

chrysotoxum was proved. The suitable medium for protocorm proliferation was solidified ND medium containing 4 mg/l BA. The proliferation rate was 85%. Encapsulated-protocorms were dehydrated by air-drying method in laminar air flow for 1, 2, 3, 4 and 5 hours. The highest survival rate of dehydrated beads was 3 hours. The survival percentage was 64%. The last experiment was performed to determine the effect of preservation temperature on survival of protocorms and artificial seeds. The conditions tested were: -20 °C and -80 °C. Encapsulated-protocorms were precultured in liquid ND medium containing 0.25 M sucrose at 4 °C in the dark for 1 week then transferred to liquid ND medium containing 0.75 M sucrose for 2 days and dehydrated before freezing. The result showed that the best condition for survival of protocorms and artificial seeds was -80 °C.

S09.377

Studies on Creating Cold Resistant *Trachycarpus fortunei* in Beijing

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Trachycarpus fortunei is not only an important plant material in forestry and urban Landscape, but also one of the most cold hardy species in *Trachycarpus* genus. It could resist -7.1 °C in the open in Sichuan Province. The distribution of *T. fortunei* is mainly along Qinling, to Yangzi River area. There was no record for cultivation of this species in Beijing before 1979. The seedlings in Beijing were from the seeds in Xi'an and sowed in 1980. They could resist -17.8 °C for a short period. In January 2009, the lowest temperature had reached -16 °C. The temperature is almost the lowest in the past 40 years in Beijing in December. The 30-year-old *Trachycarpus* only have freezing injury on old leaves. Electrical conductivity test of different *T. fortunei* for different regions was conducted. The result showed that the leave of *T. fortunei* in Beijing is more cold resistant than the same species in Kunming, Yunnan Province. The *T. fortunei* tree bore fruits every year after 2005. Over 8622 seeds were obtained in December 2009. The result showed that it was a successful way to create the cold hardy *T. fortunei* for acclimatization. Acknowledgement: Supported by National Natural Science Foundation of China. Grant No. 30872060

S09.378

Association Analysis of Some Morphological Traits and Essential Oil Components with Microsatellite Data in Damask Rose (*Rosa damascena* Mill.)

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Rosa damascena Mill. is mainly used for essential oil production. Due to the low oil content in *Rosa* genus, its medicinal properties and the lack of natural and synthetic substitutes, rose oil is one of the most expensive essential oils in the world markets. Nine polymorphic microsatellite markers were used to analyze the genetic diversity of 40 accessions of *R. damascena* collected across major and minor rose oil production areas in Iran. Along with several morphological characteristics, the oil content and composition of the mentioned plant material were measured for two years. In order to discover any possible association between molecular markers with some morphological traits or essential oil components stepwise regression analyses were performed. All microsatellite markers showed a high level of polymorphism (5–15 alleles per microsatellite marker, with an average of 9.11 alleles per locus). Furthermore, the morphological and phytochemical analyses demonstrated the similar level of polymorphism. Some traits such as the number of petals, stamens and flower weight showed 88.2, 71.7 and 84 percent association with the molecular data, respectively. Moreover a number of essential oil components such as Geraniol, Citronellol, β-Bourbonene, Hexadecanol and Heptadecane showed low or moderate levels of association with microsatellite markers.

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Storage Compounds of *Anthurium* spp. Seeds

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The Embrapa Tropical Agroindustry sustains a collection of Brazilian anthuriums with an ornamental potential. Although essential for genetic improvement and commercial exploitation, the biological knowledge of these species is still insufficient. For instance, data about the storage mechanisms and mobilization of nutrients in seeds are fundamental to obtain more resistant plants. This work aims to characterize the morphology and seed storage composition of four accessions from Embrapa Anthuriums Germoplasm Collection, with great ornamental value for cut foliage. In order to perform the morphological analysis, the seeds were transversally cut, fixed into Karnovsky, dehydrated through a growing ethanolic series, filled up with Historesin and cut using an automatic microtome. The slices obtained were stained with Xylidine Ponceau (XP) at pH 2.5 or allowed to react with acid Periodic and Schiff (PAS). The samples were also macerated and characterized regarding total protein content, carbohydrates, starch and lipids using the following methods: Bradford, anthron[g1] a, enzymatic reaction[G2] and hexane extraction, respectively. According to chemical and morphological analysis, the seeds of the studied entries present as storage compounds: lipids from 25 to 45%, starch from 11.43 to 13,5% and proteins from 9.97 to 16.75%. In all entries the carbohydrate level was spurious between zero and 0.46%. Staining with XP, an anionic dye that identifies compounds with free positive charge, allowed us to observe the presence of protein globules in the cytosol of cotyledons and endosperm cells. Additionally, PAS reaction indicated granules in the cytosol, which were identified as starch through Lugol reaction. In conclusion, the main storage content of the analyzed anthuriums seeds is lipids, starch and proteins.

S09.380

The Effect of Thyme Oil on Vase Life of Cut Rose (*Rosa hybrida* 'Grand Prix')

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To investigate the effect of various preservative solutions on the postharvest characteristics of cut rose (*Rosa hybrida* L. cv. Grand Prix), the experiment was done in the frame of completely randomized design with 3 replicates. Cut roses were continuously treated with distilled water (as control) and solutions containing silver thiosulphate, sodium nitroprusside, ethanol, thyme oil, hydroxyquinoline sulphate. Sucrose was used in all of treatments except control solution. During postharvest life of flower, parameters comprising of vase life, flower diameter, bud flower opening stages, bent neck, display quality, water uptake, fresh weight, dry weight and chlorophyll and carotenoid were measured. The results indicated that all used treatments in this study, except treatment of 10 % ethanol plus 15 % sucrose resulted to extend the vase life which between these treatments, 400 mg^l⁻¹ HQS plus 15 % sucrose prolonged the longevity, higher than the other treatments. Besides, it was observed that flower diameter in all of vase solutions was increased until fourth day, but after this day was decreased. However, effect of 10 % ethanol and 2 ml^l⁻¹ essential oil treatments on the enhancement of flower diameter was lower than control and other treatments. Theses later solutions markedly was resulted to decline flower opening, whereas the other treatments didn't. After 6 days of treatments, 50 μM SNP-treated flowers maintained water uptake more effectively than did controls or flowers treated with other solutions. Six days being treated with preservative solution containing 400 mg^l⁻¹ HQS resulted to obtain the highest fresh weight than ones. Also, dry weight of cut roses that kept in 400 mg^l⁻¹ HQS plus 15 % sucrose solution were estimated higher than ones.