Bud-take and scion growth for buds taken from drought stressed budwood trees and response of buds to BA application

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Keywords: citrus, bud take, BA, drought stress

Abstract:

We grew budwood source trees (Hamlin sweet orange) and rootstock seedling trees (Swingle citrumelo) under well watered (100% ET) and drought stress (50% ET) conditions to determine if the water status of the budwood and/or rootstock affected bud live and growth. We hypothesized that the survival and growth of buds harvested from drought stressed source trees would be negatively affected compared with buds from well-watered trees. One container-grown budwood tree was grown under each watering treatment so as to minimize variation among buds due to tree differences. After three weeks, 24 buds were harvested from each budwood tree (drought stressed and well watered). During the same three week period, 48 rootstock seedlings were grown under the same well watered or drought stress conditions (24 trees each). The harvested buds were inserted into the rootstock seedlings creating 12 trees of each budwood/rootstock water stress combination. The respective drought stress treatments were continued post-budding. The bud live and scion growth were measured over time. Seven weeks after budding, 500 ppm benzyladenine (BA) solution was applied to the buds followed by a repeat application two weeks later to the buds that did not break. Just before the second application of BA, half of the trees from drought stress treatment were moved to 100% watering regime. The bud break was generally poor (<5%) in all the treatments until 6 weeks after budding. However, BA application significantly enhanced bud break (66%) in well-watered trees, but for drought stressed trees one application of BA failed to promote bud break. Within a
week after the second BA application, 100% bud break was observed in case of well watered
trees and in the trees that were moved from drought stress to well watered regime. In the drought
stressed trees, two BA applications resulted in a total bud break of 36%. The results pertaining to
bud break and scion growth indicate that there is an interaction between BA application and
water stress and the well-watered trees showed greater bud break success rate with BA
application as compared to the drought stressed trees.