

suboptimal temperature, regardless of nutrition and crop type. Nutrient concentrations in various plant parts varied; although, most significant results showed a reduction in accumulation of nutrients at lower temperature. Whitefly oviposition was lower in petunias than zinnias. Results showed that the temperature and/or CO<sub>2</sub> treatments did not affect whitefly oviposition. These partial results show that suboptimal temperatures and CO<sub>2</sub> enrichment influence plant quality and production time, so care must be taken if this strategy is utilized to help decrease energy costs.

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### **(319) Study on Potential Production of Lotus in Thailand**

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There are many marsh areas in Thailand where some are swamps that are suitable for lotus farming especially in Budhamontol District in Nakornpatom province. It was recognized as one of the most important lotus farm in Thailand. From the survey research most farmers who grow lotus are men with average age of 43.4 years. The lotus farm areas are 18.08 rai (7.232 acres) per person in average. Most of the areas are used to be rice farm and are rented. Better income is the reason for farmers who change from rice farm to lotus farm. About 62.86 % of the farmers used their own financial cost for their lotus farm. Lotus farm begins with the preparation of lotus pond by plowing off the land surface, leaving the pond to be dried out, putting in bio fertilizers and then getting water into the pond about 15 centimeters height from the bottom. Farmers will transplant the lotus rhizomes in the pond which is called covered with soil method. The popular varieties Lotus rhizomes is Sattabanka-cha. Farmers who grow the lotus will start in summer during February–March because the plant will grow up very well and will be harvested from May onward. At the age of 3–4 months or when the lotus yield less products farmers will plough over the stems and rhizomes to be buried in the soil and let the rhizomes to sprout up. Farmers will put in fertilizers to the lotus farm at 50 kilograms per rai every 20 – 30 days. To get rid of plant insects the farmers will spray insecticides every 2 weeks. The products from lotus farm are lotus flowers, young and old berry like fruits but mostly are flowers. Lotus flowers for sale that suit the need of the market should be at the age of 2 months. Harvesting of lotus products will be accounted for 207.14 bundles (bundle with 10 flowers) on average a day. Most farmers will sell their products by themselves at Pak klongtalad. Some has sent their product to Singapore. The net income is about 1,028.25 baht per day. In addition, for export,

which is another way of marketing, only a few farmers could do by themselves due to the lack of knowledge in international market. They have to depend upon the middleman and exporter for other flowers such as orchid

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Springs F & G

### **Genetics/Germplasm/Plant Breeding: Biotechnology 2**

#### **(064) Characteristics of Differentially Expressed Genes in Cold-stressed Suppression Subtractive Hybridization Library of Winterfat**

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As a high stress resistance psammophyte, winterfat, *Krascheninikovia lanata* (Pursh) A. Meeuse & Smit, has been successfully introduced into many countries. The leaves and branches of winterfat grown in room temperatures (15-25°C) and under cold stress (-10-5 °C) were used as the Driver and the Tester, respectively. Both Tester and Driver ds cDNA were prepared from their high quality mRNA, which were purified from their total RNA. Tester and Driver cDNA were separately digested to obtain shorter, blunt-ended molecules by RasI. Two Tester populations were created with different adaptors, while Driver cDNA had no adaptors. Differentially expressed genes were equalized and enriched by two round subtractive hybridizations using excess Driver population as compared with Tester population. The differentially expressed cDNAs were exponentially amplified by first round suppression PCR using the diluted hybridization product as template. The secondary PCR was performed using the first PCR product as template by nested primers to finally enrich the differentially expressed cDNAs, which consist of the SSH library of winterfat. These cDNAs were inserted into vectors and 362 cDNA clones were obtained. The sequencing results showed that some cDNAs of cold-stressed winterfat SSH library had relatively high homology with known stress resistance-related genes or proteins. Other cDNAs are new genes which are firstly reported. Our results lay a foundation

for the cDNA cloning of valuable genes, including antifreeze, heat-resistant, drought-tolerant and alkali-salt-tolerant genes, and their transgenic applications.

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### **(065) Isolation and Characterization of Salicylic Acid Induced Transcription Factor SIWRKY from Tomato**

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WRKY transcription factors belong to a large family of zinc finger regulatory proteins in higher plants in many biological processes, such as responses to biotic and abiotic stress, plant development and metabolism. However, cloning, expression and function of WRKY family of tomato are little studied. PCR primers were designed based on the conserved domain of *Solanum tuberosum* and *Capsicum annuum* WRKY transcription factor. The full-length cDNA of WRKY-like gene was cloned from the four-leaf stage tomato using homology-based cloning and RT-PCR methods four hours after inducing by 5mM salicylic acid. Various bioinformatics methods including blastn, ORF Finder, and DNAMAN were used to analyze and predict the feature and possible functions of the novel cDNA sequence. The result showed that SIWRKY is a full-length of the novel gene. Sequence analysis indicated that SIWRKY has one conserved WRKY domain and one zinc finger structure, consisted of 975 nucleotides, and deduced amino acid sequence containing 254 amino acids. For the putative protein, SIWRKY has 83% and 64% similarity with WRKY-like transcription factor of *Nicotiana tabacum* and *Vitis vinifera* respectively. The relative high similarity with WRKY transcription factors in other botanic species was found as well. Semi-quantitative RT-PCR demonstrated that the corresponding mRNA of SIWRKY was expressed at a similar level in root, stem and leaf of tomato, and accumulated abundantly 2-8h after treatment upon 5mM salicylic acid. The research indicated that the SIWRKY gene may function in plant development and plays a role in plant tolerance to biotic stress, and it has been found that members of plant WRKY transcription factor families are widely implicated in defense responses. So, due to the potential of biotic and abiotic stress activity, tomato SIWRKY gene can be used to enhance resistance against fungi. Therefore, the functions of the novel gene are valuable for further investigations.

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### **(066) Shoot Tip Cryopreservation of *Solanum tuberosum* Germplasm**

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Liquid nitrogen storage of vegetatively-propagated germplasm collections is the most economic and reliable long-term preservation method for many of these collections. Over the past 11 years, the USDA-ARS National Center for Genetic Resources Preservation (NCGRP) cryopreserved over 100 different potato (*S. tuberosum*) germplasm accessions originating from six different countries including the United States. In vitro shoot tips of these accessions are currently processed using the droplet vitrification method described by Haeng-Hoon et al. (2006). Our goal is to place 150 shoot tips per accession into long-term liquid nitrogen storage. In the first years of the program, the post cryo viability was relatively low with 25 to 40% of the cryopreserved shoot tips surviving and growing into plants. With improvements in methodology, shoot tip viability increased from 40 to 100% in some accessions. Genotype specific responses to cryo tolerance were observed. In addition to the liquid nitrogen storage, all potato accessions stored at NCGRP are also maintained in vitro as minitubers, undergoing a periodic shoot initiation and retuberization. The cryopreservation method used for potato germplasm accessions is very efficient; however, research on protocol modifications is still needed to accommodate cryo storage of recalcitrant potato genotypes.

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### **(067) Effect of Carpel Primordia-targeted Inhibition of Ethylene Perception on Sex Expression and Fruit Ripening in Melon (*Cucumis melo* L.)**

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