Scion and Rootstock Affect on the Performance of Grafted Black Walnut Cultivars©

Mark V. Coggeshall
University of Missouri — Center for Agroforestry, 203 Natural Resource Building, University of Missouri, Columbia, Missouri 65211-7270 U.S.A.

Andrew L. Thomas
University of Missouri — Southwest Research Center, 14548 Highway H, Mt. Vernon, Missouri 65712 U.S.A.

J. W. Van Sambeek
USDA Forest Service – North Central Research Station, 202 Natural Resource Building, USDA Forest Service, Columbia, Missouri 65211-7260 U.S.A.

Eastern black walnut (*Juglans nigra* L.) is prized for both its timber and edible nuts and has been suggested as a desirable tree species to use in agroforestry-based systems in the Midwestern U.S.A. (Garrett and McGraw, 2000). New plantings of improved cultivars will be required to fully realize the economic gains expected when managing for nut production (Jones, Mueller, and Van Sambeek, 1998). Grafting is currently the most effective method used to vegetatively propagate eastern black walnut (Coggeshall and Beineke, 1997). Yet to be defined, however, are the long-term effects of different rootstock sources on scion survival, growth, and nut productivity for this species. In California, scions of Persian walnut (*J. regia*) can exhibit increased vigor and pest resistance when grafted on specific rootstocks (McGranahan and Leslie, 1990). Likewise, it is possible that the use of rootstocks grown from seeds of popular black walnut cultivars might also convey some advantages in terms of growth and survival. If so, then significant amounts of seeds would be readily available for use as rootstock sources for future orchard establishment in Missouri. Our objective in this investigation is to determine the long-term effects of different rootstock sources on scion growth and nut productivity in an orchard setting at two locations.

Twenty different rootstock-scion combinations of eastern black walnut were planted at two Missouri locations in Spring 2001. The planting sites were located at the University of Missouri Southwest Research Center (SWRC) near Mt. Vernon and the Horticulture and Agroforestry Research Center (HARC) in New Franklin. The SWRC site is on a Huntington silt loam soil and the HARC site is on a Marshall silt loam. In spring 2000, 1-year-old scions of five popular nut cultivars were grafted onto potted 1-year-old seedling rootstocks from three known female parents plus an unimproved nursery source. Graft survival and growth were assessed in Fall 2003. Nine trees of each scion-rootstock combination were planted in three blocks at the HARC site and six trees in two blocks at SWRC. Two-way analyses of variance were used to test for significant treatment differences or their interactions for planting site, scion, and/or rootstock source.

Overall tree survival was 66% at New Franklin (HARC) and 56% at Mt. Vernon (SWC). Significant differences in survival percent were not detected over planting sites (Table 1). However, scion source did have a significant effect on survival after

Table 1. Average field survival after three growing seasons for grafted trees of five cultivars grafted to seedling rootstocks of three cultivars or unimproved bedrun nursery seedlings at two locations (n = 15 grafts per scion/rootstock combination).

	Rootstock				Scion
Scion	Kwik Krop (%)	Sparrow (%)	Thomas (%)	Bedrun (%)	means[1] (%)
Emma K	50	31	56	83	52 ab
Kwik Krop	83	50	67	81	70 a
Sparrow	75	78	77	36	66 ab
Surprise	77	33	36	44	46 b
Thomas	69	67	58	87	70 a
Stock means[1]:	72 a	52 b	58 a	64 ab	

[1] Means within column or row followed by the same letter are not significantly different according to Duncan's multiple range test ($P < 0.05$).

Table 2. Average tree height + standard deviation after three growing seasons for grafted trees of five cultivars grafted to seedling rootstocks of three cultivars or unimproved bedrun nursery seedlings at two locations.

	Rootstock				Scion
Scion	Kwik Krop (cm)	Sparrow (cm)	Thomas (cm)	Bedrun (cm)	means[1] (cm)
Emma K	186 + 16	211 + 29	166 + 33	169 + 36	180 + 32 a
Kwik Krop	183 + 19	170 + 43	160 + 39	176 + 32	178 + 33 a
Sparrow	173 + 37	156 + 42	178 + 37	160 + 36	167 + 38 a
Surprise	181 + 22	140 + 36	146 + 28	192 + 36	165 + 32 a
Thomas	181 + 36	175 + 38	201 + 11	171 + 36	181 + 33 a
Stock means[1]:	180 + 27 a	171 + 41 a	171 + 34 a	173 + 33 a	

[1] Means within column or row followed by the same letter are not significantly different according to Duncan's multiple range test ($P < 0.05$).

three growing seasons in the field. Grafted Kwik Krop and Thomas scions survived better than grafted Surprise scions, regardless of rootstock source. Grafts that utilized Kwik Krop roostocks had better survival than those grafts using Sparrow rootstocks. No significant rootstock × scion interactions were detected for survival.

Mean 3rd year total scion height equaled 175 cm at HARC and 172 cm at SWRC. While there were no significant 3rd year growth differences detected for either rootstock or scion source, the rootstock × scion interaction was significant (P<3.74). Black walnut grafts which utilized Kwik-Krop seedling rootstocks appeared to produce more consistent growth, regardless of scion source. In contrast, there were significant rootstock × scion interactions detected when using both Sparrow and Thomas seedling rootstocks (Table 2). In particular, Surprise scions performed poorly on both Sparrow and Thomas rootstocks, compared to either Kwik Krop or nursery bedrun seedling rootstocks. These results suggest that the influence of rootstock origin on early growth may be more profound than scion source. We conclude that a variety of factors, including the origin of the rootstock and scion, as well as location may influence the long-term survival and growth of grafted black walnut trees in Missouri.

LITERATURE CITED

Coggeshall, M.V. and **W.F. Beineke.** 1997. Black walnut vegetative propagation: the challenge continues. pp 70-77. In: Van Sambeek, J.W., ed. Knowledge for the future of black walnut. U.S.D.A. Forest Service, North Central Research Station, St. Paul, Minnesota.

Garrett, H.E. and **R.L. McGraw.** 2000. Alley cropping practices. pp. 149-188. In: Garrett, H.E., W.J. Rietveld, and R.F. Fisher, eds. North American agroforestry: An integrated science and practice. Amer. Soc. Agronomy, Madison, Wisconsin.

Jones, J.E., R. Mueller, and **J.W. Van Sambeek,** Eds. 1998. Nut production handbook for eastern black walnut. Southwest Missouri Resource Conservation and Development, Republic, Missouri.

McGranahan, G and **C. Leslie.** 1990. Walnuts (*Juglans* L.). pp. 907-951. In: J.N. Moore and J.R. Ballington, eds. Genetic resources of temperate fruit and nut crops. Volume 2. International Society for Horticulture Science, Wageningen, The Netherlands.

Progress in Velcro Banding Asian Maples©

Nicholas Castrataro, William Johnson, and Brian Maynard

University of Rhode Island, Department of Plant Sciences, Kingston, Rhode Island 02881 U.S.A.

INTRODUCTION

The University of Rhode Island Agricultural Experiment Station is always looking for new plants to increase diversity in the Rhode Island nursery industry. Five different maple species, *Acer tegmentosum, A. ukurunduense, A. capillipes, A. davidii* subsp. *grosseri* (syn. *A. grosseri-davidii*) , and *A. tschonoskii* are new to this area and are being tested for culture and propagation. In 2003 the five maple species were propagated using a banding technique that uses Velcro strips and an early dose of rooting hormone to see if it can enhance adventitious root formation. These maples are believed to be hard to form adventitious roots on. The goal of this project is to increase the rooting percent of these plants so they can be distributed to local nurseries.

MATERIALS AND METHODS

Semihardwood cuttings were prepared 15 May 2003 for *A. tegmentosum* and *A. ukurunduense*. A 2.5-cm square of black Velcro was dipped into Hormodin 3 rooting powder. It was then wrapped around the new spring growth just below the first new node on the twig. *Acer capillipes, A. davidii* subsp. *grosseri,* and *A. tschonoskii* were banded 27 May 2003 because there was not enough new growth 15 May 2003 to attach a Velcro band on. Cuttings from *A. tegmentosum* and *A. ukurunduense* were collected on 23 June 2003. Cuttings were 15 to 20 cm in length. Sixteen controls are taken of each. The soft tips are removed from cuttings back to two nodes. Each cutting was stuck into a 5 × 5 × 14-cm cube filled with 2 perlite : 1 peat (v/v) mix. Thirty-two cubes were placed randomly into a flat. The Velcro bands were removed and cuttings were stuck 5 to 7 cm into the mix. Eight controls of each were treated with Hormodin 2 rooting powder and eight were just treated with water. *Acer davidii* subsp. *grosseri, A. capillipes,* and *A. tschonoskii* cuttings were collected 30 June