the pests make these plants able to survive all these years but the need for trimming to embellish their forms. Developing this herbs are easy with only on cuttings and as an ornamental plant and as a medicinal the leaf stems cutting and easy to grow again.

Keywords: *Orthosiphon aristatus* (Blume) Miq.; *Orthosiphon* spp.; Cat’s Whiskers; Java Tea; Bogor Botanic Gardens; West Java
**The Diversity of Sapindaceae Family as Potential Fruit Plants in Kalimantan**

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**ABSTRACT.** Kalimantan is well known for its fruit plants diversity and mostly are endemic. The high rate of deforestation has caused the loss of most of the fruit plant germplasms that have the potential to be developed economically and scientifically. Bogor Botanic Gardens as the center for plant conservation has conducted fruit plant research in Kalimantan, such as East Kalimantan, Central Kalimantan, and West Kalimantan. The research activities including exploration in order to invent the native fruit plants of Kalimantan, both wild and have been planted by the local people. This has been carried out since 2007 until 2010. As the result there are 8 species of fruit from Sapindaceae that potential to be developed economically. Those are *Dimocarpus longan* Lour., *Dimocarpus longan* Lour. Subsp. Malesianus Leenh., *Nephelium lappaceum* L. cultivar 1, *Nephelium lappaceum* L. cultivar 2, *Nephelium cuspidatum* Bl. var. eriopetalum (Miq.) Leenh., *N. ramboutan-ake* (Labill) Leenh., *Pometia pinnata* Forst., and *Lepisanthes amoena* (Haask.) Leenh. Detailed explanation will be described further in this paper.

Keywords : Fruit plants; Conservation; Kalimantan; Sapindaceae

**Characterization of Entomopathogenic Fungi Associated with Citrus Scale Insect (Hemiptera: Coccoidea) on Pummelo (Citrus grandis)**

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**ABSTRACT.** Problems faced in the development of pummelo (*Citrus. grandis*) is a result of bad fruit quality attack scale insect (Hemiptera: Coccoidea) that causes damage to the stems, leaves, and citrus fruits. Scales insect control in pummelo (*C. grandis*) primarily use chemical pesticides adversely affect tenant farmers and consumers will consume citrus fruits. One of biopesticides to control insect pests is mikoinsektisida with active
propagules of entomopathogenic fungi. The aim of this research was to survey the scales insect in some central production of Pummelo ($C.\ grandis$) included exploration, selection, pathogenicity test and identification of morphological and molecular characters. The research was conducted at the Laboratory of Integrated Research Institute for Citrus and Subtropical Fruit October 2011 to October 2012. The research began with the collection of the fungus-infected insect scale entomoathogen on agroclimate citrus in the highlands, medium, and low in the dry and rainy seasons. Results of identification scales insect on citrus cultivation centers that performed on pamelo found three species of scale insect that $Lepidosaphes\ beckii$, $Aonidiella\ aurantii$, and $Coccus viridis$. Scale insects are attacking species $C.\ grandis$ population highest of scales insect in the dry season is the species $C.\ viridis$ 2.5 tail/ leaves and population lowest of scales insect in the dry season is the species $L.\ beckii$ 1.7 tail/10 cm steam. In this research obtained 21 tail scale insect infected entomopathogenic fungus in the dry season and 19 tails in the rainy season. After cultured on PDA for 14 days, which can grow as much as 16 isolates of the dry season, and 9 isolates of the rainy season. Entomopathogenic selection results could penetrate the integument scales insect found 16 isolates of entomopathogenic fungi consisting of 8 isolates were found in the dry season and 8 isolates from the rainy season. However, only 1 isolates of the dry season and 3 isolates of the rainy season, which is up to 14 days can kill 50% of scales insect so that the 16 isolates were obtained from 5 isolates were pathogenic to scales insect. Viability and pathogenicity test results obtained 5 isolates with conidia germination ability above 80%. Isolates had the highest pathogenicity on the scales insect is Isolates PKB B3 K ($Fusarium\ subglutinans\ strain\ bp8$) were isolated from the stems of pummelo Kali Baru in the rainy season had $LC_{50}$ values = $4.4 \times 10^6$ conidia / ml within 14 days, whereas isolates with pathogenicity PMG B13 H ($F.\ proliferatum$) is the lowest in isolation of entomopathogenic pamelo stem Magetan in the rainy season had $LC_{50}$ values = $6.03 \times 10^7$ conidia / ml within 14 days. Results in morphological and molecular characterization of 5 isolates that had high levels of pathogenicity to scale insect. four isolates were $Fusarium$ species, as many as one isolates of $Gibberella$ species.

Keywords: Citrus; Scale insect; Entomopathogenic; Characterization

**Good Diversity Practices for Conservation and Sustainable Use of Local Mango in South Kalimantan**

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**ABSTRACT.** This paper presents the results of a study on mango related good practices in South Kalimantan, Indonesia. The good practices described here are actually indigenous
knowledge based on local/traditional experiences which have passed over time through
generations and still be implemented by the community. It was assured that these good
practices have potential to contribute to the conservation of mango trees which ultimately
results in maintaining the diversity, sustainable use and improved the community’s
livelihoods. This report is based on the findings of survey and field studies, as well as
focus group discussion and interviews with community in two sites/locations in South
Kalimantan, namely Site Telaga Langsat and Site Sungai Tabuk. There are 6 species
of mango involved namely Mangifera indica, M. casturi, M. gedebe, M. kemanga, M.
odorata, and M. pajang. The results showed that among the good practices pertaining to
the conservation and sustainable use of local mango tree are developing alternative uses
of the fruits other than fresh consumption such as processed products, combining and
maintaining basket of local varieties to spread harvest time, reduce risks and secure income;
informal community regulations for maintaining diversity in sacred forest area based on
community belief; propagation technique for local mango varieties by removing the outer
hard seed coat and maintain the thin layer to induce earlier fruit bearing; and direct on
the spot sales and payment system instead of using pre-harvest contractors to stimulate
and allow the marketing of diverse local varieties and derived processed products for the
income of local communities.

Keywords: Local mango; Good practices; Conservation; South Kalimantan

Callus Induction and Plant Regeneration of Oriental Lilium cv. Sorbon from Filaments

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ABSTRACT. Oriental lily (Lilium, L) is usually propagated vegetatively by bulbs. Based
on the totipotency of every parts of the plant, it is possible to regenerate such parts into
plantlets. The objective of this experiment was to determine a micropropagation protocol
for this ornamental using filaments as explant material. The filaments from greenhouse
plants were sliced into 0.5 cm long explants. These explants were placed on several in vitro
media containing thidiazuron (TDZ), kinetin (Kin), and 2,4-dichlorophenoxyacetic acid
(2,4-D) to form callus. The callus subsequently regenerated into plantlets. M9 medium
(MS + 0.1 m g/l TDZ + 0.05 m g/l 2,4-D + 0.1 m g/l Kin) was callus initiation medium
for 14 days after culture. The highest fresh callus weight was possible on M11 medium (MS + 0.2 m g/l TDZ + 0.05 m g/l 2,4-D + 0.3 m g/l Kin). The total number of leaves and bulblets of planlets grown on all tested in vitro media were not significantly different. This protocol thus allows lilium breeder to produce plantlets from callus induced from filaments.

Keywords: 2,4-D; MS; Filament; TDZ; Lilium; Callus initiation

Improving Phalaenopsis Resistance Toward Soft Rot Disease through Induction of Somaclone Variant Using Gamma Ray Radiation

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ABSTRACT. Somaclonal variation has been used as a source of variability to improve resistance three Phalaenopsis clones i.e SGN-PV2, 377 and 642 toward Erwinia carotovora subsp carotovora. Erwinia carotovora subsp carotovora is an important disease pathogen of Phalaenopsis sp causing soft rot. Research activities focussed on inducing and identifying variant somaclones obtained through gamma ray radiation and to evaluate the resistance of variant somaclones toward E. carotovora subsp carotovora infection through in vitro testing. The result of this experiment indicated that the use of physical gamma ray combined with in vitro culture improves type of somaclonal variants of Phalaenopsis plantlets regenerated from callii. Three clones radiated callii shown LD50 around 15 Gy to 22 Gy. Based on their radiosensitivity, SGN-PV2 clones was indicated more sensitive than 377 and 642 clones. Several abnormal morphological variants were observed from regenerated callii and their diversity were then evaluated using PER (Peroxidase) ang AAT (Aspartat amino transferase) isoenzyme markers. On the in-vitro testing using E. carotovora subsp carotovora, plantlets were infected the whole leaf plantlets of three clones was infected within 4 to 7 days and resulting 3 resistant mutant generated from SGN-PV2, 2 resistant mutant generated from 377 and 1 resistant mutant generated from 642 with increase in resistance to E. carotovora subsp carotovora infection.

Keywords: Somaclone variant; In-vitro testing; Phalaenopsis; Erwinia carotovora subsp. Carotovora; Resistant plant.
Variety Improvement of *Vanda* Orchid through Hybridization

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**ABSTRACT.** Indonesia Ornamental Crops Research Institute has already obtained new varieties of *Vanda* (V2 population), but the variation of morphology and colour were very narrow. The objective of this research was to improve and increase variation of morphology and colour of V2 *Vanda* orchids. Blue *Vanda* of *Vanda* Golemgo Blue Magic and *Vanda* Pachara Delight were used as parent source. The experiment was conducted in Segunung experimental station from 2006 until 2013. Nine hybridization was done by one way, it’s reciprocal crossing and backcross. The observation was executed on parent characterization, percentage of success crossing, harvesting and seed sowing, compotting, seedling time and flowering time. Results showed that all nine F1 populations were obtained. Harvesting time, compotting time, seedling time and flowering time of these nine population were varied. Five F1 hybrid populations were flowered. Red, yellow, blue, pink, and purple colour were obtained from these population.

Keywords : *Vanda*; Variety improvement; Variation

Inventarization and Characterization of Scale Insect and Biological Agent on Citrus

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**ABSTRACT.** Scale insect is known as a secondary pest in citrus and is found in several citrus production areas. Scale insects attack leaves, branches and fruits which decrease the fruit quality due to the green or yellow spot left on the fruit after the attack. The attack may lead to fruit abscission. Scale insect attacks have been reported in citrus production area in Sumatera, Java, Borneo and Sulawesi, especially in the area with high humidity. Despite the attack, information on the insect and its potential biological control are not much known. This study was intended to do inventarization and characterization on scale insect and its biological control in several citrus production areas. The research consisted
of exploration on scale insect and its biological agent in 3 citrus production areas with different altitude followed by inventarization and characterization. The result showed that in lowland citrus production area (Sambas District), there were 11 species of scale insect found with intensity of attack reached 4,8-100% on the leaves and branches. The attack was dominated by *Lepidosaphes beckii*, *Aonidiella aurantii* and *L. gloveri*. On medium land (Poncokusumo, East Java), there were 6 species of scale insect found and *L. beckii* and *A. aurantii* were dominant. The attack was about 25-100% and the highest intensity was found on leaves and fruits. While on highland (Karo and Dairi District, North Sumatera), there were 7 species found and were dominated by *L. beckii* dan *A. aurantii*. with the attack intensity of 91,8%. The attack intensity of 50% on fruits was also observed. The result of inventarization on biological control showed that there were 3 species: *Aphytis* sp (parasitoid), *Aschersonia* sp. (entomopathogen) dan *Chilocorus* sp. (predator) act as the agents. However, those biological agents on several location were found relatively low due to high application of pesticides.

Keywords: Scale insect; Biological agent; Citrus; Inventarization; Characterization

**Molecular Marker for Detecting Non Gamboge Disorder Type of Mangosteen (**Garcinia mangostana**)**

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**ABSTRACT.** Gamboge disorder (GD) or fruit damage by the yellow sap is a major problem in mangosteen. Mangosteen trees showed variability in the level of GD consists of very low or non GD, low, moderate and high GD. However it was difficult to differentiate between GD and non GD plants because evaluation of the disorder was strongly influenced by the environmental conditions. The objective of this study was to examined the usefulness of molecular marker from bioinformatic sequences for detecting non GD mangosteen accesions. Plant materials used were 28 mangosteen accessions, different in the levels of GD. The primer used in this study was designed from bioinformatic analysis of specific expressed sequence tag libraries of cell wall strength, termed as MCWS. The result showed that two specific DNA fragments were absent in the high GD accessions. The “MCWS” primer suggest as a novel marker for discriminating of GD and non GD types in mangosteen as well as a marker for detecting variability in mangosteen as apomictic plant.

Keywords: Molecular marker; Mangosteen (*Garcinia mangostana* L.); Gamboge disorder
Evaluation of the Responses of Different Genotypes of Citrus to Huanglongbing Disease under Natural Conditions

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ABSTRACT. Citrus Huanglongbing (HLB), formerly known as Citrus Vein Phloem Degeneration (CVPD) in Indonesia, is one of the most devastating diseases of citrus in the most citrus growing areas. It causes serious economic losses and even kill citrus trees within 5 years. The causal agent is associated with the phloem-limited fastidious prokaryotic α-proteobacterium Candidatus Liberibacter spp. There has been no single effective strategy to control HLB disease up to now, underlying an urgent need to study the possibility of obtaining resistant varieties of citrus as an alternative disease control strategies. This study was conducted during 2010-2012, aimed to 1) examine different citrus genotypes and/or relatives respond to CLas, and whether there are resistant or tolerant varieties; 2) understand whether there is a correlation between severity of disease and the level of bacterial concentration; 3) determine how environmental conditions affect symptoms development. Thirty eight citrus species and relatives of germ-plasm collection at Citrus and Subtropical Fruit Research Institute, Batu, East Java were assessed to categorize the level of susceptibility against HLB. Based on PCR results, the typical symptoms developed and the ability of plants to continue growth, the result indicated that 1) although CLas was unevenly distributed within each particular plant, comparison of titers of the bacterium in different citrus genotypes revealed that most accumulated non significant levels of CLas as indicated by PCR results, demonstrating that there is no correlation between bacterial titer and severity of disease; 2) a wide range of responses was observed among citrus species and relatives; 3) of 38 different genotypes evaluated could be categorized into three groups: a) sensitive, which exhibited severe chlorosis and/or blotching on leaves, severely twigs die-back, greatly reduced growth, and eventual death; b) moderately tolerant, which exhibited some scattered distinct symptoms, but light or no growth reduction and no plant death; c) tolerant, which exhibited symptomless infection. It is appears from this study that there is substantial tolerance to HLB among 38 citrus genotypes as performed by Severinia sp. These results provide additional information to the understanding of CLas-citrus interaction under natural conditions and possibility to improve an existing commercial citrus cultivar with HLB-tolerant Severinia in the citrus variety improvement program in the future.

Keywords: Huanglongbing; Citrus; Severinia sp
Detection of Chrysanthemum Stunt Viroid on Chrysanthemum Using Return Polyacrylamide Gel Electrophoresis (Return-PAGE)

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ABSTRACT. Diningsih, E, Suastika, G, Sulyo, Y, and Rahardjo, IB. 2013. Detection of Chrysanthemum Stunt Viroid on Chrysanthemum Using Return Polyacrylamide Gel Electrophoresis (Return-PAGE). Chrysanthemum stunt viroid (CSVd) is one of the important viroids infecting chrysanthemum in Indonesia. The purpose of this research was to develop a molecular-based method to detect and characterize Indonesian CSVd isolates by Return Polyacrylamide Gel Electrophoresis (Return-PAGE). The experiment was conducted at Plant Virology Laboratory, Plant Protection Department, Bogor Agriculture Institute, Screenhouse and Virology Laboratory, Indonesian Ornamental Crops Research Institute, Segunung, Cianjur, West Java, from May until June 2008. Total RNA was extracted from greenhouse-derived chrysanthemum leaves and Return-PAGE detection used EPPO 2002 procedure that were modified. Total RNA from extraction were visualized on Polyacrylamide Gel Electrophoresis 5%, and coloring with AgNO3. Result of this experiment showed that Return Polyacrylamide Gel Electrophoresis (Return-PAGE) method could detect of CSVd on chrysanthemum sampel.

Keywords: Dendranthema grandiflora Kitam; Chrysanthemum stunt viroid (CSVd); Return Polyacrylamide Gel Electrophoresis (Return-PAGE).

Genetic Profile of 24 Potato (Solanum tuberosum L.) Varieties Based on Simple Sequence Repeat (SSR) Analysis

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ABSTRACT. A study was conducted to identify genetic profile of 24 potato varieties consisted of 19 varieties released by Indonesian Vegetable Research Institute (IVEGRI) and three var. Atlantic imported from Australia, Korea and Scotlandia, var. Granola Kembang
and Granola BBK, at Biomolecular laboratory Indonesian Center for Biotechnology and Genetic Resources (ICABIOGRAD) Bogor, from March to July 2013. DNA was extracted using CTAB method from leaves of in vitro culture and tubers depended upon the availability of plant materials. PCR was run at annealing temperature range of 47 – 60oC, at 35 cycles using 25 SSR primers. Analysis of the genetic profile using power maker program based on 0 for no band and 1 with visible band on polyacrylamide gel electrophoresis of PCR product revealed that there are two distinguished groups IA of var. Merbabu and Tenggo with the rest of varieties tested (IB). At first sub group (IIA), Granola Kembang was distinguished with the rest of the sub group (IIIB) in which sub sub group (IIIA1) of Atlantic (Atlantic Malang, Atlantic Korea, Atlantic Australia and Atlantic Scotlandia was in the same group, and sub sub group (IIIA2) consisted of var Vernei, Amabile, Erika, Kikondo, Kastanum, Maglia and Medians. In the sub sub group (IIIB) consisted of var. Ping 06, Granola BBK, GM08, Cipanas, Manohara, GM05, Granola L (IIIB1), and the other group of Margahayu, Andina and Repita (IIIB2). The generated dendogram indicated that most potato varieties released by IVegRI had narrow genetic base except var. Merbabu and Tenggo.

Keywords: Potato; Solanum tuberosum; SSR; Power maker

**Exploration of Trichoderma spp. and Fungal Pathogen That Causes Strawberry Anthracnose and Examine of In Vitro Antagonistic Activity**

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**ABSTRACT.** Strawberries (Fragaria Vesca L.) was a fruit that has high economic value. Obstacles that are often arised in strawberry cultivation are pests and diseases. One alternative to controled the anthracnose is used biological agents Trichoderma spp. which are antagonistic to the pathogen. The objective of this research were to exploration of Trichoderma spp. as an antagonistic agents to fungal pathogen that causes anthracnose disease in strawberry. Trichoderma spp. isolated by pour plate method while the pathogen were isolated by direct plating methods. The antagonistic activities of Trichoderma spp. were tested in vitro against fungal pathogen by dual culture assay. Pathogens and antagonist were paired using three methods of pairing. The fungal pathogens had a similar to members
of the Genus *Colletotrichum* and two antagonists isolated had a similar to members of the Genus *Trichoderma*. The two *Trichoderma* spp. (TKL1 and TKL2) significantly inhibited radial growth of the pathogen. Introduction of the antagonists before the pathogen gave the best growth inhibition of the pathogen. The inhibitory effect of two *Trichoderma* spp. was not significantly differed from each other at p>0.05. Microscopic examination showed that the most common mode of action was mycoparasitism. *Trichoderma* hyphae grew initially along side and coiled compactly around the hyphae of the isolates of fungal pathogen.

Keywords: Antagonist; *Colletotrichum*; Strawberry; *Trichoderma*

**Does Climate Variability Play Role in Atlantic Potato Production in Sembalun Valley**

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**ABSTRACT.** Sembalun valley that lies at around 1.139 m above sea level (asl) is one and the only potato production area in the island of Lombok, West Nusa Tenggara. Atlantic potato, as one of the major vegetable crops in the valley was first introduced in 2005 and since 2006 is has been commercially produced. A study was conducted to evaluate the present and future prospects of growing Atlantic potato in Sembalun valley. Secondary data on potato growing area and production was collected from the farmers. Temperature data during the growing season period (June to October) was predicted using Lapse Rate Method from temperature data at Mataram Meteorological Station (52 m asl). The study results showed that the growing area of the Atlantic potato in Sembalun was steadily increased, from only 4 Ha in 2006 to become 250 Ha in 2012. Sembalun farmers gained confidence to grow Atlantic potato because of the high market demand and the already established marketing channel. In contrast to the steady increased of the growing area, the crop productivity has continued to decrease from 24.2 t/Ha in 2006 to 18.0 t/Ha in 2012. The predicted average monthly temperature during the potato growing period showed a mark increase, especially during tuber formation and filling period that occur in September. It is strongly believed that climate variability contributed significantly to the continuous decrease of the Atlantic potato production in Sembalun valley and hence, its future production prospect in the valley was daunting.

Keywords: Productivity; Decrease; Growing period; Temperature; Lapse rate method
Mangosteen Quality Improvement Through the Application of Yellow Latex and Scars Control Technology

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ABSTRACT. Yellow latex and scars in mangosteen are some serious problem that faced by the mangosteen business actor because it can decreasing the quality of mangosteen become not worthed for export. Technology to control yellow latex and scars in mangosteen is already available. The aim of this research is to increase the quality of mangosteen trough the application of yellow latex and scars control technology. This research is conducted in the farmers mangosteen orchard in Subdistrict of Leuwiliang, District of Bogor from January to December 2010 with comparing between two management models, farmers model and improvement model. Farmers model is management of mangosteen orchard that usually conducted by the farmers, and improvement model is farmers model with introduction of yellow latex and scars control technology component. Yellow latex control conducted trough irrigation and fertilization, and scars control conducted by putting on the yellow sticky trap and straw mulch. Each model contained 30 productive mangosteen tree. Result of this research showed that the application of yellow latex and scars control technology in mangosteen can raise the fruit size, number of free yellow latex and scars fruit, and increasing the fruit with super quality.

Keywords: Mangosteen; Yellow latex; Scars

Application of Fertilization and Pruning of Plant Shapes Technology in Young Mango Orchard Towards the Vegetative Growth of Gedong Gincu Mango Variety and Intercrops Yield

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ABSTRACT. Gedong Gincu is one of the mango variety with high economic value and clearly market prospect, so there is a lot of farmers who cultivate it but stil few of them are available so the growth of tree still not optimum. A research about fertilization and pruning technology application in young gedong Gincu mango orchard towards the growth of the tree and yield of the intercrops to improve and accelerate the growth has been conducted. This research was conducted in production center of gedong Gincu mango in Village of Sidamukti, Subdistrict of Majalengka, District of Majalengka from January
to December 2010 in farmers land by comparing between two management model, such as farmers model and improvement model. Farmers model are orchard management that usually conducted by the farmers, and the improvement model are farmers model with improvement by applying the technology component of tree shaping by pruning and fertilization. Each model contained of 50 similar growth and about 3 years old age. The result showed that mango tree in the improvement model had more faster growth and some of them had already bear fruit. Yield and profit from intercrops that cultivated among the mango tree in the improvement model a bit higher than in farmers model. Additional cost for applying the technology component in improvement model is Rp 857,500.00 for fertilizers, and fertilizing and pruning wages. Additional profit from the intercrops is Rp 335,000.00. Thereby the technology component application in the improvement model only spend additional cost Rp 522,500.00 for 50 trees or Rp 10,450.00 per tree.

Keywords: Mango; Growth; Fertilization; Pruning

Combination of Explants Size and Heat Treatments As An Alternative Technique For Elimination Potato Leaf Roll Virus cv. Margahayu

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ABSTRACT. Potato leaf roll virus (PLRV) were one of main diseases on potato plants in the field and will develop transmitted through tubers. One of the techniques to eliminate systemic virus PLRV a.i meristem tip culture technique combined with heat treatment. The experiment aimed to eliminate the virus Potato Leaf Roll Virus on potato cv. Margahayu within meristematic culture combined with heat treatment. The activity were conducted at the tissue culture Laboratory of IVEGRI on April to December 2010. The treatment were (1) the size of explants : meristem (M1), shoot tip (M2); (2) heat treatment culture in an incubators with temperature 30-35°C photoperiode 16 hours light, 8 hours darks: untreated /cultures incubated in culture room with temperature 22-23°C photoperiode 16 hours light, 8 hours dark (Ho); treated one weeks (H1); treated two weeks (H2); treated three weeks (H3); treated four weeks (H4). The culture media was MS (1962) + MS vits + coconut water 100 ml g/l + sucrose 30 g/l + myo inositol 100 mg/l + CaP 2 m g/l GA3 0.15 m g/l + BAP 0.05 m g/l + agar 6.5 g/l, pH 5.7 ± 0.1. The statistical analysis of the experiment, showed that there was no interaction between treatments. On the visual observation heat treatment combined with explants size on potato cv. Margahayu affected to proliferation and the growth of plantlet.

Keywords : Potato (Solanum tuberosum L); Meristem; Shoot tip; Heat treatment; PLRV
Effect of Explants Size, Variety and Antiviral Ribavirin on Meristematic Growth of Shallots (Allium ascalonicum L)

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ABSTRACT. The aims of experiment were to determine the effect of explants size (a.i. meristem, shoot tip), variety and using antiviral Ribavirin in MS medium. Experiment was conducted in tissue culture laboratory of IVEGRI on April to December 2009. The medium composition was MS (1962) + supplement (sucrose 30 g/l + IAA 2 m g/l + Kinetin 2 m g/l + GA₃ 0.1 m g/l + agar 6 g/l, pH 5.7 ± 0.1) The treatments of the experiment were (1) explants size: meristem (E1), shoot tip (E2); (2) variety: cv. Bima Brebes (V1), CV. Kuning (V2); added antiviral Ribavirin 5 m g/l: treated (M1), untreated (M2). Experimental design was CRD with 10 replications. Statistical analysis of the treatment indicated that there were no interaction between treatments, although visual observation showed explants size, variety and antiviral Ribavirin could be influenced the explants growth. The proliferation of shallots explants have been influenced by explants treatment, medium composition and environment.

Keywords: Shallots (Allium ascalonicum L); Variety; Antiviral Ribavirin; Meristem; Shoot tips

Good Agricultural Practices Implementation to Promote Diversity of Citrus in Bibis, East Java

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ABSTRACT. Bibis Village in District of Magetan, East Java Province is one of the citrus production center in Indonesia. There were some species and varieties of citrus in this village and dominated by pummelo species. The aim of this study are to identify the implementation of Good Agricultural Practices to promoting the diversity of citrus in this village. Questionaire are distributed to three selected citrus biodiversity custodian farmers and two agricultural extension officer of Bibis village to identify the implementation of Good Agricultural Practices in promoting diversity of citrus and the benefit to the market. The result showed that there was already several times Field School of Good Agricultural Practices implemented in Bibis and followed by some citrus farmers in Bibis. Not all of the GAP components were implemented by the farmers because the cost that they must spend, the time that they need to implement it, and the benefit were not significantly feel
to some citrus variety. The farmers also not implementing GAP component to all of the citrus species or variety. GAP only implemented to the species or variety which had good economic value like jeruk jowo, jeruk gulung, adas, and so on.

Keywords: Citrus; Bibis; GAP

**Development of Small Scale Program on Better Potatoes Cultivation Under Land and Water Conservation Principles**

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**ABSTRACT.** A small scale program of farmer participation was studied to promote better potatoes cultivation. The program was carried out on fertile soil of the upper watershed area of Mrica dam, located at the mountainous area of Dieng Wonosobo Regency, Central Java. Potatoes is intensively cultivated by the farmer in this area. It gives the implication on land degradation in this area and increasing sedimentation on the river. The aim of this study was directed to promote better potatoes cultivation to improve their life with applying land and water conservation principles. The program was applied on the cultivation land and on the river system. On the cultivation land, the program was focused on erosion control through application of plastic mulch and land contour cultivation. On the river system the program was directed to build, namely sediment control structures which has functioning for sedimentation trap and water harvesting on the river. The results showed that the farmers give positive respond on the program. The program gave also significantly affect, on one side is decreasing erosion on the land and sedimentation on the river. On the other side, it gives also improving water availability for irrigating land potatoes cultivation. These effects had implication on improving better life of the farmer through increasing potatoes productivity under well manage soil and water management.

Keywords: Small scale program; Better potatoes cultivation; Farmer participation; Land and water conservation measures

**Protoplast Fusion Method Development In Plant Breeding Programme In Indonesia**

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**ABSTRACT.** Protoplast fusion (somatic hybridization) is one of method in plant breeding of horticulture commodity to increase plant genetic variability and obtain resistance
source to pest and disease, and environmental stress as well. In Indonesia the use of fusion protoplast is still limited in research institute, has not reached industrial stage. Technically this method is succeed on Solanaceae family, such as Solanum melongena (eggplant) which obtain resistance gene from its wild type against wilt disease caused by Ralstonia solanacearum. The failure of this method is almost caused by incompatibility and regeneration method of cell resulted from protoplast. So far, research about protoplast fusion in Indonesia was conducted on rice, black pepper, patchouli, and eggplant. Hopefully, the role of protoplast fusion was one of ways to help horticulture development in Indonesia.

Keywords: Fusion; Horticulture; Plant breeding; Protoplast; Somatic hybridization

The Effect Control Methods on Insects Vector of Aphid and Puckery Diseases on Yield of Hot Pepper Plant

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ABSTRACT. Kerupuk or puckery diseases of pepper is one of the important diseases caused by viruses including Hordeivivus group member group has a type of Barley stripe mosaic virus and can spread to other healty plant via a vector Aphid gossypii. The purpose of this study was to find ways of kerupuk diseases control and population of vector virus effective environmentally friendly and also its influence to yield of hot pepper plant. The experiment was conducted at lowland in Subang with the elevation 700 m of above sea level. Since June to December 2010. The experiment used randomized black design with four replications and treatment as follows : (1) plastic silver mulch. (2) plastic black mulch. (3) straws mulch. (4) yellow trap. (5) cabbage border. (6) spray with insecticide 1 x /week. (7) check (control). The result of this experiment indicated that the silver plastic mulch and also black had the best effect to suppress population of vector and kerupuk diseases and other pest and diseases on hot pepper (antraknosa, fruitfly, and fruit root). This treatment could also prevent the yield of pepper fruit until 3 – 5 times fold from control treatment, and 3 – 4 times fold from insecticide treatment. Silver color plastic mulch is better than black one.

Keyword : Capsicum annum; Control methods; Pucker diseases; Vector
Screening of Hot Pepper Lines for Whitefly Transmitted Gemini Virus Resistance

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**ABSTRACT.** Activity of screening of hot pepper lines resistance and surveillance of WTG in Java was executed during November 2008 – October 2009. Screening hot pepper lines was done in IVERGI Lembang using hundred lines (92 line from ARVDC and eight commercial varieties in Indonesia) in screen house (artificial inoculation) and open field (natural inoculation). Surveillance was done in 63 location in West Java, Central Java and DI Jogyakarta. The results of this activities indicated that: (1) twelve lines consisted of five immune line (0735-5677-1, 0735-5617-1,0735-5623-1, 0735-5636-1, 0735-5646-1, 0735-5670-1). Seeds from selected plant of each line had been prepared; (2) the status of WTG incidence in Central Java and DI Jogyakarta was still higher compare to West Java, but in Cianjur and Sukabumi (West Java) incidence of WTG higher than last year; (3) commercial variety grown by farmer namely Red-Skin, Keriting Local, Victori, Prince, Tit Segitiga, TM-888, and Tanamo at this survey only show WTG infection below 5%, better among 22 varieties recorded. Viral infection increase according to the plant age. Good condition or well maintaining crop would result lowest infection of WTG. Suggestion is (a) to continue test 12 selected pepper line in endemic areas using the prepared seeds, (b) study of agronomic character of 12 lines tested is also good to be done in participatory with the competent persons, (c) surveillance of important pest predict and prevent the out break of those interferences in other areas.

Keyword : Whitefly transmitted geminivirus; Resistant pepper line; Recent-status of virus incidence

Maintenance and Evaluation of Hot Chili Pepper (*Capsicum Annuum*) Lines For Developing Male Sterility Line

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**ABSTRACT.** The use of male sterility in seed production of hybrid pepper will be able to reduce the budget and allocated time for emasculation and crossing however male sterile
lines need to be maintained properly for sustainable utilization. The purpose of this study was to establish male sterile gene pool in CMS line through backcrossing so those CMS lines will be maintained with high stability, and to evaluate the progenies possessing male sterility. Result indicated that two of three genotypes $BC_1 F_1$ had 100% sterility ($F_1 (12.5 \times J_{14}) \times J_{14}$ and $F_1 (12.5 \times J_{5}) \times J_{5}$). The successful rates of backcrossing of the genotype $BC_1 F_1$ to a maintainer line ranged from 28.0 to 37.5%. Seeds production from these backcrossing and selfing were $BC_2 F_1 (J_{16}) (1.80 \text{ g})$, $BC_2 F_2 (J_{14}) (3.07 \text{ g})$, $BC_2 F_2 (J_{5}) (2.46 \text{ g})$, $J_{16} (3.80 \text{ g})$, $J_{14} (3.40 \text{ g})$, $J_{5} (3.00 \text{ g})$, and AR RG-1 (4.60 g). While fruit weight of progenies evaluated were 7.03 to 7.34 g higher than average of the best parent (5.72 g), whereas fruit length (11.62 to 12.01 cm) longer than average of the two parents, both maintainer and restorer (10.60 cm) with a high degree of uniformity. Based on diameter and fruit type, fruit of the progenies can be included to type of hot chili peppers (> 1.0 cm), with wafy surface.

Keywords: *Capsicum annum*; Hybrid variety; Male sterility line; Maintainer line; Restorer line

**Increasing Fruit Quality of Mandarin cv. Siompu at Sub Optimal Land By Adding Zeolit**

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**ABSTRACT.** Land for developing Mandarin cv. Siompu in Buton Regency, South East Sulawesi is a sub optimal land which is characterized as dry land with thin soil layer on top of coral reef. One method to increase fruit quality in this type of land is by adding zeolit as a soil repair material. A research was conducted at production center of Mandarin cv. Siompu in Wasuembba Village, Wabula District, Buton Regency, South East Sulawesi. The objective of this research was to acquire technology recommendation to increase fruit quality of Mandarin cv. Siompu at sub optimal land. Experiment al design used Block was Random Design with treatment of zeolit addition that comprised of 3 levels, i.e. 0 ton/ha (Z0), 2 tons/ha (Z1) and 4 tons/ha (Z2). The result indicated that zeolit addition of 4 tons/ha (Z2) was able to increase citrus fruit quality, especially the value of total sugar that reached 8.30%, total soluble solid was 8.94 % briks and fruit weight of 158,20 gr/fruit.

Keywords : Mandarin cv; Siompu, Zeolit; Sub optimal land
Economics of Shallot and Hot Pepper Intercropping Cultivation in Brebes, Central Java, Indonesia

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ABSTRACT. Shallot (Allium cepa var. aggregatum) and hot pepper (Capsicum annuum) or locally known as bawang merah and cabai besar, are important vegetable crops in Indonesia. In Brebes district, Central Java, farmers traditionally cultivate shallot and hot pepper as an intercrop, since this system is considered more profitable than mono-cropping. Assessing the economics of the intercropping cultivation system has been carried out mostly through the analysis of survey data. However, the pitfall of this data collection method is the risk of either underestimation or overestimation because it relies heavily on interviewee’s recollection. An alternative method that can be used is taking daily records of farmers’ activities during crop cultivation. A total of 13 vegetable farmers from three sub districts in Brebes district were selected purposively and asked to take daily records of shallot–hot pepper intercropping cultivation. Farm-records were taken during the period of November 2010 and August 2011, since not all farmers had the same planting dates. Data analysis showed that shallot and hot pepper profitability was highly variable among farmers and was highly depending on yield, costs and farm gate market price. The study revealed that the intercropping total gross income of 164,125,000 IDR/ha with total production costs of approximately 91,653,000 IDR/ha had resulted in total net income of 72,472,000 IDR/ha. It was indicated that in shallot-hot pepper intercropping cultivation, the cost of shallot planting material and hot pepper insecticide-use showed high shares in total costs. Meanwhile, labor costs to cultivate both crops also had a large share in total costs. Average production cost per kg (Break Even Point = BEP) of shallot was 8,945 IDR, and was 6,613 IDR/kg for hot pepper. It took about 200 days to complete the shallot-hot pepper intercropping system. During this period, only 62% of market-days, the BEP price of shallot and hot pepper was higher the farm gate price. This implied that the chance of making a profit was quite limited. The current situation showed that the difference between making a profit and making a loss was quite small. Based on observed farm gate prices, the BEP price for both shallot and hot pepper still seemed too high. Hence, it became apparent that farmers had to reduce the BEP price by either increasing yield with the same use of inputs and costs or to cut back costs by using less-inputs and still achieved the same yield.

Keywords: Shallot; Hot pepper; Record keeping; Net income; Break-even-point; Brebes, Central Java
Adaptation Capability of Various Bananas and Farmer Preference to Banana Varieties Planted by Using Dung Fertilizer in Marginal Land in East Kalimantan

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ABSTRACT. Almost all of marginal land in East Kalimantan is dry land that has potency to develop agricultural enterprise. One of main commodity that can be cultivated in marginal land is banana. This study aimed to know growth development of various banana varieties that was planted by using dung fertilizer and farmer preference of banana produced. This research was conducted in Teritip village, East Balikpapan sub district, Balikpapan City from January until December 2011. Research design was Randomized Complete Block Design with four treatments and three replications. Whereas A1 : variety of ketan, A2 : variety of emas kirana, A3 : variety of raja kinalun and A4 : variety of unti sayang. The result show that the highest plant height (age of 5 month) was variety of Unti Sayang with height of 139 cm and the lowest height was variety of emas Kirana with height of 101,6 cm. The biggest diameter was Raja Kinalun with 14,06 cm and the smallest diameter was Emas Kirana (11,97 cm). Farmer preference of Banana produced were Raja Kinalun for its textuur, Variety of Ketan for its color, variety of Emas Kirana for its flavor and variety of Emas Kirana for its taste.

Keywords: Banana; Marginand; Farmer preference

Technology Adoption of Integrated Management of Healthy Citrus Orchard (Imhco) At Citrus Production Center In South Sulawesi

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ABSTRACT. Citrus is one of important and favorite fruits in Indonesia. Domestic demand for citrus tends to increase from year to year. However, one constraint in citrus production is the threat of Citrus Vein Phloem Degeneration (CVPD) which is able to decrease citrus production. One of alternative technologies to control CVPD is Integrated Management of Healthy Citrus Orchard (IMHCO), which has been generated by Indonesian Citrus and Subtropical Fruits Research Institute. The objective of this research was to identify the adoption level of IMHCO technology at farmer in Mandarin center of South Sulawesi. Research was conducted in Bantaeng and Jeneponto Regency, South Sulawesi in 2012. Data
was analyzed by percentage tabulation and descriptively. The result showed that several technology components of IMHCO with very high category of adoption level were the use of free-virus citrus seed, pruning and soil cultivation. While those with very low category of adoption level were insecticide application by watering, sex pheromone application, fruit wrapping, pruning of tree architecture, and fruit thinning. Therefore, it is necessary to perform many efforts to enhance farmer’s knowledge and awareness of the importance of those technology components; so that the adoption level can be higher.

Keywords: Mandarin; CVPD; Adoption

**In Vitro Cultur Research on Ornamental Pither Plant**
(*Nepenthes* spp.)

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**ABSTRACT.** Pitcher plant (*Nepenthes* spp.) known as carnivorous plant that has a pitcher with a variety of shapes and colors that are quite interesting. The appeal of this plant have been inviting many people to explore and exploit of the original habitat in many parts of the country. As a result of some species of unique plant has entered the endangered category. To control and regulate trading, all species of *Nepenthes* has been include in the list of Appendix I and II of CITES. Center for Plant Conservation, Bogor Botanical Gardens has sought *ex situ* conservation some species of *Nepenthes* and 5 species of whom have learned how to be propagate in vitro. The fifth species is *N. ampullaria, N. gracilis, N. mirabilis, N. papuana,* and *N. rafflesiana.* The research of the *Nepenthes* species ranging from seeds sowing, buds initiation, induced of the pitcher formation, acclimatization as well as packaging of the products will be outlined in this paper.

Keywords: CITES; In vitro culture; Pitcher plant; *Nepenthes*

**Application of Organic Materials and Decomposer Microorganisme to Increase Land Productivity and Hot Pepper Yield**

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**ABSTRAK.** Organic materials were reported increase land productivity and yield of many vegetable crops. The objectivity of this research was to find out the best organic material
and it’s dosage on increasiang land productivity and hot papper yield. The experiment conducted in Lembang 1250 m abs from May to December 2010. The research was set by two activity, the first one is composting of many kinds of organic materials used BioDek fertilizer, the second activity is the field experiment used randomized block design with 10 treatments and three replications. The treatments were kinds and dosage of organic materials i.e : garden waste compost (5, 10, and 20 t/h), rice straw compost (5, 10, and 20 t/h), oyster mushroom media compost (5, 10, and 20 t/h) and horse manure (20 t/h) as a controll. All treatments got 500 kg per ha NPK fertilizer, except the control got 1000 kg per ha NPK fertilizer. The results showed that it’s take 2 weeks for composting garden waste and rice straw with BioDek to reach 13 C/N ratio, but need 4 weeks for composting oyster mushroom media. Mineral content of organic materials not different than horse manure. Dossage and kinds of organic materials effect on plant growth and K absorbed, but not on N and P absorbed and hot papper yield. Application od garden waste compost, rice straw compost and oyster mushroom media compost dosage 5 ton per ha plus 500 kg per ha NPK fertilizer give good effect as a application of 20 ton per ha horse manure plus 1000 kg per ha NPK fertilizer. Organic materials compost can reduce dosage of organic fertilizer and NPK fertilizer application.

Keyword : Capsicum annuum L.; Organic material compost; Decomposer microorganism; NPK absorbed; Yield

**Effectivity of Granular Phospate Fertilizer GPS-20 on Snap Beans (Phaseolous vulgaris L.) cultivation in Highland Lembang, West Java**

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**ABSTRACT.** The growth and yield of erect snap bean pods Phaseolous vulgaris L. could be improved among other things by the application of optimum dosage of appropriate source of phosphate fertilizer. The goal of this experiment was to find out proper dosage of GPS-20 fertilizer that was effective to increase yield of erect snap bean plants. Research activities were carried out at Experimental Garden of Indonesian Vegetable Research Institute (IVEGRI) from January to March 2010 in Lembang - Bandung, West Java. A Rendomized Block Design with four replications was set up in the field. Treatments comprised of five level dosages of GPS-20, viz. 250, 375, 500, 625, and 750 kg P$_2$O$_5$ ha , SP-18 dosage of 555 kg P$_2$O5ha as recommended, and control (without P fertilizer). Basic fertilizers applied were: Urea 363 kg N/ha , KCL 278 kg K$_2$O/ha, manure 10 t/ha. P and basic fertilizers
were applied at 2 days before planting the seed. Seed were planted in double rows and two seed per hole in the row. The rows were covered by black silver plastic mulch. Erect snap bean plants were maintained optimally and protected intensively from pests and diseases infestations since in the beginning by the application of proper kinds and dosage of pesticides. Variable measured were vegetative growth and yield of young pods. Research results revealed that there were no phytotoxicity and abnormality symptoms occurred on erect snap bean plants that were treated by those P fertilizers mentioned above. Total yield of young pods was increased significantly by the applications of GPS-20 fertilizer 500 kg P₂O₅ ha. This GPS-20 fertilizer may be applied as an alternative of the source of phosphate fertilizer for cultivation of erect snap bean plants.

Keywords:  *Phaseolus vulgaris* L; Granular phosphate fertilizer GPS-20; Yield of young pods of erect snap beans

**Farmer Perceptions on New Superior Variety of Shallot**
**(Case Study in Tegal District, Central Java)**

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**ABSTRACT.** The needs of shallot which is the price a very significant increase lately is an opportunity for farmers to their increase crop productivity. This study aimed to explore the perceptions of farmers to new superior varieties (NSV) of shallot that was released by the Ministry of Agriculture. The individual survey was conducted in 2011 with 15 adopter and 6 non adopter farmers of NSV of shallot in Tegal District of Central Java. Data were analyzed using simple statistics. The result showed that the respondents who have planted NSV of shallot were willing to plant NSV of shallot cause by its high production (53%), early maturing (40%) and the NSV of shallot was successfully cultivated by another farmer so they willing to replicate (33%). Farmers as much as 47% stated that productivity of NSV of shallot was higher than the local variety and as many as 40% said that NSV of shallot had better agroecosystems adaptability (pest resistant, drought, submergence, poisoning) than local. In addition, 33% of farmers disagree that planting of NSV of shallot in line with local customs than local varieties. Information which was obtained from fellow members of the group proved to be incentive for other farmers to also employ the use of NSV of shallot (80%). Furthermore, another motivating factor was the existence of its own initiative (73%) and also the role of agricultural extension by 53%. Information on farmers’ perceptions of the NSV of shallot can be used as the basis for the dissemination of adoption of NSV of shallot at the farmer level.

Keywords: Perceptions; Shallot; NSV; Local variety
ABSTRACT. An experiment to determine the effect of plastic house constructions, stem density, side shoot pruning and fruit selection on growth and yield of sweet pepper (*Capsicum annuum* var. Grossum L.) was conducted at the Indonesian Vegetable Research Institute, Lembang (1250 m asl.), West Java from April to December 2005. Sweet pepper plants were grown in two different plastic house constructions i.e. 1) bamboo plastic house and 2) wood-metal plastic house. Two factor treatments i.e. stem density (6.7 and 8.3 stems m$^{-2}$) and technique of side shoot pruning and fruit selection i.e. conventional pruning and fruit selection technique used by the farmers (A) and introduction of a pruning and fruit selection technique where more leaves of the side-shoots were removed and only one fruit at each node was kept (B), were arranged in a randomized complete block design with three replication per plastic house. The plastic house treatment was only present on one replication. The results of the experiment indicated that yield of sweet pepper per m$^2$ in the wood-metal plastic house was significantly higher than in the bamboo plastic house. On average, the total marketable yield and yield of grade A (> 200g) fruit m$^{-2}$ in the wood-metal plastic house was 29.6 and 36.9% higher than that of crops grown in the bamboo plastic house, respectively. Stem density also affected significantly the marketable yield and crops grown with 8.3 stems m$^2$ had marketable yield 20.5% higher compared to that with 6.7 stems m$^2$. Pruning technique of side shoot and fruit selection significantly affected yield, individual fruit weight and fruit number m$^2$. Pruning technique B gave a significant higher yield of grade A fruits m$^{-2}$ than using conventional pruning and fruit selection technique A. However, total marketable yield was slightly lower with technique B compared to technique A. Production of sweet pepper grown under the wood metal plastic house, stem density of 8.3 stems m$^2$ and pruning technique B could be recommended as alternatives in order to increase the yields of sweet pepper.

Keywords: *Capsicum annuum* var. Grossum L.; Plastic house constructions; Stem density; Pruning technique; Yield
Effect of Ethyl Methanesulphonate on Survival, Growth, Cytogenetic of Banana (*Musa acuminata* cv. AAA) Shoot Tips

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**ABSTRACT.** *Ethyl methanesulphonate* is one of mutagen that used in inducing somaclonal variation for crop improvement purpose. The aim of this study was to determine effects of Ethyl methanesulphonate (EMS) on survival, growth, cytogenetic of banana shoot tips so that may produce somaclone that withstand drought and salinity. Induction was done by soaking the banana shoot tips in EMS at concentrations of 150, 200, and 250 mM for 30 and 60 minutes, respectively. As control the banana shoot tips was soaked in H$_2$O and buffer phosphate. Subsequently, the shoots were placed on shoot multiplication medium, *Murashige and Skoog* (MS) solid medium supplemented with 1,5 ppm of *Benzylaminopurine* (BAP). Furthermore these cultures were subcultured on the shoot multiplication medium for 3 times at interval of 3 weeks. The effect of the treatment was observed in shoots survival, growth rates and cytogenetic. The results showed a significantly decrease on shoots survival in the first subculture but not significantly decrease in the second and third subculture. Multiplication rate, average length of shoots, and the growth rate showed significantly decrease compared to the control at the first, second, or third subculture. Provision of 250 mM EMS for 60 minutes soaking caused the highest dormancy and significantly different compared to other concentrations. Immersion of the shoots with 200 mM EMS for 30 minutes and 60 minutes resulted phenotypic variation as much as 30 and 50%, respectively. EMS-treated shoots with 200 mM for 30 min and 250 mM for 30 min showed the presence of chromatid bridges, binuclei, deviation pole, laggard chromosomes, and sticky chromosomes. Aberration percentage that happened in EMS-treated shoots with 200 mM for 30 min and 250 mM for 30 min as much as 16 % and 18 % respectively. From the results, it can be concluded that EMS reduce the multiplication rate, the average of shoots length, the growth rate, and change of chromosome structure, but raise number of shoot dormancy in the banana shoot tips.

Keywords: EMS; *Musa acuminata*; Somaclonal variation

Assesment of Potato Quality Seed Breeding to Produce 10 t/h Seed Potatoes in Bener Meriah District, NAD Province

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**ABSTRACT.** Potato (*Solanum tuberosum* L) is one of the commodities in recent years is likely to increase demand. This is in line with the growing amount of people using Potatoesas...
Vegetables daily, the development of processing industries. In 2007 extensive planting of potatoes in NAD 1.230 ha, with its production reached 170 460 tonnes (Department of Agriculture Central Aceh, 2007). Estimated needs for the area of seed potatoes reached 1845 tons, assuming the amount of seed requirement of 1.5 tons/ha. Breeder seed potatoes is expected to produce quality seeds with high levels of purity and in sufficient quantities to support sustainable aquaculture technology aquaculture technology package that specific location and friendly environment. The assessment was conducted on potato production centers with a survey approach to determine the use of seed and varieties as well as its technology at the farm level. Field assessment carried out by using a randomized block design model (RBD) with 3 treatment package of seed potato breeder technology and repeated 4 times. The results obtained seed potatoes that have been nurtured to produce quality seeds and seed technology package providing a specific location, so it can produce seeds with high purity levels are sustainable in the province of Aceh. Fertilization technology package (package B) with 7.000 kg + 50 kg Urea + 50 Kg ZA + 60 kg SP-36 + 50 Kg KCl + 50 Kg NPK Bast per ha can produce potato seed tubers as much as 12.50 tons/ha.

Keyword: Potatoes; Breeding; Seed quality; Production

Oyster Mushroom Farming (Pleurotus ostreatus) in Low Land Areas in Bandar Lampung

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ABSTRACT. The development of oyster mushroom (Pleurotus ostreatus) is quite encouraging farming mushrooms in Indonesia, both for consumption and for commercial purposes. Similarly, conducted by some of the people of Bandar Lampung city that already cultivate oyster mushroom and Bandar Lampung is one of the oyster mushroom producing areas - although until now it was not managed and cultivated optimally. The purpose of this study was to quantify the cost of production, revenue, income and oyster mushroom farm efficiency. This study was conducted using surveys and interviews to farmers using a questionnaire. Respondents in this study were the mushroom growers as much as 30 farmers, selected by simple random sampling method. Types of data used are primary data and secondary data collected from January until December 2011 in the city of Bandar Lampung and surrounding areas. Data analyzed were the cost of production, revenue, and business efficiency. The results showed that the average area of kumbung was 60 m2, with a production cost of Rp12.520.000/ut, receiving Rp16.276.000/ut with R/C ratio of 1.3. Value of R/C ratio > 1 means the cultivation of oyster mushroom in the city of Bandar Lampung profitable.

Keywords: Farming; Oyster mushrooms; Financial analysis; Benefit
Leaf Sample for Nutrient Status Analysis on Duku Fruit Tree

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ABSTRACT. CHEMICAL ANALYSIS OF the leaves will be more accurately reflect changes in plant nutrient status associated with changes in production due to fertilization. Nutrient concentrations in the leaves were influenced by leaves position on the canopy. The objectives of this research were to determine proper leaves as samples and to determine optimum N, P, K nutrients status of duku tree. The research was conducted in Pemunduran Village, Kumpeh Ulu District, Muaro Jambi Regency in Jambi Provinces, from December 2008 to March 2012. Chemical analysis was carried out at laboratory of Indonesian Soil Research Institute. There were twenty samples of duku trees, with relatively the same aged (30–40 years), and located in the same area. Samples were mature leaves in the terminal branches, taken before harvest time, at harvest time, and after harvest. The leave sample positions were at the first and the third leaves from fruiting and non-fruiting branches. Research results indicated that leaves which highly correlated with the relative yield were the third matured leaves at the non fruiting branches (correlation coefficient 0.87, 0.74, and 0.71 for N, P and K, respectively). The third or first matured leaves during harvest time of the fruiting branches could be an alternative to diagnose N, P and K status of duku plants, when all branches produced fruit. Leaves nutrient concentrations were 1.74 – 2.43% for N, 0.19 – 0.25% for P and 1.85-2.77% for K.

Keywords : *Lansium domesticum*; Leaf mineral nutrients; Leaf analysis

The Role of Arbuscular Mycorrhizal Fungi on Growth and Production of The Chilli (*Capsicum Annum*)

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ABSTRACT. Chili is one of the many horticultural commodities consumed by the public. The market demand is not balanced with chili pepper production, caused price fluctuations.
The research has been conducted to carried out the effect of Arbuscular Mycorrhizae (AM) fungi on the plant growth and production of pepper (Capsicum annum). The chili inoculated by AM fungi ing the nursery, at transplanting, and combination of both. The observation has done to know the effect of fungi on growth of seedlings and disease development in the field. The results indicated that at seedling pepper inoculated with AM fungi are better growth than without AM fungi inoculation. Inoculation of AM fungi increased of plant height and production of pepper.

Keywords: Arbuscular Mycorrhizal Fungi (AMF); Pepper; Growth; Production

The Effect of Potassium Fertilization on Fruit Yield and Quality of Duku (Lansium domesticum)

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ABSTRACT. Duku is an important fruit in Indonesia, and has broad market in the traditional market and modern supermarket. In Jambi Province, duku is the most important fruits that has high commercial value, cultivated by most farmers, and the main income for farmers. Researches concerning duku cultivation in the central-production Kumpeh, however, indicated that cultivation technology has yet properly managed, especially fertilization. The study was carried on Kumpeh Ulu District, Muaro Jambi Regency, Jambi Provinces, from December 2008 to April 2012. This research was aimed to study the fertilization effects of potassium on fruit of duku. Fertilization potassium comprised of five treatments, i.e 0, 600, 1,200, 1,800, 2,400 g K₂O/plant/year. Treatment used randomized complete block design, comprised of five plants as replications. The results showed that potassium fertilization significantly affected skin thickness, percentage of edible in the first and third year and total soluble solid (TSS) in third year (on year).

Keyword: Off year; On year; Lansium domesticum; Fertilization; Potassium
Increase the Growth and Yielding Carrot (*Daucus carota L.*)
Through Bed Height and Plant Population

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ABSTRACT. Review the potential carrot of various terms shows that the development of carrot in Indonesia still has a very bright future. The carrot plant population is expected to set the crop quality will be higher compared with the farmers. Due to improper spacing or not based on careful research will bring maximum advantage risks caused by land use efficiency is not maximal, occurs tough competition between plants so that growth is not optimal or there is excess space so that the population is not maximal. The research was conducted at Berastagi North Sumatera with altitude 1400 m above sea level on August 2012 to November 2012. Randomized Block Design was used with three replications. Treatment consisted of two factors, the first factor is bed height (B1 = 15 cm; B2 = 25 cm; B3 = 35 cm) and the second factor is plant population (P0 = Control/Farmers habitual, P1 = 20 x 4 cm; P2 = 20 x 8 cm; P3 = 20 x 12 cm). The result show that bed height 15 cm is significantly affect plant height at 5 and 7 WAP (4.64 cm and 11.20 cm). Plant population with farmer habits / control had a significant effect on plant height at of 11 and 13 WAP (32.64 cm and 39.02 cm). On the weight and circumference of tubers per sample, with a population of plant spacing of 20 cm x 8 cm was significantly higher than the other treatments (133.33 g and 12.08 cm). While the weight of tubers per plot, plant population habits of farmers / control was significantly higher (5.23 kg). Bed height 25 cm and plant population with spacing of 20 cm x 8 cm in general can increase the weight of tubers per sample, the length of tubers per sample and girth of tubers per sample.

Keywords: *Daucus carota L.*; Bed height; Population; Growth; Yielding

Effectiveness of Biochar and Compost to Fertilize The Growthand Tomato Crops (*Lycopersicum esculentum Mill.*)

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ABSTRACT. Tomato (*Lycopersicum esculentum mill*), is one of various vegetable crops which has high economic value and has been cultivated since hundreds years ago. The
tomato can be served in many processed like fresh tomato juice, seasoning and vegetables for cooking. The average yield of tomatoes planting in low-land area is generally about 6,0 t/ha, while in the high-land is 26.6 t/h. One factor causing the low production of tomatoes in low-land area is the limited prominent varieties and soil fertility. Therefore, this study aimed to know the proper dosage of biochar and fertilizer compost and the interaction between those two fertilizer factors in the growth of tomato crops. The research was done in a land plot visitor of agricultural technology (Aceh Assessment Institute for Agricultural Technology), starting December 2011 until January 2013. The draft used is a random group which is employed the factorial pattern 3 x 3 up to 3 times repetition, there are two observed factors namely the biochar and compost fertilizer. The biochar factor consisted of three standards namely 0 t/h, and 10 t/h 15 t/h with compost and the first 3 t/h, 0 and 10 t/h 15 t/h. Biochar gave a very real impact on the height of plants, the diameter of a tomato trunk at the age 40 and 60 hst, the diameter of tomato fruit, the length of fruit in the first age of 75 HST and the weight of the fruit, but there is no real impact on the height of plants and trunk diameter on the age of 20 HST. Yet, the best growth and crops can be seen in the treatment of biochar 150 t/h. Compost fertilizer also has a great influence on the height of plant at the age of 20, 40, 60 HST, the trunk diameter, the length of fruit at the first crops 75 HST, the amount of fruits, and the weight per fruit. The best growth and crops is at the compost treatment 15 t/h. In addition, there is also a very real interaction between biochar treatment and compost to fertilize the height of plants and trunk diameter at the age of 60 HST, and the amount the fruits, but there is no real interaction on the height of plants, trunk diameter at the age of 20 and 40 HST, the length of the fruit at the first crop 75 HST, the length of the fruit and also the weight of the fruit itself. The best combination treatment can be obtained on biochar 150 t/h and compost treatment 150 t/h.

Keywords : Biochar; Compost; Tomato; Yield

The Growth Capability of Siam Kintamani (Citrus reticulata Blanco) Derived from Citrus Scion Multiplication Block (CSMB) and Somatic Embryogenesis (SE) Propagation on JC Rootstock

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ABSTRACT. Somatic embryogenesis of callus culture in vitro is one of citrus propagation ways for producing free virus and genetically true-to-type planting material. To induce growing of plantlets derived from this technology, they should be grafted ex vitro on to a citrus rootstock. The research of growth capability of Siam Kintamani (Citrus reticulata
Blanco) derived from conventional (using free virus material from CSMB as a scion) and plantlet ex vitro grafting method on JC rootstock was conducted at Tlekung Research Station, Indonesian Citrus and Subtropical Fruit Research Institute (ICiSFRI) from June 2011 – December 2012. The aimed of this research was to evaluate the growth capability of those citrus plants that their scion derived both from CSMB and SE propagation method. The treatments were done at nursery house by grafting/budding a plantlet/scion on to an eight-month-JC rootstock plant. One-year old Siam Kintamani grafted/budded plants were transplanted into field with plants spacing 1x1 m. The research was arranged as randomized block design, three replications and used 15 plants as unit samples. The parameters measured were plant height, rootstock and stock diameter. The results showed that, up to one year old, statistically there was no significant difference between the two treatments, the combination rootstock and stock treatment was not affect on all parameter observed. However, in general the growth and diameters plants that their stocks derived from SE, relatively better than the other treatment. From this research, we could make a conclusion that plantlets as the product of propagation via SE in vitro technique, could be used as stock and they could growth as satisfactory as a conventional one, if they grafted on the citrus rootstock ex vitro.

Keywords: Siam Kintamani; Plantlet; Grafting; Citrus reticulata Blanco; Embryo somatic

**Characterization of Fungi Found in the Surface of Mango**

*Mangifera indica L* cv. Danas

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**ABSTRACT.** The fungi growth on the surface of mangoes peel have been identification. The selected microbes grew after spray treatment were also identified. The microbes grew on the surface was Yeast. However, the fungi after 1000 mg/l benomyl spray. The fungi growth was only Penicillium Sp. Colon characterization are brownish white-cotton scope sprayed out. Spray with 1000 mg/l comercial salycilic acid the same i.e. Yeast. Thus on the mangoes cv. Danas the 1000 mg/l benomyl spray is able to after the microbes growth.

Keywords: Mangoes Danas; Fungi; Benomyl; Salycilic acid
The Effect of Planting Medium on The Growth of Pineapple Seedling

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ABSTRACT. The aim of the research was to ascertain the influence of media on pineapple seedling growth. The research was conducted at the Aripan Experimental Field of Indonesian Tropical Fruit Research Institute from November 2006 until August 2007. This research was arranged in a randomized complete block design with six treatments and four replications. These treatments were (a) soil, (b) soil + manure (1:1), (c) soil + sand (1:1), (d) soil + manure + sand (1:1:1), (e) soil + manure + sand (1:1:2), and (f) soil + manure + sand (2:1:2). The results showed that the medium of soil + manure (1:1) gave higher growth of the pineapple seedlings than the other media consistently started from three months after planting. This medium was also the best medium for the growth of pineapple seedling as it gave the highest parameters in terms of plant height, leaf length, leaf width, leaf numbers, and seedling wet weight. This result suggested that soil + manure (1:1) is useful medium for accelerating the growth of pineapple seedling.

Keywords: Pineapple; Seedling; Medium; Growth

The Effectiveness of Trichoderma harzianum as Biocontrol Agent and Manure in Controlling Fusarium oxysporum f. sp. passiflorae on Sour Passion Seedlings (Passiflora edulis f. edulis Sims)

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ABSTRACT. The objectives of the research were to find out optimal dosage of Trichoderma harzianum and types of manure to decrease percentage of wilted plants and disease intensity of Fusarium oxysporum f.sp. passiflorae on sour passion fruit seedlings. The research was conducted at screen house and pest disease laboratory at Berastagi Experimental Farm
from March to June 2010. The experiment was arranged in randomized block in factorial pattern with three replications. The first factor was Trichoderma harzianum propagule (T), T0=without T. harzianum (control), T1=T. harzianum mixed in 17 g corn medium/kg soil, T2=T. harzianum mixed in 25 g corn medium/kg soil, T3=T. harzianum mixed in 34 g corn medium/kg soil, T4=T. harzianum mixed in 42 g corn medium/kg soil. The second factor was the type of manure (k), namely: kA=chicken manure and kS=cattle manure. The result showed that propagule of T. harzianum mixed in 42 g steamed corn seeds/kg soil was the best dosage to decrease Fusarium oxysporum f. sp. passiflorae attack on sour passion fruit seedling with incubation period, percentage of wilted plant and length infection profile, namely 50 days after inoculation (dai), 3.33% and 7.1 cm respectively. T. harzianum decreased up to 88.5% disease intensity on sour passion fruit seedling. Propagule of T. harzianum mixed in 42 g corn medium/kg soil was the best dosage to influence plant height and leaf number, 34.26 cm and 6.71 sheets, respectively. The cattle manure was the best manure to decrease Fusarium oxysporum f. sp passiflorae attack on passion fruit seedling that showed from incubation period, percentage of wilted plant and length infection profile namely 38.13 dai, 29.33% 89.25% and 10.09 cm, respectively. The chicken manure contributed to plants height, while cattle manure contributed to leaf number, each 33.15 cm and 5.75 sheets, respectively.

Keywords: Passiflora edulis f. edulis sims; Trichoderma harzianum; Manure; Fusarium oxysporum

The Effect of Trichoderma spp. to Control Pathogen Causing Damping off on Japanchê Citroen Seedling

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ABSTRACT. The experiment was aimed to know Trichoderma spp. effect to control pathogen causing damping off on Japanchê citroen rootstock seedling. The first objective was achieved by applying antagonistic test of three isolates of Trichoderma spp. against soil borne pathogen causing damping off. The second objective was to know effect applying Trichoderma spp. in rice bran medium on Japanchê citroen seedling. The experiment was carried out in the Phytopathology laboratory and screen house of Indonesian Citrus & Subtropical Fruits Research Institute (ICSFRI) in February-April 2010. The experiment was conducted using Completely Randomized Design (CRD), with three replications. Three species Trichoderma (T. harzianum, T. koninggi, and T. viridae) and two pathogen
causing damping off \((\text{Fusarium} \text{ sp. and Sclerotonia sclerotiorum})\) were used in this experiment. The results of in vitro test indicated that \textit{Trichoderma} spp. inhibitory percentage against \textit{Fusarium} sp. and \textit{S. sclerotiorum} ranging from \(68.93\% \) to \(82.78\%\). \textit{T. harzianum} was more effective in inhibiting \textit{Fusarium} sp. than other \textit{Trichoderma} spp. (82.78\%), whereas inhibition of \textit{T. viridae} was greater on \textit{S. sclerotiorum} compare to inhibition by other \textit{Trichoderma} spp. (71.11\%). Antagonist interaction mechanisms that occur are mycoparasitism, competition and antibiosis, so hyphae to be lysed. The results of in vivo test showed that application of both \textit{Trichoderma} and pathogen on seedling medium were not significantly different on seed germination and on plant height. Damping off disease was not found on all treatments, due to unfavorable environmental conditions for this disease.

Keywords: Damping off; \textit{Trichoderma} spp.; Japanche Citroen

\textbf{Yellow Disease on Longbean \((Vigna sinensis \text{ L.})\) in Indonesia: Detection and Seed Transmission Test of The Causal Agents}

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\textbf{ABSTRACT.} Since early the year of 2008, many yellow diseases has been detected on long bean \((Vigna sinensis \text{ L.})\). Recently, the diseas is widely distributed in Indonesia with high level incidence. The disease significantly contributes to the quality and quantity of the products. The occurrence of the disease seriously make some economic losses, therefore it is important to detect the causal agents and conduct seed transmission test for deciding a control strategy of the disease. The field research was conducted in the areas of Special Region of Yogyakarta, Central Java and East Java. The detection of the causal agents was conducted in Laboratory of Plant Virology, Faculty of Agriculture UGM using a universal primer of Krusty & Homer of begomovirus by Polymerase chain reaction (PCR) methods. Seed transmission test was conducted by growing on test, PCR analysis and electron microscopy observation. Field observations showed that the disease was commonly found on the generative stage and has been widely distributed in all areas of longbean plantation in Special region of Yogyakarta, Central Java and East Java with high level incidence. The commonly symptom showed golden yellow leaves and mosaic symptoms on infected plants were frequently found. Another symptoms on infected plant were leaf cupping, reducing of leaf size and number, leaf malformation, virescens and phylody. The pods of infected plant showed reducing in number and the
size. Those pods usually has yellow symptoms and malformation. The malformation pods produced a few small seeds and usually had no seed on it. PCR analysis showed that samples of infected plant produced the DNA about 580 bp that belongs to begomovirus group. Growing on test of seeds from infected plant showed that most of the seeds did not germinate, whereas on the germinated seed produced bean sprouts with yellow pale symptom leaf and malformation. Result of electron microscopy observation and PCR test using malformation bean sprouts revealed that there were no particles of begomovirus and there were no band of the DNA of begomovirus. Based on a comprehensive test, it could be concluded that the causal agent of yellow disease on long bean plant was begomovirus. The isolate of begomovirus of longbean was not seed transmitted.

Keywords: Begomovirus; Yellow disease; Long bean; Seed transmission; PCR; Electron microscopy

Feromon-Exi on The Population of Spodoptera exigua in The Assessment of Sustainable Farming System on Sandy Coastal Area of Southern Bantul

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ABSTRACT. Sustainable agricultural should conduct with integrated pest control (IPC) practice on shallot cultivation at the sandy soil, southern coastal area in Yogyakarta. The application of Pheromone-exi as a trap pheromone for male imago of Spodoptera exigua is one alternatives plant management, toward environmental sustainable. Research on Pheromone-exi trap effect to populations of Spodoptera exigua was conducted in Dusun Patehan, Gadingsari Village, Sanden Subdistrict, District Bantul at ± 0,4 hektares with 5 cooperatives farmers. The observation was conducted to population of Spodoptera exigua by counting the number of imago trapped. For the needs of observation, five applications with designed by random complette block design (RCBD). The application tests were on shallot monoculture pattern, shallot and red chili polyculture pattern, and shallot and eggplant polyculture pattern, and control (without trap). The results showed that the use of Pheromone-exi significantly trapped Spodoptera exigua imagoes at Bantul sandy coastal area. Pheromone-exi on monoculture cultivation pattern, trapped the Spodoptera exigua imagoes more higher than others. Generally, the application of Pheromone-exi on horticulture cultivations (shallot, red chili, and eggplant) at Bantul sandy coastal area could decrease of Spodoptera exigua population. Integrated pest control based healthy plant cultivation practices is one of the sustainable agriculture could achieved.

Keywords: Spodoptera exigua; Sandy coastal area; Shallot; IPM; Sustainable agriculture
Bioecology of Rust on *Dendrathema grandiflora* at Yogyakarta

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**ABSTRACT.** Three different experiments were done i.e. (1) current status of the disease intensity of *Puccinia horiana* in Hargobinangun greenhouse (700 m above the sea level), Pakem Sleman, Yogyakarta; (2) study of *P. horiana* severity within mulching cultivation on *D. grandiflora*’s mother’s plant in Pakembinangun greenhouse (500 m above the sea level), Pakem Sleman, Yogyakarta; and (3) knowing the agronomic figure on *D. grandiflora* in Hargobinangun greenhouse (700 m above the sea level), Pakem Sleman, Yogyakarta. Disease intensity data collected will be analyzed using statistical method of analysis of variance and to compare the means of observations will be done using Duncan’s multiple range test. The damage intensity on 1/3 the bottom of leaves amounted from 50 to 70%, on 1/3 the middle of leaves amounted from 25 to 50%, and 1/3 the top of leaves from 10 to 25%; the disease intensity was found on mulching cultivation of mother’s plant, since 2 weeks after planting (WAP) until 10 WAP; Swarna Kencana (100%), Ratnahapsari (90%), Puspita Pelangi (55%), and Kusumapatra (50%). In general, Swarna Kencana and Ratnahapsari were very susceptible to *P. horiana*. Puspita Pelangi and Kusumapatra were susceptible to *P. horiana*. Air temperature, humidity and soil pH in Hargobinangun were 190 – 300 C, 90% and 6.7 respectively; whereas temperature, humidity, and soil pH in Pakembinangun were 220 – 300 C, 40% - 80%, and 6.2 respectively, and all of the variety on *D. grandiflora* was infected and show as main host of *D. grandiflora* in Yogyakarta.

**Keywords:** Temperature; Humidity; Soil Ph; Disease intensity; Severity; Pustule; *P. horiana*; *D. Grandiflora*; Variety

**Financial Analysis of Chrysanthemum Potting in Pakem, District of Sleman, Yogyakarta Special Region**

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**ABSTRACT.** The farmer in the Pakem, Sleman District is a small farmer, having the small land area. The rice production on that area is 2 – 3 ton/ha. Based on the zone of
agro ecosystem, the land area of the medium land ecosystem are right to horticulture cultivation. Ornamental plant cultivating such as the cut flower of chrysanthemum is one commodity are introducing by AIAT’s Yogyakarta. The successfully of ornamental plant cultivating development can be reached if the financial analysis are profitable and feasible. The objective of this study was to determine the financial analysis of chrysanthemum agribusiness in the medium land of Sleman District. The experiments were conducted in the medium land of Orchard Ngipiksari, Hargobinangun Village, District of Pakem Sleman, Province of Yogyakarta Special Region, on the highland of 400 – 700 m height above the sea level. The study was conducted during the growing season of 2010 from June to October. Research was used the level of feasibility by the analysis incremental of benefit cost ratio (B/C ratio) and revenue cost ratio (R/C ratio). From the analysis calculation know that B/C ratio was 1.27 that’s mean profitable to cultivating the cut flower of chrysanthemum and R/C ratio 2.27 it is mean that the farming of pot chrysanthemum was feasible to develop the agribusiness of the chrysanthemum cut flower in the medium land of Sleman District.

Keywords: Profitable; Feasible; Agribusiness; Cultivation; Chrysanthemum

Storage Trial Parasitoids Tamarixia radiata As A Mass Production Management Strategies

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ABSTRACT. Parasitoids Tamarixia radiata is a potential biological agents to control Diaphorina citri which is known as vectors of disease Huang Lung Bing on citrus crops. Since the parasitoid age period of T. radiata is relatively short, management of mass production is needed before they are released. One effort that could be done to extend the shelf life of this parasitoid is by storing in cold temperatures. For the research, parasited nymphs with age 7, 8, 9, 10 and 11 days after infestation were used. Storage was done at temperature of 13, 15 and 17°C for 14 days. Results showed that at temperature of 13°C on parasitoid age of 7 and 8 days, there were no imago emerged during storage while on age 9, 10 and 11 days the imago emerged were 10%, 13% and 47% respectively. At temperature of 15°C, most imago parasitoid emerged during 2-10 days of storage period (22-100%). Furthermore, at temperature of 17°C all parasitoid emerged to imago during storage period of 2 to12 days. The ideal age of parasited nymph for storing is at age 9-11 days after infestation and stored at 13°C temperatures for 9-11 days and at temperature of 15°C for 6-10 days.

Keywords: Storage; Mass production; Tamarixia radiata
Growth Pattern of Hormones of Mandarin Fruit cv. Batu 55 During Ripening Stage Planted in High and Low Area

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ABSTRACT. The purpose of this study was to understand the pattern of hormonal changes on fruit ripening stage of mandarin Batu 55 planted in high and low area. Each of ten plants of mandarin cv. Batu 55 grown in pots and were being fruited as big as 2 – 3 cm in diameter located and well maintained in the Experiment Garden of Punten with elevation of 950 m above sea level and at Banjarsari with 5 m above sea level. The fruits were harvested on young, physiologically mature and ripe stage, and brought in Integrated Research and Testing Laboratory of Gajah Mada university, then analyzed the content of hormones in the fruit rind. Ethylene hormone levels and total carotenoid in mandarin cv. Batu 55 rind which planted at high altitudes was greater than those in the lowlands, and the opposite phenomenon occurs for gibberellin hormone thus explain why the color of this mandarin rind at the lowlands could not be developed well into a yellow-orange color. Content of carotenoid total in the fruit rind of ripening stage of Batu 55 mandarin both harvested from trees planted in high and low area were 595,5 µg and 206,6 µg. Although hormonal changes and carotenoid levels in the rind of young fruit, physiological mature and ripe stage fruit from trees planted in the high and low were fluctuating but they had the same pattern. Hormones of auxin, cytokinins and ABA were not detectable or present in small quantity.

Keywords : Citrus reticulata Blanco; Mandarin; Hormones; Ripening stage

The Effectiveness of Lemongrass Essential Oil in Controlling The Mango Red-banded Caterpillar (Noorda albizonalis Hampson)

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ABSTRACT. Mango fruit borer (red-banded caterpillar) Noorda albizonalis is one of the important pests detrimental to the cultivation of mangoes. A control measure to reduce the level of attacks is necessary in order to prevent the loss of higher yields. One control
A technique that is safe and environmentally friendly is plant-based pesticides; among other things is the essential oil of citronella. The research was conducted at the station of Cukurgondang East Java from July to December 2011. The experiment was arranged in a randomized block design with eight replications in which the treatments were concentrations of essential oil 2, 4, 6 cc/l and control (untreated). Parameters observed were intensity of fruit borer attack and economic profit obtained from the use of this technology. The results showed that the application of citronella essential oil could reduce the level of fruit borer attack and production loss on mango, mainly at the concentration of 6 and 4 cc/l. The profit per hectare gained from application of citronella essential oil at concentrations of 6 and 4 cc/l was IDR 3.596.000,- and IDR 2.864.000,- respectively.

Keywords: Mango; Noorda albizonalis; Control; Citronella oil

Evaluation of Mango Plant Growth from Grafting Dwarf Rootstock with Five Varieties of Commercial Mango Scion

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ABSTRACT. Evaluation of mango plant growth from grafting dwarf rootstock with five varieties of commercial mango scion. The dwarf rootstock had potential value to develop due to it can produce dwarf character of mango. Beside there was needed to improve mango performance, it can be easier in plant management and harvesting. Yet up to now, Saigon is a rootstock variety of mango that having dwarf character and can used to mango propagation. The objective of the study was to know about plant growth of grafting Saigon rootstock with five varieties of commercial mango scion. The research was conducted at Sumani orchad in Indonesian for Tropical Fruit Research Institute, Solok, West Sumatera, from January to December 2008. The experiment was arranged in split plot design with two factors and three replications. The first factor as main plot was Madu and Saigon as rootstock, meanwhile the second factor as sub plot was five varieties of commercial mango scion (Arumanis 143, gedong Gincu, Khirsapatih Maldah, Kensington Apple and Irwin). The result showed that it was compatible between Saigon rootstock with five varieties of commercial mango scion. From observation for eight months since planting in the field, there was not significantly growth different on plant which grafted both with Saigon or Madu rootstock. The result of this study could be recommended that Saigon rootstock can be used as alternative rootstock beside of Madu variety to mango propagation. Afterward, it is still needed longer observation in the field to prove that the dwarf character can achieved by using Saigon as rootstock.

Keywords: Dwarf character; Saigon rootstock; Plant growth; Mango
Superiority Potential of Citrus New Variety Candidate Jestro JrM 2012 (*Citrus reticulata*) As Substitute Alternative of Imported Citrus

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**ABSTRACT.** Citrus variety candidate Jestro JrM 2012 is classified as tanggelo hybrid which is suitable for citrus development in Indonesia in order to meet domestic demand of citrus. It can be the potential substitute of imported citrus, because its quality is as good as imported citrus quality, which has special descriptions i.e. fruit skin color is strongly orange, shiny and smooth. These characteristics are match with domestic consumer’s desire. Research methodology was conducted by observation in the field. Population Mother Plant comprised of three plants was observed. Data from Indonesian Citrus and Subtropical Fruit Research Institute (ICSFRI) previous research were also used to complete the analysis, as well as visual (morphology) characterization based on Descriptor List for Citrus (IPGRI); while fruit chemical characterization was conducted at Laboratory of Agricultural Yield Technology of Brawijaya University. Data of observation result was analyzed by DMRT 5%. The result indicated that citrus new variety candidate Jestro JrM 2012 had superior characteristics i.e. it can produce fruits of 15 – 20 kg/plant at age of 2,5 years old, sugar content quality was 12% (brix), long shelf life of 24 – 36 days (8 weeks) after harvest time, and fruit skin color was strongly orange.

Keywords: New Superior Variety; Quality; Character

The Use of Peg 8000 for Inducing Formation and Maturity of Durian Somatic Embryos

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**ABSTRACT.** The experiment was conducted in Tissue Culture Laboratory of Indonesian Tropical Fruit Research Institute in Solok from January to December 2012. The objective of this study was to determine the suitable medium composition for the formation and maturation of somatic embryos durian. The plant material used was the durian flower bud. Media composition tested for somatic embryo formation were 1/2 MS (Nitrate) containing sucrose
50 g/l, PEG 8000 (20 g/l and 50 g/l), casein hydrolyzate (200 ppm and 250 ppm) with PGR composition of BAP, KIN, and 2,4-D. Media composition tested for somatic embryo maturation was 1/2 MS (macro) enriched with 0.1 ppm GA3, 0.01 ppm ABA, BAP, CH and PEG. The result revealed that 20 g/l and 50 g/l PEG 8000 could induce the formation of somatic embryos durian. The suitable media composition for the initiation and formation of durian somatic embryo were 1/2 MS (Nitrat) + 0.1 ppm BAP + 0.01 ppm 2,4-D + (20 - 50) gr/l PEG 8000, while for maturation of somatic embryo of Durio was 1/2 MS (makro) + 0.1 ppm GA3 + 0.01 ppm ABA + (1-2) ppm BAP. Top of form.

Keywords: Durio; PEG 8000; Induction; Maturation; Somatic Embryos; Media

Is Solarization An Effective Treatment to Control Banana Fusarium Wilt

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ABSTRACT. Fusarium wilt caused by Fusarium oxysporum f.sp. Cubense (Foc) is the first of six deadly diseases on world banana production and one of the major constraints of banana production in Indonesia. The research was conducted in Aripan experimental station of ITFRI which is naturally-heavily infested by tropical race 4 of Foc. The objectives of the research were to reduce pathogen inocula in the soil and wilt incidence, and improve banana production. The experiment was arranged in a randomized block design with four replications. The treatments were (1) solarization: plots were covered with transparent polyethylene plastic for 10 months (2) rotation with maize: plots were planted with two periods of maize (3) bare: no crop for 10 months and (4) control: continuous planting of banana. The result showed that plant rotation with maize and baring condition reduced pathogen population in the soil, but could not escape from banana fusarium wilt. Continuous planting of banana retained the population of fusarium in the soil. Solarization suppressed fusarium population in the soil and reduced banana fusarium wilt incidence since it could increase soil temperature up to 52.35°C. It could delay the emergence of the disease until six months after planting while at the other treatments fusarium wilt emerged at three months after planting. Solarization performed linear trend of disease development until the end of observation while the other treatments resulted in logarithmic trend and reached peak at six months after planting. Among the treatments, solarization was the only treatment which produced yield.

Keywords: Fusarium wilt; Solarization; Rotation; Bare; Fusarium oxysporum f. sp. Cubense
The Effect of IAA and BAP on The Increase of Shoot Multiplication of Mangosteen (Garcinia mangostana L.) Through In Vitro Culture

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ABSTRACT. Shoot multiplication of mangosteen is one of steps on in-vitro culture technique to increase the number of shoots. This research aims to determine the appropriate concentration of IAA and BAP to increase the number of mangosteen shoots regenerated by in-vitro. The research was conducted at the Tissue Culture Laboratory, Indonesian Tropical Fruit Research Institute, from February to June 2013. Explants used were shoots from callus regeneration. Explants were cultured on WPM media enriched with 30 g/l sucrose and 2 g/l gelzan. The experiment consisted of six treatments, ie : 1) WPM + 0.1 mg/l IAA + 1 mg/l BAP, 2) WPM + 0.1 mg/l IAA + 2 mg/l BAP, 3) WPM + 0.1 mg/l IAA + 3 mg/l BAP, 4) WPM + 0.5 mg/l IAA + 1 mg/l BAP, 5) WPM + 0.5 mg/l IAA + 2 mg/l BAP, and 6) WPM + 0.5 mg/l IAA + 3 mg/l BAP. Each treatment was repeated 12 times (12 bottles) and each bottle culture planted 4 explants. The results showed that WPM media enriched with 0.1 mg/l IAA + 1 mg/l BAP was the best media for multiplication of mangosteen shoots derived from indirect regeneration, increasing 13.5 shoots per bottle.

Keywords : Multiplication; Shoots; Mangosteen; PGR

Virulence of Fusarium oxysporum f.sp. Cubense Vegetative Compatibility Group 0124/5 (race 1) and 01213/16 (Tropical race 4) on Banana Ambon Hijau (Cavendish group) and Ambon Kuning (gros Michel) at Screen House Test

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ABSTRACT. Panama wilt (Fusarium oxysporum f. sp. Cubense = Foc) is one of the most significant threats to banana production world wide as well as in Indonesia. There are 24 Foc VCG reported, while 10 of them were found in Indonesia. This research aimed to study interaction of Foc VCG 0124/5 (Race 1) and VCG 01213/16 (TR4) on Ambon Hijau (AAA/
Cavendish group) and Ambon Kuning (AAA/Gros Michel) cultivars at screen house stage. The study was conducted at Protection laboratory and screen house of Indonesian Tropical Fruit Research Institute (ITFRI), from March until November 2011. The experiment was designed factorial randomized block design consisted of two factors, five replicates, and 10 plants of treatment unit. The first factor was banana cultivar (Ambon Hijau - AAA/Cavendish group and Ambon Kuning - AAA/Gros Michel), while the second factor was \( \text{Foc VCG} \) (VCG 0124/5 - Race 1 and VCG 01213/16 - tropical race 4). The result showed that there was no interaction between banana cultivar and \( \text{Foc VCG} \) on disease incident, but was significantly different on incubation period. Both VCG 0124/5 and 01213/16 attacked either Ambon Hijau or Ambon Kuning cultivar at ≥ 90% of disease incident. \( \text{Foc VCG} \) 0124/5 and 01213/16 needed to incubate respectively for 14.16 and 13.4 days, which is not significantly different, to infect Ambon Hijau, while the second VCG incubated 13.63 days significantly faster than the first one. Both tested VCGs could infect both cultivars, however it performed different degree of virulence, where VCG 0124/5 was virulent to-while VCG 01213/16 was highly virulent to both banana cultivars.

Keywords: Banana; \( \text{Fusarium oxysporum} \) f. sp. Cubense; VCG 0124/5; VCG 1213/16; Virulent

**Improvement of Soursop Seedling Growth Through Application of Root Growth Stimulant**

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**ABSTRACT.** The research was carried out at the Aripan Experimental Field Station of Indonesian Tropical Fruits Research Institute, West Sumatera from February to September 2009. The research aimed to obtain the proper dosage of growth regulator for rooting (asam amino, polisakarida, prekursor rooting) treated to soursop seedlings (local variety). The aim of the used was a randomized block design with five treatments and three replications, each treatment consisted of 20 plant. The treatments were: A = 0.002 %, B = 0.004 %, C = 0.006 %, D = 0.08 % and E = 0 % per plant (control). The parameters observed were: (1) plant height; (2) stem diameter; (3) leaf number; and (4) root length. The result showed that application of growth regulator for rooting (asam amino, polisakarida, prekursor rooting) at concentration 0.006 % give the best result for soursop seedling growth.

Keywords: Annona muricata L.; Plant Growth Regulator; Seedling; Concentration
The Effect of Water Irrigation Frequency to The Quality of Pineapple Plant (*Ananas comosus* L. Merr) of Smooth Cayenne Variety

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ABSTRACT. Maximum growth could be achieved by provision of an appropriate water. In order to produce a good result, the provision of water should meet the plant requirement, especially in the dry season. One of the provision of irrigation water to the dry land is to restore soil moisture to field capacity. This study was conducted by applying some water on the frequency on Smooth Cayenne variety of pineapple plants in early growth phase. It was done to determine the appropriate amount of water so that the plant does not experience stress due to lack of water. The data observed from this research were actual evapotranspiration (ETc), leave lengths, and plant weight gained at the end of the research, the data analyzed with statistical test of variance and Least Significant Differences (LSD). The results of the analysis of the data showed the maximum growth of pineapple plants reached on the provision of water treatment with the frequency of three days revealed by the growth of the plant (leaf length), the highest achieved at week 11 to week 13. Differences crop highest weight was achieved on treatment with a frequency of three days at 675 grams. The best irrigation schedule of pineapple plant to the field capacity was found in the frequency of once every three days, with average water needs were 92 ml/day.

Keywords : Irrigation; Pineapple; Water needs; Frequency; Provision of water

Effects of Citronella Grass Extracts on The Oviposition Behavior of Carambola Fruit Fly (*Bactrocera carambolae*) in Mango

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ABSTRACT. Carambola fruit fly (*Bactrocera carambolae*) causes economic losses because the female deposit her eggs in fruits and the larvae bore into the fruits. The availability
of non-preferred and safe substance in deterring the females to lays eggs will provide an effective tool to protect the fruits. This research examined three types of citronella grass extracts in regard with their effects on disturbing the oviposition behaviour. Water, methanol, and n-hexane citronella grass extracts were applied to fruits and the fruits were then exposed to gravid females. Olfactometry tests were carried out to investigate the mechanisms by which extracts modify *B. carambolae* oviposition. The methanol extract deterred the females for oviposition with OAI= -0.83, whereas the water extract and n-hexane extract had no effect on oviposition with OAI ranged -0.02 to 0.29 and -0.02 to -0.38 respectively. Furthermore, the olfactory test showed that the methanol extract had no effect on repellency. Therefore, the mechanism of reducing the oviposition was most likely through gustatory rather than olfactory processes. The major compounds in the methanol extract were silane, [((3.beta)-lanosta-8,24-dien-3-yl]oxy]trimethyl and elemol. The methanol extract of citronella grass has the potency to be used as a tool to protect mango from *B. carambolae* oviposition.

Keywords: Carambola fruit fly; Citronella grass; Mango; Methanol; Olfactory tests

Shallot Productivity under Different Growing Season and Land Type of Coastal Sandy Land and Wetland

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ABSTRACT. There are approximately 3,300 ha of coastal sandy land in Yogyakarta Special Region. Some technologies have been introduced to manage the land for agriculture production, among others, shallot cultivation with using organic manure, clay soil, and inorganic fertilization. This assessment was conducted to evaluate the levels of bulb and economic yields of shallot cultivated with an introduced technology, especially in fertilization, under rainy, and dry seasons on coastal sandy land, as well as, on wetland for comparison. The assessment was conducted in Galur, Kulon Progo Regency during 2008 to 2009 by on-farm method with 96 field trial units, land area used per unit around of 300 m². In 2008, shallot of *Tiron* variety was planted in rainy and dry seasons with 20 field trials for each season. In 2009, two shallot varieties, *Tiron*, and local *Cerme*, were planted on coastal sandy land and wetland with 20 and 8 field trials for each variety on each land type. Fertilization introduced was 50 ton of manure, 150 kg of muriate of potash (MOP), 150 kg of NPK 15:15:15 and 50 kg of ZA/ha while other cultivation technology components followed as habitual farmer’s practice. Results of the assessment indicated that bulb yields
of Tiron variety in dry seasons were higher than that in rainy season. In dry season, bulb yields of the Tiron variety could achieve 18.85 to 21.93 t/ha while in rainy season only around of 8.09 t/ha. Even in the same dry season, the bulb yields of Tiron variety were also higher compared to that achieved of local Cerme, i.e. 15.05 t/ha. On the other hand, there was no prominent difference in terms of bulb yield obtained from the both varieties cultivated on coastal sandy land and wetland with clay texture soil. Economically, profit of the Tiron shallot cultivated in the dry season was also quite high, i.e. around of IDR 29.00 million/ha. Shallot of Tiron variety compared to Cerme local variety has higher yield potentially and well adaptable on coastal sandy land and wetland ecosystems. Development of shallot cultivation with using Tiron variety on coastal sandy land will be more profitable when planted in the dry season.

Keywords: Fertilization; Variety; Rainy season; Dry season; Bulb yield; Economical yield

The Assessment of Organic Cultivation Technology on Hot Chili in Lampung

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ABSTRACT. Problems chili farm productivity and incomes are low because it has not properly applied technology package and the many pests and diseases. Assessments conducted in the Village of Margo Mulyo, Sub District Teginengi, Pesawaran Regency. The treatment are applied organic cultivation technology package of hot chili, and hot chili cultivation technology package to farmers, each using a Kio variety and Lembang-1 variety which is the recommendation of the Balitsa Lembang. The design used was randomized block design with eight replications and parameters are observed, the components of growth (plant height and number of branches), total production, pests and diseases and and inputs cost of production. Analysis of data growth, pests and diseases and production using the F test followed by Duncan test. In this activity also analyzed farming. The assessment shows that, the best growth variability obtained at Kio-Organic (80.68 cm and 23.94), the highest production obtained at Kio-Organic (1946.3 kg/ha) and harvest organic chili cultivation was more long harvest (17 harvests) and pests and diseases attack percentage is lower than the cultivation of the farmers technology. Analysis showed Kio organic farming, organic Lembang-1, Kio-farmer and farmer Lembang-1 has a value of R/C ratio respectively, 1.31; 0.43; 0.43 and 0.12.

Keyword: Capsicum annuum L.; Organic cultivation; Lampung
New Varieties Adaptation Assessment to Improve Production Onion on Dry Land in Bima NTB

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ABSTRACT. Study of adaptation of new varieties (new varieties) onion aimed to get new varieties onion potentially high yield, according to the biophysical and socio-economic conditions of the local (site-specific), and get VUB-tolerant rain. The review was conducted in lowland dry land irrigation shallow wells which take place in the wet. 2013 (March-May 2013). Assessment using a randomized block design, repeated 3 times, treatment 9 VUB (Pikatan, Pancasona, Mentes, Kramat-1, Katumi, Maja Cipanas, Sembrani, and comparative Super Philip and Keta Monca Bima), planted in plots measuring 7m x 5 m with spacing of 20cm x 15cm, fertilized with NPK Phonska much as 1.0 t /ha and 2.0 t compost /ha. The study showed that the ability to grow plants ranging from -100 98.0 percent, and plant height ranged from 27.87 to 35.0 cm. Production achieved by each of the varieties ranged from 2.60 to 5.40 t /ha dry bulb, the lowest production achieved by comparison of varieties Super Philip 0.27 t /ha, 2.60 t Katumi, Keta Monca Bima, Sembrani and Maja cipanas 3.23 t respectively. Kramat-1 3.63 t, 4.44 t Pikatan, Pancasona 5.07 t and the highest achieved by the production of varieties Mentes 5, 40 t / ha dry bulb cloves 5-7/pohon the number and age of harvest 55 days.  The low production is achieved due to high rainfall and unfavorable weather triggering attacks tuber rot /fusarium wilt 40% -98% and 76% dieback -95%, so that a very low number of crops which ranges from 9.33% - 69%. Super Philip number of crops is 9.33% lower than in most other varieties ranged 42% -66%, this shows Philip Super resistant to high rainfall.

Keywords : Adaptation; New varieties; Dry land; Production

Morphological Variation of Haploid Dianthus chinensis Plants Obtained by Pseudofertilization

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ABSTRACT. The production of plant derived from parthenogenesis of Dianthus chinensis was reported from pseudofertilization applied by using irradiated pollen. Haploid plants
of *Dianthus chinensis* L. derived from pseudofertilization showed significant variability in morphological characteristic. The study was investigated at the Indonesian Ornamental Crop Research Institute (IOCRI) from August 2011 to September 2012. The objective of this study was to investigate gametoclonal variation of haploid *Dianthus chinensis* plant. 288 immature seeds obtained from the cross between 227 donor female flowers of *D. chinensis* D-chi11 and irradiated pollens of *D. chinensis* D-chi14. Immature seeds have to be rescued by *in vitro* technique. Out of the 288 immature seeds, only 33 immature seeds could grow. Flowcytometry analysis identified seven haploid plants, and all of them were small size plants. Haploid plant can be distinguishable with the diploid by the absent of pollen in haploid plant. The morphology (shape of leaf, flower and colour of flower) of haploid plants were different from the diploid ones.

Keywords: *Dianthus chinensis*; Pseudofertilization; Haploid; Morphology

**Breaking Dormancy of Gladiolus Corms (*Gladiolus hybridus*) using Plant Growth Regulators**

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**ABSTRACT.** A long period of dormancy is one of the constraints in the supply of seed plant gladiolus. The objective of the research was to investigate the effect of plant growth regulators (PGR) in breaking the dormancy of gladiolus corms cv. Nabila. The experiment was used α-napthalene acetic acid (NAA) and gibberelic acid (GA₃). The concentration of NAA was 0, 50, 100 and 150 ppm, while the GA₃ concentrations were 0, 50 100 and 150 ppm. The randomized complete block design (RCBD) with one factor was used in the first experiment with five replications. In the second experiment the best combination of both PGR from the first experiment were selected and applied to corms with different storage periods (0, 2, 4, 6, and 8 weeks). The RCBD with two factor and five replications was used. The results of the first experiment showed that all treatment using NAA and GA3 individually accelerated the rooting and sprouting of the corms therefore indicating the dormancy breaking occurred. The results of the second experiment showed that 100 ppm NAA and 50 ppm GA gave similar effect in dormancy breaking of the gladiol corms. The corms directly harvested and storage for two weeks were easily rooted and sprouted.

Keywords: NAA; GA₃; Storage
In Vitro Propagation of New Indonesian Terrestrial Hybrid Orchid Spathoglottis

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ABSTRACT. Ornamentals variety improvement especially Spathoglottis orchid has been conducted by Indonesian Ornamental Crops Research Institute (IOCRI). Four terrestrial orchid Spathoglottis was resulted from hybridization and selection interspecific cross. In order to produce breeder seed, mass propagated urgently required. Nevertheless, the experiments were conducted to propagate for providing breeder seed. This research examined several media supplemented with combination of auxin and cytokinin. Pseudobulb of terrestrial orchid Spathoglottis Bintang Merah Putih, Bintang Segunung, Sutera Ungu and Koneng Layung were used as explant source on protocorm like bodies (PLBs) formation through in vitro culture by manipulating cytokinin and auxin. Preculture was needed to provide clean axillary bud and was conducted on Vacin & Went agar based media. The result showed that PLBs were best induced from axillary bud on MS or Vacin & Went agar-based supplemented with 0.01 mg/l TDZ + 0.1 mg/l IAA or 200 mg/l adenin hemisulfat.

Keywords: Axillary bud; In vitro; Micropropagation; Spathoglottis

Soil Nutrient Status in RGL Citrus Plantation in Lebong District, Bengkulu Province

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ABSTRACT. Phenomenon of national Citrus fruit quality has not been satisfactory and the emergence of nutrient deficiencies in the soil and leaves that lead to the deterioration of citrus crops in several production centers suggests that efforts to maintain soil fertility by farmers through fertilizer still does not meet the needs of plants. The purpose of this assessment was to know the level of fertility of the soil to increase the productivity of RGL citrus. The assessment was done on RGL Citrus plantation in Rimbo Pengadang Subdistrict, Lebong District, Bengkulu Province in 2012. Assessment activities conducted in upland plateau 835 m asl. The scope of the assessment activities include: (1) soil sampling at five locations on the land RGL planting citrus farmer cooperators. Composite soil samples were taken, (2) RGL Citrus leaf sampling to determine nutrient elements. Collection of secondary data such as soil conditions, rainfall and rainy days was obtained from BP3K.
and relevant agencies. Data were analyzed descriptively. The study showed that the N nutrient status is low, moderate to high of available P, low to moderate of K, acid soil pH, quite high organic material and low of macro elements (Ca, Mg, Na). Leaf analysis results showed that the content of Mn and Zn is still above the critical threshold. Citrus production in citrus growing areas for crops RGL 3 years ranged between 5 to 7.8 tonnes/ha. From the assessment, it is found that the condition of the land in the Rimbo Pengadang Subdistrict is suitable to be developed as a center for RGL citrus plantation, with the application of fertilizers according to crop needs.

Keywords: Soil nutrient status; Crop nutrient status; RGL Citrus; Soil fertility

The Effect of Phosphorus on Growth and Fruit Quality of Tangerine cv Siam Mamuju at Organosol

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ABSTRACT. The objective of this research was to study the effect of phosphorus (P) application on growth and fruit quality of Tangerine cv. Siam Mamuju at organosol. The research was conducted on five-year-old citrus trees at organosol by randomized block design, with P dose treatments in six levels (0; 25; 50; 100; 150; and 200% of P weight in fruit harvested), and three replications. Result suggest that application of P was not significant effect on growth vegetatif (plant high and canopy wide). Increasing P dose tended to increased percent juice in fruit but reduced percent acid, percent soluble solids, and percent vitamin C in juice.

Keywords: Tangerine cv siam Mamuju; Phosphorus; Vegetatif growth; Fruit quality; Organosol

Study on Threshold Control of Mites on Citrus Cause Russet, Population Growth Rate and Potential Biological Control Agent in the Field

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ABSTRACT. Russeting on citrus fruit causes a prices decrease ranging from 20-30%. One of the causes of russetting citrus fruits are citrus rust mite (CRM) attack. Threshold
control this pest is not known to have carried out the study. The study was conducted in Punten orchard on fruit age 1 and 2 months from flowering stage. The treatments are tested citrus rust mite infestations (CRM) 10, 20, 30, 40, 50 mite/cm². The results showed that the observation of one month after infestation, CRM population increase on average increased three times from the initial population. Russet symptoms on the surface of the fruit skin highs seen in treatment E (50 mite/cm² initial infestation) of 38% is comparable with treatment D (40 mite/cm² infestation) by 33%, followed by treatment C, B, and A is a row by 29%, 23%, and 19%. Inventory results of biological agents in East Java and West Kalimantan found that two of the family Coccinellidae predators and Phytoseiidae and one entomopathogenic fungi *Hirsutella* sp. associated with CRM.

Keywords: Russeting; Threshold control; Population; Biological agents; Citrus rust mites

**Consumen Preference of Various Banana Planted in Marginal Land in East Kalimantan**

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**ABSTRACT.** Banana is one of fruit commodities that can be consumed in fresh or as processed food. Until now, there are many processed bananas such as chip, *dodol*, *sale* etc in the market. This study aimed to know consumen preference of banana chip with various tastes and banana cake with 2 ways of processing (baked by oven and steamed cake). This study conducted in Teritip, East Balikpapan sub district, Balikpapan City from August-December 2012. The taste of banana chips tested were original tase, balado, grilled corn, chocolate. The cake tested were oven dreied cake and steam cake. The panelist was 25 people. The results showed that banana chip that has highest color preference was chocolate, the highest flavor also chocolate banana, grilled corn and balado. All texteur had similar preference. The banana chocolate was the highest preference of taste. Whereas for cake, the baked oven one had highest preference for all parameters (color, flavor, textuur and taste).

Keywords : Banana; Preference; Processed food

**Physical and Chemical Characteristics Chrysanthemum Flowers Instant Drink**

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**ABSTRACT.** Research on the physical and chemical characteristics of instant drink chrysanthemum was held in April - June 2013 in and Post-harvest mechanization
Laboratory, Yogyakarta Assessment Institute for Agricultural Technology and Seruni Menoreh Women Farmer Group Samigaluh District, Kulon Progo Regency. The research method used was experimental laboratory with completely randomized design, two (2) factors and a 5 (five) replications. The first factor is the addition of chrysanthemum; flowers (3% and 6% of the volume of ed was local DIY, ie Cintamani. The results showed that instant chrysanthemum drink with the above treatment has a total sugar content of 66.58 to 72.18% g/100, vitamin C level from 30.10 to 38.92 g, and beta-carotene levels Microgram/100 -1327.41 253.90 g.

Keywords: Chrysanthemum instant drink; Physical and chemical characteristics

Quality Improvements of Seed and Ware Potatoes Affected by Postharvest Handling and Processing

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ABSTRACT. This paper reviews some aspects of postharvest handling and processing that provide quality improvements of seed and ware potatoes as comparison those practiced by farmers. Researches have been done on the potato quality improvement at IAARD including sprout control, control of tuber size, tuber quality, storage, and processing. The improvements could reduce losses of quality to support farmer’s income, however the implementation of these technologies to the farmer levels needs an adaptation process. Research on improving of processing method is needed to increase in the quality of product including flavor. Research on packaging is mainly concentrated on the development of suitable packaging system for the product. There is correlation between pre-harvest, post-harvest and processing on the quality product of potato.

Keywords : Postharvest; Processing; Potato; Quality; Income

Selection of Microbes Grew on the Surface of Mango (Mangifera indica L.) cv. Indramayu Treated by Various Anti Microbes

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ABSTRACT. The aim of the research was to find out the type coloni of microbes that have been selected by various treatments. The treatments were control (no spray), sprayed
with 500 mg/l salicylic acid formula, sprayed with 1000 mg/l salicylic acid formula, sprayed with 500 mg/l salicylic acid + Calcium formula, sprayed 1000 mg/l salicylic acid + calcium formula, sprayed with 500 mg/l commercial salicylic acid solution, sprayed with 1000 mg/l commercial salicylic acid solution, sprayed with 500 mg/l benomyl, 1000 mg/l benomyl solution. The colony types were first treatment (control): (1) white-cotton shaped-widened (dominant), (2) black-spotted-widened, (3) grey-cotton shaped-rounded (4) yellow-rounded; second: (1) white -cotton shaped-widened (dominant), (2) milky white-rounded; third: (1) white-cotton shaped-widened (dominant), (2) milky white-rounded; fourth: (1) White-cotton shaped-widened (dominant), (2) black-spotted-widened; fifth: (1) white-cotton shaped-widened (dominant), (2) black-spotted-widened; sixth: (1) white-cotton shaped-widened (dominant), (2) grey-cotton like-rounded; seventh: (1) white-cotton shape-widened (dominant), (2) grey-cotton shaped-rounded; eighth: white-cotton shaped-widened; ninth: white-cotton shaped-widened. The number of colonies of above treatment were 4 colonies for control fruit, 1 colony for benomyl treated fruit; 2 colonies for the others. Both 500 and 1000 mg/l have the most powerful capacity to select the growth of microbes.

Keywords : Indramayu mango; Salycilic acid formula; Benomyl; Salycilic acid solution; Salycilic and calcium formula

Microbe Profiles on the Surface of Mango
(Mangifera indica L) cv. Arumanis Treated by Various Anti Microbes

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ABSTRACT. The aim of the research was to find out the profile fresh and rotten mangoes; and the effect of various treatments on the types of microbes that can grow on the surface. Unripe mangos were bought from the market and brought to the laboratory for microbes profiling such as on fresh mangoes, rotten mangoes, and after sprayed with 1000 mg/l commercial salicylic acid solutions and 10 mg/l nano silver ion. Fresh mangoes had an isolate of non spore forming fungi, Khamir and Botrytis sp. After storage at ambient temperature the profile of the microbes were Khamir, Botrytis sp, Aspergillus sp and Colletotrichum sp. Following spraying with 1000 mg/l salicylic acid formula besides the same as control microbes, the other microbes such as Fusarium sp. was present. Sparing with 1000 mg/l commercial salicylic acid solutions was slected the microbes so that
only Khamir, Aspergillus sp, Acromonium sp grew. Following treatments with commercial nano ionic silver (10 mg/l spray) only Khamir and Fusarium sp can grow. Antifungal treatment certainlly limited the growth of microbes whilst their also induced the growth of other microbes such as Fusarium sp.

Keywords : Arumanis mango; Salycilic acid solution; Nano silver

**Effect of Mahkota Dewa (Phaleria macrocarpa) Extracts Against Bactrocera carambolae Oviposition on Mango (Mangifera idica)**

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**ABSTRACT.** Bactrocera carambolae that is as one of the important pests on export products is requiring the save control technique. The use of natural products for controlling this pest is safer to both environmental and consumer health. The objective of this research was to determine the effect of water, methanol, and n-hexane extracts of Mahkota dewa fruits (Phaleria macrocarpa) on the B. carambolae oviposition. The water, methanol, and n-hexane extract of Mahkota dewa fruits were smeared on the mangoes which were then exposed to gravid females of B. carambolae. Olfactometry tests were carried out to investigate the mechanisms by which extracts modified B. carambolae oviposition. The results showed that water extract stimulated female of B. carambolae to deposit more eggs at the concentration of 1,000 ppm (OAI=0.95) and 5,000 ppm (OAI=0.67), but its effect was neutral at 2,500 ppm (OAI=0.19). Methanol extracts stimulated egg deposition at all concentrations tested. Meanwhile, n-hexane extract stimulated egg deposition at the concentration of 1,000 ppm (OAI=0.41) and it was neutral at 2,500 ppm (OAI= -0.24) and 5,000 ppm (OAI=0.05). Based on the olfactometry tests, the stimulation of Mahkota dewa fruit extracts on B. carambolae oviposition probably through gustatory rather than olfactory processes. The major compound of water, methanol, and n-hexane extracts were 1H-cyclopropa [a] naphthalene, 1a,2,6,7,7a,7b- hexahyro-1,1,7,7a- tetramethyl-, (1aR,7R, 7aR,7bS)-; squalene/skvalen/supraene/spinacene/2, 6, 10, 14, 18, 22-tetracosahexaene, 2, 6, 10, 15, 19,23-hexamethyl and MPA/pregn-4-ene-3,20-dione, 17-(acetyloxy)-6-methyl-, (6.alpha)-respectively. These finding suggest that Mahkota dewa fruit extract may be useful as a pull factor in puss and pull strategy in fruit fly control and also as a stimulant on the B. carambolae mass rearing.

Keywords: Mahkota dewa fruit extract; Bactrocera carambolae; Mango; Oviposition
The Effect of Bagging on Fruit Quality in Five Grape Varieties (*Vitis vinifera*)

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**ABSTRACT.** This study aims to determine the effect of bagging that is effective in controlling fruit decay and improving the quality of grapes. The study was conducted at the experimental field at Tlekung 900 masl. This fruits engendered crops twice per year. Research methods in factorial randomized block design. The first factor is not wrapping or control (P0), white plastic bagging (P1), gauze bagging (P2) and a combination of white plastic plus gauze. while the second factor is Jestro Ag 60 varieties (W1), Kediri kuning (W2), Prabu Bestari (W3), Bs 85/kardinal (W4) and Bali (W5) respectively - each treatment was repeated three times. The results showed a significant effect on the level of bagging fruit damage and improving the appearance of the fruit quality of fruit and TSS, while the varieties were not significantly different. The best treatment is a combination of plastic gauze wrapping with damage 8 - 12%, then gauze bagging 15 - 26%, controls 20 - 44% and plastic bagging 23 - 56%. The best quality of fruit produced by bagging gauze - plastic combination that is shown the appearance of a smooth, no spots and uneven color. But the type of plastic bagging to bearing fruit with the highest TSS then control, combination-plastic gauze and gauze.

Keywords: Bagging; Grape; Quality of fruit; Varieties

Study on Optimum Picking Age of RGL Citrus Fruit in Lebong District, Bengkulu Province

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**ABSTRACT.** Lebong Gerga citrus (registered with RGL variety) is a leading commodity Lebong district because its competitive advantage, which is yellow-orange fruit colour with high juice content and fruiting throughout the year. One of the problems encountered in the field is diverse fruit quality due to picking time is not quite right (too fast or too long harvest), so that the taste of some fruits either feels sour or also less tasty (already over-ripe). The purpose of this study was to determine the optimum age of RGL citrus fruit
picking to obtain good fruit quality. Assessment was carried out in the Rimbo Pengadang, Lebong District, Bengkulu Province. In this assessment was used completely randomized design with seven fruit picking treatments with three times replication. Picking treatment at the age of 32, 34, 36, 38, 40, and 42 weeks after the flowers bloom by taking the fruit according to the quadrant. Primary data was collected through direct observation in the field and based on the results of interviews and through questionnaires. Secondary data obtained from the officers / agencies such as the Department of Agriculture and Food Security, BP4K, and BP3K. The parameters measured were flowers blooming time, fruit weight, fruit diameter, and fruit quality. Data were analyzed by descriptive analysis and statistical tests. The assessment results showed that the optimum harvest time of RGL citrus ranged from 34 to 38 weeks after flowering blooms. At those picking age of fruits, the quality of fruits was already meet the standards with a delicious fruit flavor, orange color of fruit skin were around 50 to 80%, juice content were around 57.92 to 60.33%, and the vitamin C content were around 38 to 45 mg/100g.

Keywords: Citrus Gerga; Orange RGL; Picking the optimal age

**Determination of Critical Storage Quality Characteristic of Minimally Processed Cauliflower**

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**ABSTRACT.** Principally, the critical characteristic that limits the shelf life of food products, including the Minimally Processed Cauliflower (MPC), is the minimum safe limit based on consumer acceptance quality. The objective of this study was to determine the critical quality characteristic of MPC that can be used to define its shelf life. The research was conducted in five step activities as follows: (1) preparing the sample of MPC with varying degrees of freshness (from fresh to wilted) (2) performing the objective measurement of quality variables (3) conducting sensory analysis using hedonic test for overall acceptance by panelists (4) testing the correlation between hedonic test and analyzed quality variables, and (5) determination of the critical point as the limit criteria of the cauliflower shelf life. The results showed that the critical quality characteristic of MPC were the color changes (defined in lightness value /L value which was measured by chromameter at a scale of 0/dark – 100/light) and weight loss. The minimum acceptance level decided by sensory
Panelists was scale 3 which was related to the color of MPC with a value of lightness/L 78.51 and/or weight loss 10%. The use of the critical quality characteristic of the MPC to define its shelf life can be done by selecting one of the faster quality characteristic reaches a critical point or can use both of them.

Keywords: Minimally processed cauliflower; Critical storage quality; Shelf-life

Simulated Transport Damage Study on The Physicochemical Properties of Tangerine Citrus (Citrus reticulata) var. Siam Banjar

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ABSTRACT. This study was undertaken to determine the physicochemical properties of tangerine citrus (Citrus reticulata) var. Siam Banjar that were treated with degreening and coating agents, packed in two types of packaging materials and subjected to simulated commercial transportation. Optimum mature tangerine citrus var. Siam Banjar treated with 0.4% w/w of calcium carbide for 72 hours and coated with 12% bees wax emulsion were packaged in two types of packaging materials (wooden box and a combination of polyurethane foam wrapping and carton box) with a weight of contents 15 kg. The treated fruits were subjected to vibration treatment by implementing a simulated commercial transportation. Fruits were carried out on the truck-bed for a distance of 173 km. Fruit quality evaluations were performed after storage at room temperature (25°C) for 26 days, included percentage weight loss, percentage incidence of fruit decay, total soluble solid, and sensory evaluation (visual appearance, colour, texture, odor, freshness, appearance, fruit firmness, taste, and overall acceptability). The results showed that the fruits packed in a combination of polyurethane foam wrapping and carton box was better and more effective in maintaining the quality of tangerine citrus var. Siam Banjar, which was indicated by the lower percentage weight loss (16.34%), lower percentage decay incidence (26.70%), lower level of TSS (10°Brix), and better in sensory attributes of visual appearance, colour, texture, odor, freshness, appearance, fruit firmness, taste, and overall acceptability. Overall, package type had significant effect on the fruits quality attributes.

Keywords: Tangerine var. Siam Banjar; Transportation; Packaging; Quality
Factors Influencing The Adoption of Fruit Processing Technologies by Mango Farming Households in South Kalimantan, Indonesia

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ABSTRACT. The objective of this study was to identify the factors influencing the adoption of diverse processing technologies by mango farming households in South Kalimantan, taking into account the gender aspect. The study was conducted in five villages in South Kalimantan in which a project of introducing and implementing mango processing technologies had been done in 2005-2006. Data were collected from 75 farmers/respondents dispersed in those five villages using semi-structured questionnaires. A probit model was used to analyze factors influencing farmers’ decisions to adopt the mango processing technologies. The results revealed that a significant proportion (87%) of respondents did not adopt the mango processing technologies as opposed to 13% adopters. A statistical analysis of data collected revealed that nine out of thirteen hypothesized factors significantly influence the adoption of the mango processing technologies by farmers at $P < 0.01$. These factors include age of farmer, education level of farmer, farming experience, visit/technical backup by extension officers, distance to the market, income from mango cultivation, income other than from mango cultivation, and startup capital. Household size, source information, and membership of farmer association did not influence the decision of the farmer on adoption the mango processing technologies. In addition, gender is also not significant, indicating that women and men have the same propensity to adopt the mango processing technologies.

Keywords: Mango processing technologies; Adoption; Socio-economic; Gender

Value Chain and Price Transmission Study of Fresh Chili in East Java

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ABSTRACT. Chili (Capsicum annuum) is a vegetable commodity that has an important role for agriculture sector as well as important cash flow income for small scale producers
in Indonesia. Chili prices in Indonesia were quite volatile over the last 10 years. Most of the causes of this price volatility come from the supply side or marketing chain. This study was used a value chain analysis study approach in East Java to identify the sources of price volatility generated by the marketing chain. The study seeks to understand the role of traders in setting prices for fresh chili determine to how traders adjust margins to cover risks from uncertain prices, transportation cost, post-harvest damage or other factors related to delivering chili to market. From the data collection, how chilies product are flows and prices are transmitted from farmers to traders and the factors that affect prices along the marketing chain were understood. The results of this study showed that traders mostly sold fresh chilies to wholesaler but some go to processors or directly to retail outlets. Price transmission was a key indicator of efficiency in the market. A small margin between the farm price and the retail price indicated an efficient marketing chain. The information on market price efficiency for fresh chilies from farmers to customers through the value chain for East Java can guide changes in business practices that could improve efficiency of the market. Greater efficiency means either higher farm prices, lower consumer prices, lower consumer prices or reduced price volatility.

Keywords: Market efficiency; Chilies; Price transmission; East Java

**Fruit Rot Disease Caused by *Lasiodiplodia* spp. on Several Postharvest Fruits in Indonesia**

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**ABSTRACT.** Research on taxonomy of *Lasiodiplodia* spp. are well developed recently in all over the world. Some Botryosphaeria anamorph had been characterized based on DNA structure as new species of Lasiodiplodia sp. There were even three species originally from tropical area, Australia and Venezuela, had been successfully characterized and named as *L. venezuelensis, L. crassispora* and *L. rubropurpurea*. The fruit rot symptom caused by *Lasiodiplodia* spp. are frequently similar to fruit caused by other pathogen, moreover the infection often occurs together with other fruit rot causal agents. This research was undertaken to observe the symptom of fruit rot caused by *Lasiodiplodia* spp. and to collect their pure culture isolated from a single spore. Methods in this research were sample collection of various symptom of fruit rot, single-spore isolation for pure culture collection, morphology identification based on literature, and inoculation test. Result showed that *Lasiodiplodia* spp. were found in the largest amount of samples which attacked seven from seventeen observed fruits. From all fruit rot observed, the pure culture of Lasiodiplodia spp. are isolated from mangosteen, avocado, mango, orange and cacao fruit. Inoculation test resulted the same symptom as previous symptom which were either fruit mumification or bottom rot.
Supply Chain Management to Develop Agribusiness of Mangosteen in West Java, Indonesia

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ABSTRACT. Mangosteen (Garcinia mangostana L.) is a horticultural commodity ranked top as export fruit from Indonesia. West Java is the biggest mangosteen producing province with a total production of 36.8 thousand tons in 2011, accounting for 31.4% of the national production. The study aimed to analyze how supply chain management can develop agribusiness of mangosteen in West Java. The study was conducted in May, 2013 in Purwakarta district, West Java, involving 56 farmers and 14 collectors. Supply Chain Analysis was conducted on the flow of information, product and funds between different stages. The analyses showed that 100% collectors delivered products to wholesaler, although 28% of them also brought to retailers (delivered products ranged from 10-40%). Only 14% of them sold directly to consumers even though they also delivered to wholesaler and retailers (products are sold only 5% of total production). Flow of information about price and market demand came from whole market to wholesalers and collector in district/sub district/village level. As well as collectors, farmers were actively looking for this information to avoid receiving a very low price. There was difference in nominal per kilogram at three harvest times. Price at the beginning was higher than at harvest time and at the end of the season, even reached double. Policy intervention from government is essential matter to support SCM application to develop agribusiness of mangosteen.

Keywords: Mangosteen; Supply chain management; Agribusiness; Policy intervention

Indonesian’s Durian Trade Performance

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ABSTRACT. Durian (Durio zibethinus Murr.) is a fruit - tropical fruits typical of Southeast Asia are very popular and earned the nickname the king of fruit. Opportunities for commodity markets durian is quite bright for both the domestic market as well as export commodity is wide open. However, durian exports for 5 years (2007 s / d 2011) just as much as 101 tons with a value of U.S. $ 228 329. Meanwhile, the volume of imports to Indonesia durian in the same period to reach 128 280 tonnes with a value of U.S. $ 168 364 035.
These data indicate that the Indonesian’s durian trade is deficit. When production compared to the volume of exports for 5 years, it can be seen that the Indonesian durian fruit can be exported very little, which only ranged between 2-33 tons or only 0.003 to 0.005 % of the production, and the rest only for domestic consumption. The low percentage of exports was due to the resulting low-quality fruit and so diverse that it did not meet export standards. Durian existing and already in production in Indonesia was largely a jungle durian seeds derived from plants no maintenance effort and almost entirely left to nature, except at the time of harvesting. This led to the fruit produced vary in size, shape, color and taste that fruit quality is low so it did not meet export standards. Durian exports to foreign countries was still a big chance to be improved, because many varieties of durian in Indonesia, which had a quality suit the tastes of foreign consumers and to date the export of durian still limited by quota to be increased according to the ability of the free market. Based on the above assessment, has been carried out by a team of ICHORD’s policy analysis. Results of this study are expected some policy prescriptions can be generated to improve the competitiveness of local durian durian in order to compete with imports, especially in the domestic market, so it was able to be relied upon as a commodity import substitution.

Keyword: Durian; Trade; Performance; Export; Import

Oyster Mushroom (Pleurotus ostreatus) Farming and Marketing in Low Land in Jati Agung District South Lampung Regency

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ABSTRACT. South Lampung is one of the areas that has the potential for development of oyster mushroom cultivation in Lampung province because it is near the capital city of Lampung Province. One prospective effort for increasing productivity oyster mushrooms is by using a good and superior seeds. This study aimed to: (1) analyze the magnitude of the cost structure, income, and capital utilization efficiency of oyster mushroom cultivation, (2) analyze the cost, decent price, breakeven price and productivity, (3) analyze business administration and marketing of commodity tracks for oyster mushrooms in South Lampung regency. Location of the study was conducted in Jati Agung District of South Lampung Regency which has the nearest access to the city of Bandar Lampung. This study was conducted using surveys and interviews to farmers using a questionnaire. Respondents in this study is a hybrid corn farmers as much as 30 farmers, selected by simple random
sampling method. Types of data used are primary and secondary data that were collected from January to December 2012. The results showed that the structure of farm income over cash costs and total cost was beneficial because the revenue received by farmers was greater than the costs incurred. Farm productivity gained more beyond productivity and price BEP, meaning oyster mushroom farming profitable. There were two patterns of farm marketing channels which concluded that the short-channel marketing will be more profitable for farmers.

Keywords: The culture; Oyster mushrooms; Pricing; Marketing; Profitable

**Characteristics and Performance of Shallot Industry in Indonesia**

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**ABSTRACT.** In Indonesia, shallot ranks third amongst all vegetable crops in terms of cultivated area. Between 90,000 and 110,000 hectares are harvested every year and it is assumed that at least 100,000 rural households can be classified as shallot farm households. In addition, many men and women are working or hired in shallot farms and business at different stages along the product chain. This study was conducted to provide a description and analysis of the shallot Industry in Indonesia. Some information and analysis of the shallot chain are also provided due to the close links between shallot production and marketing. A review of existing studies, reports, and government statistics was carried out early on during the research and qualitative methods were employed for collection of primary data. The fieldwork was carried out in January, February and December 2012 using Focus group discussions (FGD) with farmers and semi-structured interviews (SSI) with producers, other chain actors, and some knowledgeable observers in East Java and NTB.

This study showed that the productivity of shallot is still below the level of potential. Some production constraints encountered due endemic pests and diseases as well as quality of seed. Besides, post-harvest handling is also less of a concern because it is still traditional. Thus there are still opportunities to be able to increase the production of shallot by improving seed genetic resources and farming technologies. Government support is needed for the provision of warehouse facilities in strategic markets and improved transportation facilities to maintain the quality.

Keywords: Shallot industry; Value chain analysis; Cultivation practices; Indonesia
Agroecotechnology Strategy In Sustainable Pest And Diseases Management on Citrus Plantation

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ABSTRACT. Potential of horticultural products in global trade period, the required high quantity and quality of the products which very competitive. Citrus is a strategic horticultural commodities that has bright prospects as a source of high economic growth and income, especially for farmers. Its application of industrial-scale in plantation is one strategy to increase the competitiveness of products. The sustainable crop protection is needed to be implemented to produce competitive citrus fruit, that’s free of chemicals harmful to health. The main focus of the Agroecotechnology strategy is to optimize productivity land resources as well as the maintenance and enhancement efforts coupled natural resources towards the achievement of ecological and environmental conservation. The Agroecotechnology strategies are: (1) plantation farming is not exploitative but a balance cycle, (2) production system also functions as a system of land resource conservation and the environment, (3) priority to maintenance of biodiversity and ecosystems, (4) implementation of integrated management of citrus gardens health (IMCGH = PTKJS), (5) early warning system of pest disease monitoring result periodically, (6) the relationship between inputs and outcomes are harvested balanced, (7) inorganic materials from outside the ecosystem as a complementary input, not as a primary input. Implementation of this strategy is a healthy farming techniques, is expected to strengthen the success of IPM techniques and ensure the sustainability of agricultural resources to produce optimally, and to agroecology balance maintenance in the long term..

Keywords: Agroecotechnology; Citrus; IMCGH; PTKJS; Ecosystem; Ecology; Environmental conservation

The Prospects of Gerga Citrus in Lebong District, Province of Bengkulu

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ABSTRACT. RGL citrus, better known as Gerga citrus, is a superior commodity in Lebong District because it has competitive advantages such as yellow - orange colour of...
fruit with high levels of juice and fruited throughout the year. The development prospects of Gerga citrus assessment was implemented in 2012 at developing area of Gerga citrus in Lebong District, Bengkulu Province. The sources of data used in this study were: (1) primary data in the form of technical and institutional issues, farm record keeping of Gerga citrus farming for 6 years, existing technologies of citrus cultivation and post-harvest, and marketing of citrus and (2) secondary data in the form of regional potential data. Primary data was collected through: (1) focus group discussion with the head of 10 citrus farmer groups and five government officials; (2) interviews with farmers / entrepreneurs who have succeeded in citrus farming, and (3) distribution of questionnaires to 40 citrus growers/ field workers and (4) field observations. SWOT analysis and financial analysis were used to find the feasibility. From the economic analysis result of Gerga citrus farming during 6 years, the break-even point of Gerga citrus agribusiness occurred at the 4th years of farming. The crop productivity at the 5th years of farming was 32.5 t/ha and at the 6th years farming was 42.5 t/ha. At the citrus price Rp15.000,00 per kg then the profit can be reached Rp200.000.000,00 and Rp400.000.000,00 in the 5th year and 6th year of farming respectively. This study suggests that the prospect of the development of citrus Gerga Lebong is very good. Through the SWOT analysis was obtained the strategies which is needed to develop citrus agribusiness region such as increasing knowledge of farmers /workers, providing farming inputs for farmers, strengthening financial and marketing institutions and also support from relevant agencies in giving strong motivation to citrus farmers.

Keywords : Citrus Gerga; RGL citrus; Citrus agribusiness region

**Research Result to Overcome The Effect of Climate Change on Horticultural Plant in Indonesia**

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**ABSTRACT.** Climate change is a change in the global climate caused by nature as well as human. For horticultural plant, the change shows the effect on the increasing of pest and disease attack, declining of productivity, and also damage on yield. This paper is presenting a review on several researches that have been done to cope with the climate change. It is showed that research for that purpose can be applied by manipulating environment along with manipulating plants. By environmental manipulation, result showed that we may achieve some improvement for horticultural production. For example, reforestation improves the environment so that apple grow better in Batu, the application of IMHCO (integrated management of healthy citrus orchard) in district of Jember increases yield.
from 5-10 ton/ha to 10-12 ton/ha, mulch and manure application decreases fruit break on mandarin cv Terigas in West Borneo, yellow sap on mangosteen could be controlled by management of soil humidity, and by using green house or screen house, plant growth can be managed under any circumstances. Furthermore, plant manipulation is also important. For instances, we may use citrus seed derived from combination of grafting and budding as well as JC and other alternative as rootstocks at tidal area in South Borneo, arrange plant architecture on apple so that the branches grow ascend to avoid the apple flower getting wet because of rain, moreover Gemini virus on chili and tomato may be controlled by using resistant varieties, while modern technology may be useful on development of transgenic plants that could survive the climate change.

Keywords: Climate change; Horticultural; Research