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# Third Year Performance of Honeycrisp on Dwarfing Rootstocks

Paul A. Domoto
*Iowa State University*, domoto@iastate.edu

Lynn R. Schroeder
*Iowa State University*, lsispg@iastate.edu

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**Abstract**
To evaluate the adaptability and performance of new and promising apple rootstocks in the dwarfing size-control category, a NC-140 regional rootstock trial was established in 2010 at 12 sites in the United States (CO, IA, IL, IN, MA, MI, MN, NJ, NY, OH, UT, WI), two sites in Canada (BC, NS), and one site in Mexico (CHIH) with Honeycrisp serving as the test cultivar. The Iowa planting, located at the ISU Horticulture Research Station, includes 31 rootstocks with new selections from theCornell-Geneva breeding program (G., CG.),Russia (B.), and Germany (PiAu , Supp.), with M.26, M.9 Pajam 2 and M.9 T337 serving as industry standards. Tissue cultured propagated (TC) rootstocks of G.41, G.202, and G.935 were included for comparison with normal (N) stool bed propagated rootstocks. This report summarizes the tree-growth characteristics of the Iowa planting during the 2012 growing season.

**Keywords**
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**Disciplines**
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# Third Year Performance of Honeycrisp on Dwarfing Rootstocks

**RFR-A1215**

Paul Domoto, professor
Department of Horticulture
Lynn Schroeder, field lab tech
Horticulture Research Station

## Introduction

To evaluate the adaptability and performance of new and promising apple rootstocks in the dwarfing size-control category, a NC-140 regional rootstock trial was established in 2010 at 12 sites in the United States (CO, IA, IL, IN, MA, MI, MN, NJ, NY, OH, UT, WI), two sites in Canada (BC, NS), and one site in Mexico (CHIH) with Honeycrisp serving as the test cultivar. The Iowa planting, located at the ISU Horticulture Research Station, includes 31 rootstocks with new selections from the Cornell-Geneva breeding program (G., CG.), Russia (B.), and Germany (PiAu , Supp.), with M.26, M.9 Pajam 2 and M.9 T337 serving as industry standards. Tissue cultured propagated (TC) rootstocks of G.41, G.202, and G.935 were included for comparison with normal (N) stool bed propagated rootstocks. This report summarizes the tree-growth characteristics of the Iowa planting during the 2012 growing season.

## Materials and Methods

The trees were planted at a 4 × 14 ft spacing with 1 to 3 trees/plot in a randomized block design replicated four times. Gala/B. 9 trees were planted between each block and at the ends of the rows as pollinators, and Auvil Early Fuji/Bud 9 trees were inserted as replacements for trees broken off by wind in 2010. Trees are being trained to the tall spindle system using a 3/4-in. metal conduit for support. Supplemental water is being provided though trickle irrigation.

## Results and Discussion

Although the 2011-12 winter was considered mild, freezing events occurred on January 21 (-8°F) and March 5 (5°F). An unusual warm spell occurred in mid-March when recorded high temperatures ranged from 77 to 84°F. Honeycrisp king blossoms were open by April 4 and full bloom occurred on April 9, about three weeks ahead of normal. During the period from April 10-12 a severe freeze occurred with 19°F recorded in the field on April 11.

The April 11 freeze killed all the blossoms. Prior to the April freeze, blossom clusters per tree were counted, and many aborted cluster were observed and counted (Table 1). Trees on B.71-7-22 and B.9, followed by G.11, had the highest blossom cluster density, while trees on B.70-20-20 and CG.4814 failed to bloom. Trees on Supp.3 and B.71-7-22 had the highest percentage of aborted buds.

Four out of six trees on Supp.3 failed to leaf out or leafed out and died. Many trees on other rootstocks exhibited early season symptoms of decline (Table 1). It appears that the March 5 freeze probably killed the Supp.3 trees and caused injury to the blossom clusters.

With the lack of a crop, zonal leaf chlorosis as reported in 2011 was evident on Honeycrisp trees in early July. When evaluated in September, trees on all rootstocks exhibited symptoms with trees on PiAu 9-90, Supp.3, G.935N, G.935TC, and Bud 71-7-22 having the highest incidence of the disorder (Table 1).

After three growing seasons, most rootstocks have produced very few suckers (Table 1). Differences in tree growth are starting to become evident with some changes in ranking

from 2011. However, protocol for the tall spindle training system call for the tree height to be confined to 10 ft by pruning back to weak laterals, and tree spread to be confined to the allotted trees spacing (4 ft) by bending vigorous shoots below horizontal and removing vigorous side branches.

**Acknowledgements**

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**Table 1. Growth characteristics of Honeycrisp apple trees on 31 rootstocks in the Iowa planting of the 2010 NC-140 apple rootstock trial for 2012.**

| | | 2011 | 2012 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rootstock | No. of trees | Trunk dia. (in) | Blossom cluster density[z] | % Dead clusters /tree | Tree vigor rating [y] | Zonal chlorosis rating [x] | No. of suckers / tree | Trunk dia. (in.) | Tree height (ft) | Tree spread (ft) |
| B.70-20-20 | 12 | 1.27 | .0 | . | 3.1 | 5.8 | .5 | 1.62 | 8.3 | 4.6 |
| CG.3001 | 2 | 1.10 | 4.0 | 9 | 3.0 | 6.0 | .0 | 1.48 | 8.4 | 4.7 |
| B.70-20-21 | 12 | 1.08 | 6.0 | 20 | 2.3 | 4.8 | .1 | 1.44 | 7.6 | 3.9 |
| B.7-3-150 | 10 | 1.05 | 4.6 | 15 | 1.3 | 4.8 | .0 | 1.42 | 7.8 | 4.0 |
| B.67-5-32 | 10 | 1.01 | .8 | 13 | 1.9 | 4.2 | .0 | 1.39 | 7.9 | 4.3 |
| G.202 N | 3 | 1.08 | 1.9 | 0 | 2.7 | 6.7 | .7 | 1.36 | 8.5 | 5.0 |
| B.64-194 | 7 | 1.11 | 2.8 | 12 | 3.4 | 6.4 | .0 | 1.36 | 7.8 | 3.8 |
| CG.4814 | 4 | .99 | .0 | . | 2.3 | 5.5 | .3 | 1.36 | 8.2 | 5.0 |
| PiAu 51-11 | 11 | 1.00 | .3 | 14 | 1.5 | 5.2 | .3 | 1.34 | 7.9 | 4.1 |
| B.70-6-8 | 12 | 1.01 | 4.4 | 30 | 2.0 | 5.9 | .0 | 1.33 | 7.7 | 4.0 |
| CG.4004 | 4 | .98 | 3.8 | 7 | 2.8 | 7.0 | .5 | 1.30 | 8.2 | 4.2 |
| CG.4214 | 8 | .87 | 4.5 | 15 | 3.8 | 6.6 | 2.1 | 1.24 | 8.1 | 3.9 |
| PiAu 9-90 | 6 | 1.02 | .8 | 18 | 3.8 | 9.0 | .5 | 1.23 | 7.7 | 4.0 |
| CG.4013 | 3 | .93 | 3.6 | 15 | 1.0 | 4.7 | 1.7 | 1.23 | 7.4 | 4.2 |
| CG.5087 | 3 | .90 | .5 | 0 | 2.3 | 6.0 | .0 | 1.21 | 8.5 | 4.9 |
| M.26 EMLA | 4 | .96 | 5.1 | 24 | 1.8 | 5.5 | .0 | 1.21 | 7.2 | 3.7 |
| G.935 N | 10 | .91 | 5.1 | 14 | 1.8 | 7.9 | 1.2 | 1.18 | 7.9 | 4.2 |
| G.202 TC | 4 | .96 | 6.4 | 18 | 2.8 | 7.8 | .0 | 1.14 | 7.6 | 3.8 |
| M.9 Pajam2 | 12 | .88 | 2.9 | 20 | 3.0 | 6.7 | 1.3 | 1.13 | 7.2 | 3.7 |
| G.41 TC | 3 | .84 | 3.5 | 5 | 3.0 | 5.3 | .0 | 1.09 | 6.8 | 3.7 |
| G.41 N | 8 | .82 | 4.4 | 15 | 3.3 | 6.4 | .0 | 1.08 | 7.4 | 4.2 |
| M.9 T337 | 12 | .83 | 2.9 | 17 | 1.7 | 6.4 | .3 | 1.07 | 7.0 | 3.5 |
| G.11 | 10 | .89 | 11.6 | 32 | 2.0 | 6.8 | .0 | 1.07 | 7.6 | 4.0 |
| B.10 (62-396) | 9 | .83 | 2.0 | 14 | 3.8 | 5.7 | .1 | 1.07 | 6.7 | 3.1 |
| CG.4003 | 3 | .80 | 3.8 | 18 | 3.0 | 7.3 | .3 | 1.02 | 8.0 | 3.8 |
| Supp. 3 | 6 | .79 | 2.1 | 84 | 5.3 | 9.0 | .0 | 1.00 | 7.5 | 3.5 |
| G.935 TC | 3 | .84 | 9.4 | 20 | 1.7 | 8.0 | 1.0 | .97 | 7.3 | 3.7 |
| CG.2034 | 5 | .75 | 4.5 | 5 | 2.0 | 7.8 | .2 | .95 | 7.3 | 3.7 |
| B.9 | 12 | .70 | 18.0 | 31 | 2.0 | 6.8 | .3 | .87 | 6.3 | 2.7 |
| B.71-7-22 | 4 | .51 | 23.1 | 55 | 2.8 | 8.5 | .5 | .60 | 4.9 | 1.8 |
| CG.5222 | 0 | . | . | . | . | . | . | . | . | . |
| LSD .05 | | .11 | 5.6 | 33 | 1.4 | 1.8 | 1.2 | .18 | 1.0 | 1.1 |

[z]Number of blossom cluster per $cm^2$ trunk cross sectional area recorded at the end of the 2011 growing season.
[y]Tree vigor rating (April 24): 1 = healthy; 2 = leaves slightly off-color; 3 = leaves off-color, some growth suppression; 4 = leaves off-color and small, grow weak; 5 = leaves off-color, small and sparse, growth very weak; 6 = dead.
[x]Leaf zonal chlorosis rating: 0 = 0 to 9%; 1 = 10 to 19%; 2 = 20 to 29%; 3 = 30 to 39%; 4 = 40 to 49%; 5= 50 to 59%; 6 = 60 to 69%; 7 = 70 to 79%; 8 = 80 to 89%; 9 = 90 to 99% of the leaves exhibiting symptoms.