

O-48 (153) Keynote Speaker**NEW ARCHITECTURES AND ROOTSTOCKS IMPACTS ON VIGOR, YIELD EFFICIENCY, FRUIT QUALITY, PHOTOSYNTHESIS, AND MINERAL PARTITIONING IN MODERN APPLE ORCHARDS**

Prof. Dr. Esmail Fallahi, University of Idaho, Parma Res. & Extension Center, 29603 University of Idaho Lane, Parma, ID 83660-6699, United States of America; efallahi@uidaho.edu

The increasing world population and decreasing suitable land and water mandate establishment of high-density orchards, using size-controlling rootstocks. Rootstock vigor facilitates various tree architectures and affects pomological characteristics of the scion cultivar. In the past two decades, scientists at the University of Idaho Pomology Program, in junction with NC-140 national program, have experimented with several tree canopy architectures. Among these systems, tall spindle and V shape training systems in combination with dwarf rootstocks, have resulted in heavy production of exceptionally high quality apples. Also, as part of our NC-140 project, we have studied the long-term impact (5 years) of several rootstocks on precocity, yield, and fruit quality attributes and leaf mineral nutrition of the apple scion cultivars through different projects over several years. In this study, 'Aztec Fuji' apple, trees on 70-20-20, B.67-5-32, CG.4004, CG.3001, and PiAu5111 had the largest trunk cross sectional area (TCSA) but those on B.7-20-21 and B.71-7-22 had the smallest TCSA. Trees on G41N, 935N, and CG4004 often had high yields, but those on PiAu9-90 and B.71722, and B.7-20-21 had the least production. Trees on CG.4003 and G11 were among the most yield efficient and crop efficient, while those on B.70-20-20 and PiAu990 were the least yield-efficient trees. Trees on G.41N, and CG3001, CG.4004 often had the largest fruit while those on B.7-20-21, CG.4003, and PiAu990 had smallest fruits. Fruit from trees on B.7-20-21 had the highest soluble solids concentration (SSC) and firmness because of their smallest size. Trees on B.70-20-20 were among those with the least fruit color, SSC, and firmness. Fruits from trees on G11N and G11TC rootstocks had more advanced starch degradation pattern. Leaves from the current terminal shoots of 'BC-2 Fuji' apple trees on M.9 had higher net photosynthesis and transpiration than those on M.7 EMLA rootstock. A wide range of differences existed in apple leaf mineral nutrient concentrations among rootstocks. 'Gala' trees on more vigorous rootstocks such as Geneva 30 and Supporter 4 had higher leaf K. 'Gala' trees on B.9 ceased terminal growth earlier than those on vigorous ones. Rootstocks also affected fruit minerals and fruit with higher nitrogen and lower calcium had less color and poor storage life.

Keywords: High density systems, yield efficiency