

# NC-140 Dwarf Apple Rootstock Evaluation and Trial

## RFR-A2031

Brandon Carpenter, agricultural specialist  
Horticulture Research Station  
Gail Nonnecke, university professor,  
Morrill professor  
Shillah Kwikiiriza, graduate student  
Olivia Meyer, graduate student  
Department of Horticulture

### Introduction

Selection of apple rootstocks adapted to Iowa's climatic conditions is critical for sustainable orchard management. The project's aim is to evaluate current and new dwarfing rootstock selections and their effects on the fruiting cultivar, Buckeye Gala. Beneficial effects from new dwarfing rootstocks can be a key component of sustainable apple production. Evaluation of new rootstock selections along with established rootstocks will determine their suitability for Iowa climatic conditions.

### Materials and Methods

The field experiment was established in 2019 with a randomized complete block design and five replications. Rootstock treatments included seven cultivars grafted with Buckeye Gala fruiting cultivar. Two rootstock selections developed by Cornell University, Geneva, NY (G969 and G4814); one selection by International Fruit Obtention, Seiches-sur-le-Loir, France (IFO #2); and four established rootstocks (Bud10, M26, M9-T337, and G41) were used. One-year-old trees were planted in 2019 and set 3 ft apart within a row, and rows were spaced 14 ft apart, on center. Treatment plots consisted of three trees of the same rootstock. Fruiting cultivars, Ambrosia, grafted on Bud10 rootstock, and Ludacrisp,

grafted on Bud 9 rootstock, were included for pollination of Buckeye Gala. In 2019 and 2020, trees were supported by a temporary trellis system of metal fence posts and single wire. Trunk diameter of trees was measured six inches above the graft union. Height at the highest point of the trees and spread of the widest limbs were measured. Data were analyzed using SAS (PROC GLM), and mean separation within a variable was completed using Tukey HSD ( $P \geq 0.05$ ).

### Results and Discussion

The experimental orchard received damage during a derecho storm August 10, 2020, with sustained winds over 80 mph for at least 30 minutes. Some trees across all rootstock treatments were broken off at the graft union (Figure 1). The rootstock treatment with the highest number of damaged trees was G4814.

Trees grown on G969 and M26 rootstocks had a larger trunk diameter compared with treatments M9-T337 and G41, but the average difference between the largest and smallest diameter was only 0.24 in. (Table 1). M9-T337 rootstock cultivar had a shorter tree height compared with M26, G4814, IFO #2, and G41 treatments. Trees growing on M26 rootstock had a wider limb spread compared with G969. These observed effects are from the second year of growth and the planting is considered to be in its first year of establishment. Additional years of research will provide reliable information about the apple rootstocks' adaptability to soil, climate, and pests, and characteristics of tree anchorage, size, precocity, winter hardiness, and fruit yield.

### Acknowledgements

Appreciation is extended to staff of the ISU Horticulture Research Station for their assistance and maintenance of the orchard.

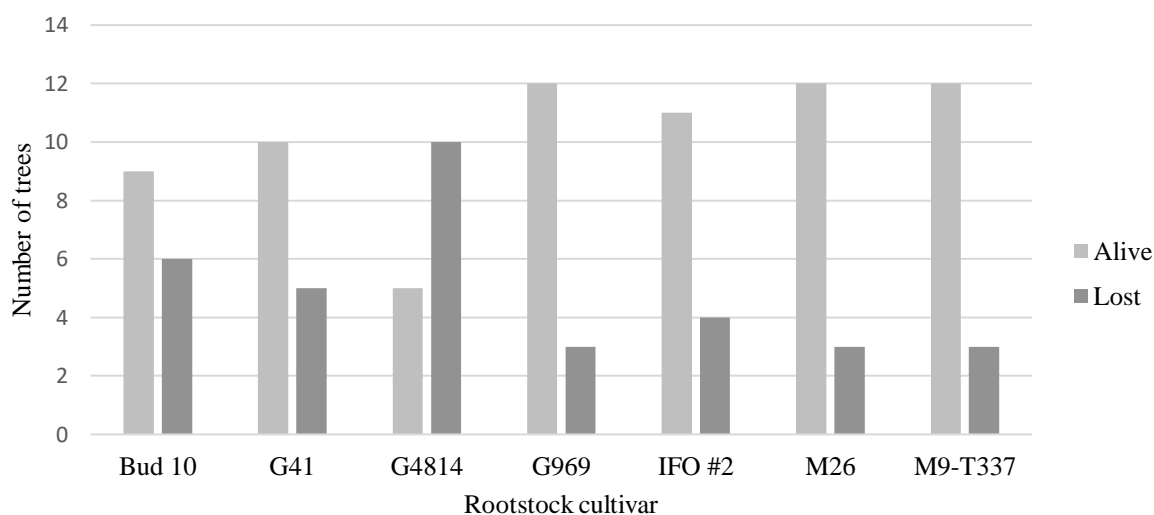
This project is part of the USDA, NIFA, NC140, Multistate Project, Improving Economic and Environmental Sustainability in Tree Fruit Production through Changes in Rootstock Use.

**Table 1. Tree trunk diameter, height, and limb spread of Buckeye Gala apple grown on seven rootstocks, Ames, Iowa.**

Rootstock	Tree trunk diameter (in.) <sup>z</sup>	Tree height (ft, in.)	Tree limb spread (ft, in.)
G969	1.04 a <sup>y</sup>	7 ft, 2.2 in., ab	3 ft, 11.2 in., b
M26	1.03 ab	7 ft, 10.5 in., a	5 ft, 2.2 in., a
Bud 10	0.95 abc	7 ft, 4.6 in., ab	4 ft, 0.8 in., ab
G4814	0.93 abc	7 ft, 11.3 in., a	4 ft, 9.5 in., ab
IFO #2	0.88 bc	7 ft, 8.1 in., a	4 ft, 5.1 in., ab
M9-T337	0.81 c	6 ft, 7.1 in., b	4 ft, 0.4 in., ab
G41	0.80 c	7 ft, 7.7 in., a	4 ft, 4.0 in., ab

<sup>z</sup>Tree trunk diameter measured six inches above graft union; tree height measured at the highest point of trees; and tree spread determined from the widest limbs.

<sup>y</sup>Mean separation within a column by Tukey HSD; means followed by the same letter within a column are not different from one another,  $P < 0.05$ .



**Figure 1. Number of Buckeye Gala apple trees grown on seven rootstocks that were upright (alive) or broken off at graft union (lost) after a severe derecho storm August 10, 2020, Ames, Iowa.**