From Forest Nursery Notes, Summer 2009

20. Impact of shading on seedling growth of *Maclura pomifera* (Osage orange). (ABSTRACT). Rozum, J., Kopsell, D., Bachman, G., and Wiegand, B. HortScience 44(4):1172. 2009.

L. chinense × *L. tulipifera* (9911, 9901, 9907, 9906, 9902 and 9904) were conducted with their parents as the control. Potted seedlings at their water holding capacity were placed in plastic house in mid-July and then different gradients of water stress were achieved under natural conditions. Leave samples were taken to determine their water content, chlorophyll content, proline content and photosynthetic characteristics at 24 h, 72 h, 120 h, and 168 h after completed water saturation. The results showed that significant difference was present in decrease extent of leave water content under water stress between hybrid clones and their parents. The decrease extent in descending order was CKc, 9911, 9906, 9902, 9904, 9901, CKt, 9907. Water stress caused great damage of chlorophyll in leaves of the two parents. The damage extent in all *Liriodendron* samples was remarkably different, and in descending order was CKc, CKt, 9904, 9906, 9902, 9901, 9907, 9911. Chlorophyll content of different *Liriodendron* samples within 168h after water stress in descending order was 9911, 9901, 9907, 9906, 9902, 9904, CKt, CKc. Water stress improved the proline content of *Liriodendron*. The proline content of 9901 increased up to 360.0 $mg \cdot g^{-1}$ FW, which equaled approximately three times the CKc. Water stress had great effects on photosynthetic characteristics of *Liriodendron*. With the increasing of water stress, net photosynthetic rate decreased sharply. The net photosynthetic rate of hybrid clones was much higher than that of CKt and CKc. Evaluation on water tolerance of *Liriodendron* via fuzzy decision method showed that 9901 and 9911 had the strongest water tolerance capacity, followed by 9907, 9906, 9902, CKt, 9904 and CKc in descending order, indicating that the hybrid clones of *L. chinense* × *L. tulipifera* generally exhibited remarkable super-parent superiority in resistance to water stress.

Specified Source(s) of Funding: the National "Eleventh Five-Year Programme" of China (2006BAD03A0501)

(76) Impact of Shading on Seedling Growth of *Maclura pomifera* (Osage Orange)

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Osage orange (*Maclura pomifera* (Raf.) C.K. Schneid.) shows potential for use as a biofuel feedstock. Specifically, the fruit of Osage orange is being investigated for biofuel-production due to its high percentage of oil, fermentable sugars, and other carbohydrates. Since Osage orange does not begin bearing fruit until approximately ten years of age, there is a need to evaluate the seedling stage of development. Because Osage orange is being considered for inclusion in intercropping production systems, the effect of shading on seedling growth is important. However, there is limited data describing best management practices for seedling production. The objectives of our research were to determine shade tolerance and the effects of varying shade percentages on Osage orange seedlings in a controlled greenhouse environment. Greenhouse trials were conducted in January and June of 2008, lasting for 90 and 120 days, respectively. Osage orange seedlings were grown in "conetainers" in each trial, sized 16 and 40 cubic inches, respectively, and set up in a randomized block design with four blocks. Treatments were a no shaded control, and shading cloth of 30%, 50%, and 70%. Plant growth parameters including height, leaf number, fresh and dry leaf, shoot and root weights, and leaf area were measured every 30 days during each trial. Trial one, which was conducted in January, resulted in no significant differences among growth parameters, therefore the experiment was repeated during the growing season. After 120 days height, leaf area, and dry root weight were significant among treatments. Height increased linearly ($P \leq 0.001$) from 231 mm under 0% shade to 344 mm under 70% shade. Leaf area increased linearly ($P \leq 0.001$) from 178 cm^2 under 0% shade to 287 cm^2 under 70% shade. Treatments did not affect number of leaves, fresh or dry leaf weight, fresh or dry shoot weight, or fresh root weight. Dry root weight, however, decreased linearly ($P \leq 0.01$) from 2.04 g under 0% shade to 1.40 g under 70% shade. These results show that Osage orange can be exposed to higher shade amounts without detriment to overall biomass, while increasing height and leaf area. Therefore, Osage orange shows promise in an intercropping system without biomass being negatively affected, although competition for water and nutrients also need to be considered.

(77) Calla Lily Growth and Development in Response to Saline Irrigation

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Salinity is an important factor impacting plant growth world-wide. Salinity is increasing not only in agricultural areas, but also in urban areas, where ornamental plants are often grown; however, very little research has been done on salt stress and ornamentals. The purpose of this research is to quantify the effect of moderate salt stress on Calla Lily growth and developmental timing. Salt stress was measured in four different Calla Lily varieties (Flame, Pink Rehmanii, Pillow Talk, and White Alba) with three different concentrations of NaCl (0, 25, and 50 mM). In both the spring and the fall a group of rhizomes were irrigated with saline irrigation solutions immediately after planting. The time to emergence and time to first flower were recorded for 150 days. When the salt stress was applied pre-emergence there was no variation in emergence or flowering time in the fall. However, in the spring the plants exposed to 50 mM NaCl had a lower percentage of plants that flowered. Salt stress was also applied to a group of rhizomes after emergence for 63 days. Although there were differences among varieties for height, biomass, and flower number there was no salinity by variety interaction for any of the parameters measured. None of the salinity treatments had a significant effect on plant height, chlorophyll, or fresh weight. While flower number was not affected by salinity in the fall, it was significantly decreased in the spring. The dry weight of the shoot was significantly decreased in the 50 mM treatment, which was correlated with decreased midday photosynthetic rates. Despite the decrease in plant dry weight, the effect of salinity was so minimal to overall appearance of the plants when the salt stress was applied post-emergence that it was impossible to determine which plants were being stressed just by visual inspection. It appears that there is tolerance to moderate salinities in these varieties of calla lily; therefore, irrigation with lower quality water may be possible in both landscapes and greenhouse conditions without loss of ornamental quality.

(78) Water Relations, Yield and Fruit Quality of Grafted, Field-grown Watermelons

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Vegetable grafting is becoming popular not only for disease control, but also for managing abiotic stresses such as drought. The ability of