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'Noiret'™ Grape

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'Noiret'™ (pronounced "nwahr – ay") is a mid-season red wine grape suitable for the production of varietal wines. The distinctive red wine is richly colored and has notes of green and black pepper along with raspberry, blackberry, and some mint aromas. A major distinguishing characteristic of this selection is the fine tannin structure that is complete from the front of the mouth to the back. The tannin structure and the absence of any hybrid aromas strongly distinguish this selection from other red hybrid grapes. The vine is moderately winter hardy and moderately resistant to powdery mildew and Botrytis bunch rot.

ORIGIN

'Noiret'™ was developed at the New York State Agricultural Experiment Station, Cornell University. It is a complex interspecific hybrid red wine grape resulting from a cross made in 1973 between NY65.0467.08 (NY33277 x 'Chancellor') and 'Steuben' (**Fig. 1**). From 251 seeds, 116 seedlings were evaluated in a seedling vineyard. Twenty-eight seedlings were fermented for evaluation of wine characteristics, and about ten were propagated for further testing. The original seedling vine was germinated in 1974 and planted to a permanent site in fall, 1975. Since its initial test for wine characteristics in 1980, it has been identified as test selection NY73.0136.17. 'Noiret' has been available for testing by growers and research cooperators since 1994.

DESCRIPTION

Own-rooted vines grown in phylloxera (*Daktulosphaira vitifoliae* Fitch) infested soils have been long-lived and moderately vigorous. Use of vines grafted onto standard rootstocks is suggested for increased lon-

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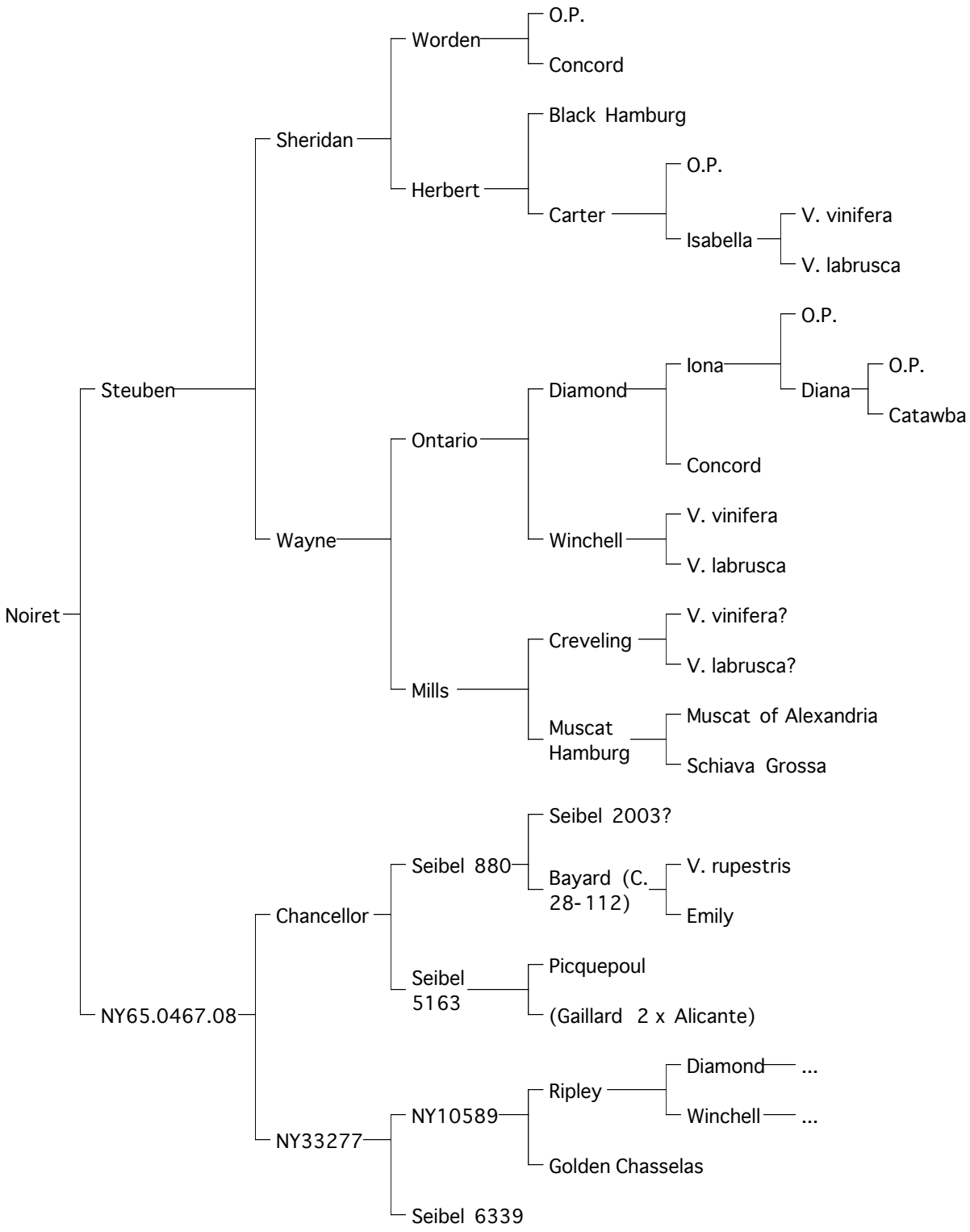
Figure 1. Pedigree of Noiret grape.



gevity and maintenance of vigor. However, care should be taken to protect the graft union from winter cold damage.

Vines of 'Noiret'™ have been observed in plantings at the New York State Agricultural Experiment Station and information on productivity, diseases, pests, and viticultural traits has been recorded. In comparison with two other varieties grown in this area ('Concord' and 'GR 7'), 'Noiret' appears less productive and vine size is smaller but still acceptable (**Table 1**).

Table 1. Observations of vines grown at Geneva, New York, 1996-2005.

Cultivar	Cane pruning weight (lbs/vine)	Cluster weight (lbs.)	Berry weight (gm)	Fruit yield (lbs/vine)
Corot noir	3.1	0.41	2.09	19.1
Noiret	3.3	0.35	3.25	12.4
GR 7	4.2	0.31	1.54	33.4
Concord	4.5	0.25	3.19	16.7

Cold damage resulted in greatly reduced 'Noiret' fruit yields in 2004 and 2005, but 'Concord' and 'GR 7' were unaffected. Between 2001 and 2003 (years during which cold damage was negligible), fruit yields of 'Noiret' were comparable to 'Concord' vines in the same vineyard. The berries are comparable to 'Concord' in weight, but the clusters are larger. Cluster thinning is not usually necessary, but may be helpful in some years. Fruit are usually produced only from shoots developing from primary buds. The vine growth habit is semi-upright to semi-trailing.

Under conditions suitable for disease control in hybrid grape plantings, powdery mildew is only a problem when conditions are highly conducive to disease development, and Botrytis is rare. Downy mildew (*Plasmopara viticola*) of the fruit and leaves can occasionally be a serious problem. 'Noiret' is rated as slightly susceptible to powdery mildew (*Uncinula necator*), black rot (*Guignardia bidwellii*), and Botrytis, and moderately susceptible to downy mildew. Sulfur can be used for powdery mildew control, but should be alternated with other materials. Some sulfur phytotoxicity has been observed, though not usually severe; sulfur applications should be avoided in hot weather. Significant foliar injury has been observed following the use of the strobilurin fungicide, Pristine. Consequently, the new labels for Pristine have a "do not use" restriction for 'Noiret'. The overall level of disease observed is on par with many other interspecific hybrid grapes, and is generally less than observed with European grapes (*V. vinifera*). Under a disease control program usually used for interspecific hybrid grapes, there should be no special disease concerns, though additional sprays for downy mildew may be necessary if conditions warrant.

Budbreak usually takes place after 'Concord' and 'GR 7', but before most *V. vinifera* cultivars. Spring frost is not usually a problem. Bloom takes place 2 – 6 days after 'Concord'. Fruit turn color early in September, yet are harvested between late September and early October. Some fruit are occasionally lost due to the brittleness of the rachis, but the amount of loss is not usually significant. Growers have had no special problems with machine harvesting.

Vines are moderately winter hardy, and some trunks have been lost after very cold winters. Care should be exercised to choose relatively good vineyard sites

Table 2. Wine and juice analyses for Noiret, Corot noir, and additional red wine varieties, 1999-2005.

			JUICE ANALYSES					WINE ANALYSES (after ML & cold stb., before TA adjustments)			
Variety	Yeast / Treatment	Date of Harvest	Brix	pH	TA g/L	Tartrate g/L	Malate g/L	pH	TA g/L	Tartrate g/L	Malate g/L
Noiret	GRE/20°C constant/ML Alpha	4-Oct-05	19.0	3.52	9.2	6.4	3.9	3.63	5.9	3.4	-0.1
Corot noir	GRE/Std. Curve/ML Alpha	19-Oct-05	19.3	3.51	7.4	4.8	2.8	3.82	5.2	3.2	-0.1
GR 7	HP/EC1118/ML Alpha	14-Sep-05	18.7	3.17	14.7	7.2	6.9	3.80	6.1	3.7	0.2
Cabernet Franc	BM45/Modified Std/ML Alpha	19-Oct-05	21.4	3.36	9.0	4.8	3.9	3.48	6.5	3.2	***
Lemberger	GRE Std. Temp.	19-Sep-05	20.5	3.08	8.7	5.2	2.2	3.22	6.9	3.7	-0.9
Pinot noir Cl. 667	L2056/Std. curve /ML Alpha	23-Sep-05	21.7	3.45	8.6	4.5	3.6	3.96	5.4	2.7	0.1
Corot noir	GRE/std. temps/Alpha	11-Oct-04	16.6	3.41	8.4	***	***	3.73	5.7	2.9	0.3
Noiret	HP/GRE/ML Alpha	28-Sep-04	16.6	3.30	12.8	***	***	3.46	6.4	3.9	-0.8
Noiret	GRE/std. temp/Alpha	11-Oct-04	18.7	3.31	10.7	***	***	3.57	7.4	4.3	-0.2
GR 7	HP/GRE/ML Alpha	28-Sep-04	17.4	3.11	12.1	***	***	3.84	5.5	3.9	0.4
Cabernet Franc	GRE/Std. temp/Alpha	13-Oct-04	20.3	3.31	8.6	***	***	3.68	5.3	3.1	-0.3
Corot noir	EC1118/HP	14-Oct-03	16.8	3.10	9.1	***	***	***	10.2	3.2	4.3
Corot noir	EC1118/HP/ML Alpha	14-Oct-03	16.8	3.10	9.1	***	***	3.63	6.7	***	***
Corot noir	EC1118/HP	4-Nov-03	16.5	3.31	14.1	***	***	***	9.7	3.5	4.5
Corot noir	EC1118/HP/ML Alpha	4-Nov-03	16.5	3.31	14.1	***	***	3.66	6.0	***	***
Noiret	EC1118/FS/ML Alpha	21-Oct-03	18.4	3.12	13.4	***	***	3.33	9.0	***	***
Noiret	EC1118/FS	21-Oct-03	18.4	3.12	13.4	***	***	3.10	13.0	***	***
Noiret	EC1118/HP/ML Alpha	21-Oct-03	18.4	3.12	13.4	***	***	3.47	8.3	***	***
Noiret	EC1118/HP	21-Oct-03	18.4	3.12	13.4	***	***	***	12.8	4.3	5.5
Pinot Noir (clone mix)	GRE/FS/ML Alpha	1-Oct-03	21.4	3.27	13.8	***	***	3.76	6.4	3.9	0.0
Cabernet Sauvignon	BRL97/FS/ML Alpha	14-Oct-03	19.4	3.08	9.7	***	***	3.20	***	***	***
Noiret	EC1118/FS/ML Alpha	8-Oct-02	20.0	3.14	7.8	***	***	3.36	7.4	***	***
Noiret	EC1118/FS	8-Oct-02	20.0	3.14	7.8	***	***	3.26	8.6	***	***
Noiret	EC1118/HP/ML Alpha	8-Oct-02	20.0	3.14	7.8	***	***	3.55	6.2	***	***
Noiret	EC1118/HP	8-Oct-02	20.0	3.14	7.8	***	***	3.42	7.6	***	***
Corot noir	EC1118/HP	15-Oct-02	19.0	3.22	7.2	***	***	3.58	6.9	***	***
Corot noir	EC1118/HP/ML Alpha	15-Oct-02	19.0	3.22	7.2	***	***	3.70	5.4	***	***
Lemberger	BRL97/FS/ML Alpha	15-Oct-02	22.8	3.36	6.5	***	***	3.64	6.9	***	***
Pinot noir clone blend	AMH/FS@25 C/ML Alpha	24-Sep-02	22.0	3.34	8.0	***	***	3.86	5.0	***	***
Corot noir	EC1118/FS	3-Oct-01	17.8	3.33	8.9	2.7	1.4	3.58	7.1	1.6	0.2
Corot noir	EC1118/FS/ML	3-Oct-01	17.8	3.33	8.9	2.7	1.4	3.55	6.9	3.9	0.3
Corot noir	EC1118/FS	18-Oct-01	18.4	3.45	7.3	5.8	2.8	3.49	7.4	2.2	1.0
Corot noir	EC1118/FS/ML	18-Oct-01	18.4	3.45	7.3	5.8	2.8	***	***	***	***
Noiret	EC1118/FS	2-Oct-01	19.8	3.27	9.5	4.9	2.0	3.26	10.2	3.8	2.4
Noiret	EC1118/FS/ML	2-Oct-01	19.8	3.27	9.5	4.9	2.0	3.45	7.9	5.4	0.2
GR7	EC1118/HP	18-Sep-01	20.8	3.38	12.7	5.5	3.5	3.64	10.9	2.6	5.2
Cabernet Franc	GRE/FS/ML	22-24-Oct-01	***	***	***	***	***	3.46	6.9	4.4	0.8
Pinot noir cl. 113	AMH/FS/ML	9-Oct-01	23.8	3.49	7.7	6.8	2.8	3.66	5.7	3.2	<0.1
Pinot noir cl. 115	AMH/FS/ML	9-Oct-01	21.8	3.52	7.4	6.6	2.9	3.71	5.5	3.0	<0.1
Lemberger	Syrah/FS/ML	17-Oct-01	23.4	3.43	7.5	6.1	2.3	3.54	6.2	3.9	<0.1
Corot noir	EC1118/FS	31-Oct-00	18.0	3.14	8.7	5.9	3.9	3.48	9.0	2.7	3.9
Corot noir	EC1118/HP	31-Oct-00	18.0	3.14	8.7	5.9	3.9	3.43	9.3	3.8	3.4
Noiret	EC1118/FS	19-Oct-00	19.2	2.89	11.6	***	***	3.13	12.6	3.2	4.3
Lemberger	Syrah/ML	31-Oct-00	20.8	3.03	8.7	7.3	3.3	3.67	5.6	2.1	0.2
Cabernet Franc	AMH/FS/ML	24-Oct-00	19.4	3.10	10.0	6.8	4.8	3.61	6.1	1.3	0.2
Pinot noir clone blend	RC212/FS/ML	17-Oct-00	22.2	3.03	10.7	7.4	5.3	3.64	6.1	1.1	0.2
Corot noir	AMH/FS/ML-M	5-Oct-99	19.0	3.17	5.9	***	***	3.53	6.5	1.9	>0.05
Corot noir	AMH/HP/ML-M	5-Oct-99	19.0	3.17	5.9	***	***	3.69	5.3	2.2	0.1
Noiret	AMH/FS/ML-EQ54	27-Sep-99	20.4	2.91	7.5	***	***	3.20	8.0	2.6	<0.01
GR7	EC1118/HP	9-Sep-99	19.6	3.11	10.4	***	***	3.58	8.8	2.3	4.2
Pinot noir clone 115	AMH/FS/ML-M	20-Sep-99	21.0	3.54	7.0	6.1	1.5	3.40	5.7	1.7	0.0
Pinot Noir clone blend	AMH/FS/ML-M	24-Sep-99	~22	3.23	7.8	***	***	3.83	4.6	1.0	0.0
Lemberger	AMH/FS/ML-EQ54	6-Oct-99	23.0	3.09	7.9	***	***	3.57	5.5	1.8	>0.05
Cab. Franc	GRE/FS/ML-EQ54	12-Oct-99	23.0	3.13	7.3	***	***	3.30	6.3	2.4	<0.20

Abbreviations used: HP = hot pressed at 65 C, 20 min; FS = fermented on the skins; ML = malolactic fermentation.

for 'Noiret', free of frost pockets. Though considered to be hardier than *V. vinifera* varieties, 'Noiret' is as hardy as some interspecific hybrid cultivars ('Chambourcin' and 'Cayuga White'), but not as hardy as many of the riparia-based cultivars like 'Marechal Foch' and 'Frontenac'. Between 1996 and 2005, mid-winter primary bud cold hardiness was measured by differential thermal analysis (Pool et al. 1990). The predicted temperature of 50% primary bud kill (LTE_{50}) for 'Noiret' was –14.3 F. During the same period, the LTE_{50} for 'Concord', 'GR 7' and 'Cayuga White' were –17.9 F, -16.7 F, and –11.8 F, respectively. Following severe winter temperatures (-14 to –17 F) in 2003/04 and 2004/05, Geneva-grown own-rooted vines produced little fruit, and about 50% of vines had no fruit at all. Most of the crop loss in 2004 and 2005 was due to trunk damage.

'Noiret' presents very convenient juice chemistry (**Table 2**). The Brix at harvest tends to be 2 to 3 degrees lower than for comparable vinifera cultivars 'Cabernet Franc' and 'Pinot noir'. It consistently has a very good, deep red color and no problems with high acidity or high pH. The acidity usually balances itself very easily after malolactic fermentation. Adjustment of acidity has only occasionally been necessary in the wines after malolactic fermentation. Must sugar content required small additions of sugar to achieve 20 or 22 Brix.

To explore the potential wine flavors of 'Noiret' more fully, it was vinified with various fermentation temperature profiles and with several different yeasts. All fermentations were carried out in 120L stainless steel tanks with automatic temperature control. The fruit were crushed into the tanks and inoculated with selected yeast starter cultures. After completion of alcoholic fermentation, the wines were pressed and inoculated for malolactic fermentation with the same ML culture (Alpha) and allowed to complete MLF in 18L and in 12L glass carboys. Fermentation temperature profiles explored over the past 5 years:

(i) Standard temperature profile started at 20 C with a rapid increase to a maximum of 35 C by day 3 and subsequent slow cooling to 30, then 25, and finally 20 C by the end of fermentation.
(ii) Late heat spike in which the fermentations was started at 20 C and slowly allowed to warm to 30 C at the end of fermentation at which time the wine was heated to 40 C and held at this temperature for 2 days.
(iii) Constant fermentation temperature of 25 C.
(iv) Constant fermentation temperature of 20 C.

Several wine yeasts, including GRE, D254, BM45, AMH, and RC212 were compared at either a constant 25 C fermentation temperature (i); or at the standard fermentation temperature (ii).

In 2004 (a cool year), the ripest fruit flavors (absence of unripe, green flavors) and good tannins and mouthfeel were found in the version with the late heat spike (with the yeast GRE), second in the version with constant 25 C and the yeast GRE. The other yeasts and other temperatures produced thinner, greener, less preferred wines. A careful analysis of these results shows how important it is to match the wine processing technique to the cultivar (and the year). Among the fermentation temperatures evaluated, the preferred wines were from either the standard fermentation temperature profile (i) or from the late heat spike (ii). The tannin texture of 'Noiret' is fine and mouthfilling, consistent from the front of the mouth to the back. The aroma profile of 'Noiret' tends to exhibit raspberry, blackberry fruit and some mintiness.

'Noiret' also makes attractive soft red wines when the grapes are hot pressed (de-stemmed and heated to 65 C for 15 minutes with slow cooling, then pressed and inoculated with a selected yeast cul-

Table 3. Performance of grape cultivars at Vincennes, IN (SW), 2000-2005.

Cultivar	Cane pruning weight (lbs./vine)	Cluster weight (lbs.)	Berry weight (gm)	Fruit yield (lbs./vine)
Corot noir	1.3	0.45	2.4	20.1
Noiret	2.7	0.43	2.0	20.2
Concord	3.8	0.31	3.6	26.6
Chancellor	1.9	0.27	1.7	18.3
Foch	2.1	0.21	1.2	25.3
Norton	3.1	0.19	1.1	17.8

Table 4. Performance of grape cultivars at West Lafayette, IN (WC), 1996-2005.

Cultivar	Cane pruning weight (lbs./vine)	Cluster weight (lbs.)	Berry weight (gm)	Fruit yield (lbs./vine)
Corot noir	1.1	0.29	2.2	16.3
Noiret	2.2	0.34	2.1	14.1
GR 7	0.8	0.17	1.4	13.3
Concord	2.0	0.19	3.0	24.5

ture). These wines have attractive berry and cherry fruit aromas and a soft, round mouthfeel.

VITICULTURAL PERFORMANCE IN INDIANA

As an indication of performance outside New York State, we include here some information about the performance of 'Noiret' in trials run by Purdue University. 'Noiret' has been tested at 2 locations in Indiana; Vincennes (Southwest) and West Lafayette (West Central). 'Noiret' has performed very well at both locations (**Tables 3 and 4**). Vine size is moderate to large and yield is good. It produces large, loose clusters of medium sized berries. In early plantings vine vigor was low and grafted vines were recommended. However, own-rooted vines planted more recently have been vigorous. There has been no difference in vine size or yield between own rooted vines and those grafted to 3309 at Vincennes.

Fruit quality has been very good. Unlike many commonly grown red hybrids, 'Noiret' is similar to 'Corot noir' in that it tends to have low acidity and low pH. Titratable acidity levels at harvest are about 2 g/L less than other red hybrids. Wines lack the pronounced hybrid character of reds such as 'Foch' and 'Chancellor'. 'Noiret' has good tannins and produces wines with aging potential. Fruit are normally harvested in mid September in Southwest Indiana and early October in West Central Indiana.

Disease resistance of 'Noiret' is good. It is susceptible to black rot leaf spot, but only slightly susceptible to downy and powdery mildew. Fruit rots have not been a problem with either 'Noiret' or 'Corot noir'.

'Noiret' is cold hardy under Indiana conditions. Following -15 F low in 2003,'Noiret' had 93% live buds, while Concord had 81%, and 'Corot noir' had 58% live buds. 'Noiret' buds out relatively late and spring frost damage has not been a problem.

OVERALL RECOMMENDATION

'Noiret' represents a distinct improvement in the red wine varietal options available to cold climate grape growers. Wines are free of the hybrid aromas typical of many other red hybrid grapes. The wines have a very attractive, fine tannin texture. Care should be taken to grow 'Noiret' on sites less susceptible to extreme winter temperatures, and downy mildew should be carefully controlled.

AVAILABILITY

Vines of 'Noiret' are available from licensed commercial nurseries; contact B.I. Reisch <bir1@nysaes.cornell.edu> for a list of sources. Commercial nurseries should contact Cornell Research Foundation, 20 Thornwood Drive, Suite 105, Ithaca New York 14850 (phone: 607-257-1081; fax: 607-257-1015; email <des33@cornell.edu>; internet: <http://www.cctec.cornell.edu/>) for a license to propagate and distribute 'Noiret'. Virus-tested cuttings may be obtained from Foundation Plant Services, University of California, One Shields Avenue, Davis, California 95616-8600 (phone: 530-752-3590; fax: 530-752-2132; email <fps@ucdavis.edu>; internet: <http://fps.ucdavis.edu/>).

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