‘Red Dragon’ Ornamental Hazelnut

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‘Red Dragon’ is a new ornamental hazelnut (*Corylus avellana* L.) cultivar. It was released by the Oregon Agricultural Experiment Station in Mar. 2008. ‘Red Dragon’ has red leaves, contorted growth habit, and resistance to eastern filbert blight (EFB) caused by *Anisogramma anomala* (Peck) E. Müller.

Origin

‘Red Dragon’, tested as OSU 897.078, resulted from a cross of OSU 487.055 × OSU 367.039 (Fig. 1) made in 1997. OSU 487.055 is from a cross of ‘Contorta’ (syn. *Corylus avellana* var. *contorta*) × VR 6-28, and OSU 367.039 is a redleaf selection from seeds derived from open pollination of ‘Contorta’. VR 6-28 is from a cross of ‘Riccia di Talanico’ from southern Italy and ‘Gasaway’. We believe that ‘Rode Zeller’ (syn. ‘Rote Zellernuss’) is the donor of the redleaf trait, which is conferred by a dominant allele at the leaf anthocyanin locus. A tree of ‘Rode Zeller’ was near the ‘Contorta’ tree from which open-pollinated nuts were collected. ‘Red Dragon’, OSU 487.055, and VR 6-28 carry in a heterozygous state a dominant allele for complete resistance to EFB in Oregon from ‘Gasaway’ (Mehlenbacher et al., 1991). Contorted growth habit is conferred by a recessive allele from ‘Contorta’ (Smith and Mehlenbacher, 1996). ‘Contorta’ was discovered in a hedgerow in Frocester, U.K., approximately 1863 and has been propagated by graftage or layerage (Wakefield, 1962). The nursery trade often calls it ‘Harry Lauder’s Walking Stick’. Hybrid seeds from the cross OSU 487.055 × OSU 367.039 were harvested in Aug. 1997, stratified, and seedlings with contorted growth habit grown in the greenhouse during the summer of 1998 using standard practices (Thompson et al., 1996). From this cross, 42 seedlings with contorted growth habit were planted in the field in Oct. 1998. The designation OSU 897.078 indicates the row and tree location of the original seedling. Nuts were first observed on the original seedling in 2002. Grafted trees of ‘Contorta’ and 19 contorted selections, three or four

trees of each, were planted in a trial in Mar. 2004. The trial was a randomized design in a single row located at the Smith Horticulture Research Farm in Corvallis. Trees in the trial were observed from 2004 to 2008. In 2006 and 2007, 10 nursery growers were invited to take notes on the trees and comment as to which were more desirable. These comments supplemented the notes recorded by the hazelnut breeding program (S.A. Mehlenbacher and D.C. Smith).

Description

Compared with ‘Contorta’, grafted trees of ‘Red Dragon’ are slightly more vigorous with a desirable growth habit that is spreading rather than pendulous and have moderate branching (Figs. 2 and 3). Too little branching would result in a “leggy” appearance, whereas too much branching would result in a very dense canopy. The moderate vigor of ‘Red Dragon’ should facilitate propagation. The degree of contortion is moderate, which is also considered desirable. Because of the natural growth habit of ‘Red Dragon’, it should be possible to maintain a desirable tree form with minimal pruning. Catkins, leaf buds, and young leaves are dark purple in color (Figs. 4 and 5). Leaf size is medium, allowing the contorted growth to be visible in the summer months. The leaves of ‘Red Dragon’, like those of ‘Contorta’, are somewhat curled. Compared with other selections in the trial, ‘Red Dragon’ showed better retention of red leaf color in late summer in leaves near the shoot terminals (Fig. 5). Comments on ‘Red Dragon’ from nursery growers were overwhelmingly positive, especially for growth habit and color retention.

‘Red Dragon’ and several similar selections were propagated by tie-off layerage of the suckers in the summers of 2003 through 2005 and harvested in late November to early January. The layers of ‘Red Dragon’ rooted with a higher frequency and produced more roots than most other contorted selections, and the layers were moderately vigorous (data not shown).

In May 2002, DNA was extracted from several contorted seedlings and amplified with the polymerase chain reaction. Random amplified polymorphic DNA (RAPD) markers UBC 152₈₀₀, UBC 268₅₈₀, and AA12₈₅₀ that are linked to the EFB resistance gene from ‘Gasaway’ (Mehlenbacher et al., 2004) are present in ‘Red Dragon’. Scions were collected from ‘Red Dragon’ and sev-

eral other contorted selections in the spring of 2004 and three trees of each were grafted to rooted layers of *C. avellana*. The shoot tips of the grafted trees were inoculated in the greenhouse with a spore suspension of *A. anomala* and then held under high humidity (Lunde et al., 2000). All three inoculated trees of ‘Red Dragon’ remained free of disease as did the resistant ‘Gasaway’ controls, whereas those of several other selections and the susceptible ‘Daviana’ controls in the same test developed cankers. The lack of cankers confirmed the results of the RAPD markers and indicates complete resistance to the isolate of EFB in Oregon. The response of ‘Red Dragon’ to inoculation with other isolates of EFB from the eastern United States has not been tested.

Susceptibility to bacterial blight caused by *Xanthomonas campestris* pv. *corylina* has not been determined, although no trees have been lost to the disease in our trial plots.

Damage by bud mites (primarily *Phytotus avellanae* Nal.) was rated on ‘Red Dragon’, ‘Contorta’, and eight other contorted selections in the trial planted in Spring 2004. Ratings from 1 (no blasted buds) to 5 (many blasted buds) were recorded on three or four trees of each genotype in December for 3 years (2005 to 2007). Bud mite susceptibility ratings for ‘Red Dragon’ (3.1) and ‘Contorta’ (2.6) were not significantly different [least significant difference (LSD) (0.05) = 0.9]. Bud mite ratings on the original seedlings of ‘Red Dragon’ and other contorted selections recorded in Dec. 2000 to 2002 and 2004 were similar to those in the trial.

The number of catkins was rated in the trial simultaneously with bud mite ratings on a scale of 1 (no catkins) to 5 (many catkins). ‘Red Dragon’ (2.3) sets fewer catkins than ‘Contorta’ (3.2) but more than several other selections (LSD_{0.05} = 0.6). Hazelnuts flower in midwinter with few other plants. Catkins elongate in mid- to late winter in response to warm temperatures and, combined with the contorted growth habit, make an attractive display in the garden. The catkins are purple (Fig. 3), but the pollen is yellow. Pollen shed and female receptivity occur late in the season, at a similar time to ‘Contorta’.

‘Red Dragon’ is being released for its ornamental value rather than nut production. ‘Red Dragon’ sets a few nuts that are small, slightly long, and compressed. The nuts are borne in clusters of one or two in husks equal in length to the nuts. ‘Red Dragon’ has incompatibility alleles S₆ and S₂₆. Both

Fig. 1. Pedigree of ‘Red Dragon’ ornamental hazelnut.

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Fig. 2. A grafted tree of 'Red Dragon' in midwinter showing contorted shoots and spreading growth habit. The rootstock is 'Mortarella'.

Fig. 4. 'Red Dragon' shoots and catkins in midwinter showing presence of anthocyanin.

combines red leaf color and contorted growth habit, but the Plant Patent does not mention resistance to EFB.

Availability

A plant patent is being sought for 'Red Dragon'. Nurseries interested in propagating 'Red Dragon' should pursue a licensing agreement with Oregon State University. In vitro cultures of 'Red Dragon' were established, and micropropagation is slow but feasible. A list of licensed nurseries and micropropagators, and additional information, is available from S.A. Mehlenbacher.

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Fig. 3. A grafted tree of 'Red Dragon' in midsummer showing contorted shoots and dark red leaf color. The rootstock is 'Mortarella'.

Fig. 5. 'Red Dragon' leaves in midsummer showing anthocyanin in leaves near the shoot terminals.

alleles are expressed in the stigmas, but only S_6 is expressed in the pollen.

Fingerprints from simple sequence repeat markers show that 'Red Dragon' is different

from the recently introduced *C. avellana* 'Red Majestic' (Plant Patent 16048) and that trees of 'Red Majestic' from two sources showed different fingerprints. 'Red Majestic'