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‘Blanc Du Soleil’: A Wine Grape for the Southeast United States

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‘Blanc Du Soleil’ is a white wine grape cultivar (*Vitis* hybrid) developed by the Florida A&M University Grape Genetics and Breeding Program (US PP 34.483 P2, 9 Aug 2022). It is the first cooperative release with Texas A&M University. ‘Blanc Du Soleil’ has exhibited very good adaptation to the climate of the Texas Gulf Coast and Florida Panhandle, resulting in the production of high-quality wine. The most significant characteristic of ‘Blanc Du Soleil’ is its apparent Pierce’s disease (PD) resistance (*Xylella fasitidiosa*, Wells et al.) in Coastal Texas and Florida, areas of the United States with extremely high PD pressure. No symptoms of PD have been observed in twenty-three years of trialing and very few incidents of bunch rot occurred.

‘Blanc Du Soleil’ resulted from a cross of ‘Stover’ × ‘Blanc Du Bois’ (Fig. 1; the pedigree extends beyond named cultivar parents to species information, when possible, to fully reflect its background). ‘Stover’ is a hybrid of ‘Mantey’, a seedling of unknown parentage derived primarily from *Vitis shuttleworthii*, and ‘Roucaneauf’, a complex hybrid with *Vitis cinerea* and *Vitis berlandieri* parentage (Mortensen 1968). ‘Blanc Du Bois’ is a hybrid of *Vitis* spp. Florida D6-148 and *Vitis vinifera* ‘Cardinal’ (Mortensen 1987). ‘Stover’ and ‘Blanc Du Bois’ are both Pierce’s disease (PD)-tolerant white wine grapes developed in Florida. By acreage, ‘Blanc Du Bois’ is the most widely grown white wine grape in Texas (US Department of Agriculture, National Agriculture Statistical Service 2021).

The original ‘Blanc Du Soleil’ vine was selected in 1999 from a seedling field at the Florida A&M University Center for Viticulture and Small Fruit Research Vineyard, Tallahassee, FL (northwest Florida; lat. 30°47′68″ N, long. 84°17′25″ W; USDA hardiness zone 8a) and tested as selection A24-6-6. This location is ≈37 km from the Gulf of Mexico and, based on the incidence of PD, has high pressure with infestations of xylem-feeding insects, mainly the leafhopper group known as sharpshooters (consisting of two tribes Proconiini and Cicadellini [Hemiptera: Cicadellidae]) that vector this disease (Kamas 2014). Initial testing of ‘Blanc Du Soleil’ was performed in Florida, but additional evaluations followed in Texas. Hardwood cuttings of A24-6-6 were sent to Texas A&M University in 2010, and a test site was established at a commercial vineyard in Industry, Texas (Central Gulf Coast Texas; lat. 29°97′87″ N, long. 96°49′8″ W; USDA hardiness zone 8b.) This location is ≈160 km from the Gulf of Mexico and has extremely high PD pressure (Buzombo et al. 2006). In 2015, a cultivar trial was established in a commercial vineyard in Goliad, Texas (southwest Texas; lat. 28°77′0″N, long. 97°43′11″ W; USDA hardiness zone 9A) ≈90 km from the Gulf of Mexico, a location that has extremely high PD pressure. A24-6-6 was released and named ‘Blanc Du Soleil’ in 2021 (US Patent Appl. No. 17,300,669, 20 Sep 2021).

Description and Performance

After selection in 1999 and initial field evaluation in Tallahassee, hardwood cuttings were sent to Texas for testing. Nine A24-6-6 vines were grafted on ‘Kober 5BB’ rootstock and planted in Industry, Texas, for field evaluation. The soil at the site, as classified by the US Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), was a Cuero loam with a pH of 8.2. Vines were trained to a mid-wire bilateral cordon training system with vertical shoot positioning (VSP). The row × vine spacing was 3.05 m × 2.44 m. Data collected at Industry in 2012–15 on fruit characteristics included harvest date, berry weight (based on a 100-berry sample collected once each season), soluble solids using a handheld refractometer, titratable acidity, and pH. The control cultivar used for comparison, ‘Blanc Du Bois’, was also grafted on ‘Kober 5BB’ and grown using the same practices as the ‘Blanc Du Soleil’ including vine spacing and training.

In Goliad, 90 own-rooted vines were planted in 2015 and produced fruit beginning in 2017. The vines in the trial were trained using the Watson Training System (Scheiner et al. 2020) at a row by vine spacing of 3.66 × 2.44 m. Viticulture data collection for 2018–22 at Goliad included budbreak, bloom, and harvest dates; soluble solids; titratable acidity; pH; and, in 2018 and 2019, yield per vine, cluster weight, berry size, and dormant pruning weight. The soil at the Goliad site was a Raisin loamy fine sand with a pH of 7.5 (USDA-NRCS). The comparison cultivar, ‘Blanc Du Bois’, was planted in 2014. Vines were also trained to the Watson Training System at a row by vine spacing of 3.66 × 2.44 m, and the management practices performed were the same as the ‘Blanc Du Soleil’.

Wines were produced in 2018 and 2019 using a standard protocol for microvinification. Whole clusters were pressed using a water press at 3 bars, and the juice was cold settled at 5 °C for 24 h followed by racking to remove solids. Sulfur dioxide was added as potassium metabisulfite at a rate of 30 ppm. The juice was inoculated with EC-1118 yeast at a rate of 0.26 g/L and fermentation was carried out at 15.56 °C until dryness (<0.5 g/L). Wines were subsequently racked several times for clarification, then cold stabilized. Immediately before bottling, 20 ppm sulfur dioxide was added. After 6 to 10 months, wines were analyzed for ethanol, color, and acidity, and informal sensory evaluations were carried out with wine industry members, students, and faculty at Texas A&M University.

In Tallahassee, a five-vine plot of own-rooted vines was established in 2017. Vines

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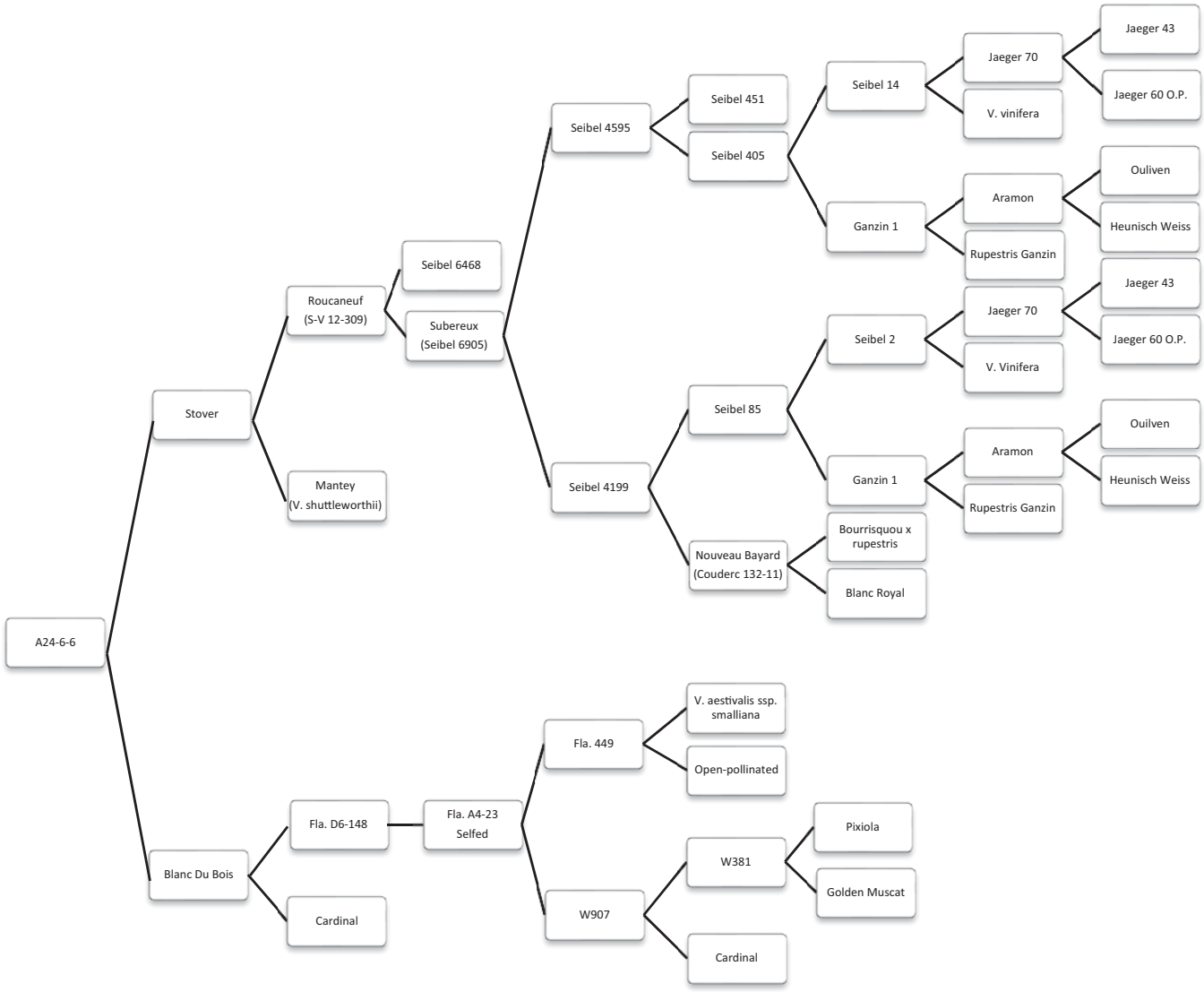

Fig. 1. Pedigree of 'Blanc Du Soleil' grape.

were trained to a high-wire bilateral cordon training system. The row by vine spacing was 3.04 × 2.44 m. The first crop was produced in 2019, and data were collected in 2019–22 on budbreak and harvest date, berry weight, berry size, cluster weight, number of berries per cluster, soluble solids, juice pH, and titratable acidity. The soil at the site, as classified by the USDA-NRCS was an Orangeburg fine sandy loam.

Wines were produced in years 2019–21 at the Florida A&M University (FAMU) Center for Viticulture & Small Fruit Research (CVSFR) using a similar winemaking protocol as in Texas with minor modifications. Clusters were processed using a manual crusher/destemmer and pressed with a membrane hydro-press for two cycles at 2.8 bars. Sulfur dioxide (35 ppm) was added as potassium metabisulfite during processing. Static racking was performed on the juice after cold settling for 24 h. The clarified must was inoculated with VL1 yeast from Laffort at a rate of 0.25 g/L and fermented at 18 °C until dryness (<0.5 g/L). After fermentation was complete, two additional static rackings were performed to achieve clarity. Before bottling, sulfur dioxide was added to reach 1.0 ppm molecular SO_2. Wine samples were stored at 21 °C for 3 to 6 months before being analyzed for vinification parameters (density, alcohol % v/v, glucose, fructose, net dry matter, pH, total acidity, volatile acidity, malic acid, lactic acid, free and total sulfur dioxide, and chromatic characteristics) and bioactive compounds using the Wine Analytical Laboratory at the FAMU CVSFR.

All analysis were conducted according to the International Organization of Vine and Wine (OIV) Compendium of International Methods of Analysis. Density and specific

Fig. 2. Clusters of 'Blanc Du Soleil' grape.

Fig. 3. Mature 'Blanc Du Soleil' cluster from the Goliad, TX, USA, site.

Table 1. Fruit characteristics for 'Blanc Du Soleil' and 'Blanc Du Bois' at the Industry, TX, USA, research site in 2012–15.

	Selection	
Characteristic	'Blanc Du Soleil'	'Blanc Du Bois'
Harvest[i]	19 Jul (1.83)	3 Jul[iii]
Berry wt (g)[ii]	2.08 (0.15)	2.62 (0.18)
Cluster wt (g)	119.80 (8.19)	110.10 (10.12)
Yield (kg/vine)	4.71 (0.96)	5.47 (0.77)
Soluble solids (%)	17.20 (1.05)	17.85 (0.26)
Juice pH	3.32 (0.17)	3.48 (0.19)
Titratable acidity (g/L)[iv]	7.34 (2.39)	6.10 (0.54)

[i] Mean (*SD*) calculated for 2012–15.
[ii] Mean (*SD*) calculated for 2012 and 2015.
[iii] Mean (*SD*) calculated for 2015.
[iv] Tartaric acid equivalents.

gravity were measured using a Gibertini DensiMat gravimetric scale (Gibertini, Novate Milanese, Italy). Percent alcohol (v/v) and volatile acidity was determined with Gibertini Distillatore Elettronico Enochimico. Glucose, sucrose, malic, and lactic acid were measured using a Bio-Rad SmartSpec™Plus (Hercules, CA, USA) spectrometer and enzymatic kits from Randox Food Diagnostics (Crumlin, UK). Net dry matter was calculated using OIV methods based on density and sugar content. Juice pH was measured using a Jenway 3510 pH meter. Total acidity was measured using OIV 0.1M sodium hydroxide titration. Sulfur dioxide was measured using Ripper titration. Color was analyzed using the spectrophotometer to measure the absorbance at 420-, 520-, and 620-nm wavelengths. Intensity was calculated using OIV methods.

Standard cultural practices for bunch grape culture were practiced at all trial sites including annual dormant pruning, weed control using mechanical and chemical methods, and drip irrigation applied as needed. Annual N applications and complete fertilizers were used for fertilization on demand.

Fungicides were applied to control black rot (*Guignardia bidwellii* Viala & Ravaz), powdery mildew {*Erysiphe necator* Schw. [syns. *Uncinula necator* (Schw.) Burr., *E. tuckeri* Berk., *U. americana* Howe, and *U. spiralis* Berk. & Curt; anamorph *Oidium tuckeri* Berk.]} and downy mildew (*Plasmopara viticola* Berl. & de Toni), and anthracnose (*Elsinoë ampelina* Shear) as per commercial requirement for the area (Scheiner et al. 2022). Insecticides to control PD vectors were not applied at any research site.

Yield characteristics. Vines at all trial locations were pruned to one- to two-bud spurs annually. In Texas, bud fruitfulness (percentage of shoots bearing clusters) ranged from 86.48% to 87.65% with yields ranging from 2.59 to 3.97 kg per vine in Goliad. In Tallahassee, yields ranged from 3.1 to 3.7 kg per vine, an acceptable yield for commercially wine grape production in the region.

The clusters of 'Blanc Du Soleil' are medium-sized, often shouldered, and cylindrical. Cluster weights in Goliad ranged from 79.44 to 106.46 g. In Florida, cluster weights were larger averaging 168.8 to 235.1 g. 'Blanc Du Soleil' clusters are moderately to well filled with medium-sized, light green– to bright yellow–colored berries (Figs. 2 and 3). Berry weights averaged 1.97 g in Industry (Table 1), 1.84 g in Goliad (Table 2), and 2.90 g in Tallahassee (Table 3).

Fruit composition and quality. Soluble solids averaged 17.20% in Industry (Table 1) and ranged from 17.48% to 16.86% and 19.0% in Goliad (Table 2) and Tallahassee, respectively (Table 3). Soluble solids were comparable to 'Blanc Du Bois' at all locations, but 'Blanc Du Soleil' retained greater acidity. Wine pH was lower and titratable acidity was higher for 'Blanc Du Soleil' at both locations in Texas, which may be valuable for warm climate regions where high pH may result in problems with wine stability.

Wine pH and titratable acidity of 'Blanc Du Soleil' ranged from 3.09 to 3.20 and 6.8 to 8.9 g/L, respectively, in Texas. In Florida, wine pH ranged from 3.06 to 3.22 and titratable acidity ranged from 8.2 to 9.8 g/L (Table 4). Malic acid was less than 2 g/L in the Texas wines and less than 2.6 g/L in the wines from Florida indicating that most of the acid present was tartaric acid (Table 4). Overall, fruit quality based on chemical composition was observed as high, and less fruit rot was noted in 'Blanc Du Soleil' fruit than 'Blanc Du Bois' in neighboring plots.

Vine characteristics. In Goliad, budbreak was observed between 25 Feb and 5 Mar, a few days before 'Blanc Du Bois'. In Tallahassee in 2019, budbreak occurred on 26 to 28 Feb, 6 d later than 'Blanc Du Bois'. In Texas and in Florida, 'Blanc Du Soleil' was harvested from 129 to 136 d after budbreak, slightly later than 'Blanc Du Bois' but still considered early season compared with 'Black Spanish', a PD-tolerant red wine grape cultivar widely grown in the Texas Gulf Coast.

In Goliad and Tallahassee, 'Blanc Du Soleil' was observed to have good vigor on its own roots but was less vigorous than 'Blanc Du Bois'. In Goliad, 'Blanc Du Soleil' vines had dormant pruning weights that averaged

Table 2. Fruit and vine characteristics of 'Blanc Du Soleil' and 'Blanc Du Bois' at the Goliad, TX, USA, research site in 2018–19.

	Selection			
	'Blanc Du Soleil'		'Blanc Du Bois'	
Characteristic	2018	2019	2018	2019
Bud break	25 Feb	6 Mar	27 Feb	10 Mar
Bloom	18 Apr	23 Apr	22 Apr	25 Apr
Harvest	10 Jul	17 Jul	29 Jun	7 Jul
Berry wt (g)[i]	1.66 (0.26)	2.02 (0.16)	—	—
Berries/cluster	64.42 (8.45)	39.27 (5.87)	—	—
Clusters/vine	24.04 (7.25)	43.84 (6.88)	—	—
Cluster wt (g)	106.46 (13.51)	79.44 (5.82)	—	—
Yield (kg/vine)	2.59 (0.91)	3.97 (0.79)	—	—
Soluble solids (%)	17.48 (0.48)	16.86 (0.30)	17.46 (0.33)	17.13 (0.26)
Juice pH	3.30 (0.08)	3.04 (0.07)	3.51 (0.09)	3.40 (0.13)
Titratable acidity (g/L)[ii]	8.28 (1.16)	9.01 (0.16)	6.30 (0.51)	6.56 (0.37)
Shoots/vine	19.45 (2.20)	22.88 (2.65)	—	—
Pruning weight (kg)	1.31 (0.26)	1.46 (0.38)	1.79 (0.51)	—
Bud fertility (%)	86.48 (2.62)	87.65 (5.92)	—	—

[i] Mean (*SD*) calculated for 'Blanc Du Soliel' in 2018 and 2019.
[ii] Tartaric acid equivalents.

Table 3. Fruit and vine characteristics of 'Blanc Du Soleil' and 'Blanc Du Bois' at the Tallahassee, FL, USA, research site in 2019–21.

	'Blanc Du Soleil'			'Blanc Du Bois'
Characteristic	2019	2020	2021	2021
Bud break	28 Feb	28 Feb	20 Feb	26 Feb
Harvest	13 Jul	10 Jul	26 Jun	4 Jul
Berry wt (g)	3.30 (0.1)	2.8 (0.1)	2.7 (0.2)	2.7 (0.2)
Berry length (mm)	17.20 (0.2)	17.4 (0.3)	—	17.2 (0.6)
Berry width (mm)	16.0 (0.2)	15.2 (0.1)	—	15.1 (0.4)
Berries/cluster	67.0 (3.9)	89.3 (2.2)	38.8 (1.6)	90 (3.2)
Clusters/vine	18.0	16	71	18
Cluster wt (g)	169.8 (3.1)	235.1 (3.9)	79 (4.1)	226.4 (8.3)
Cluster length (cm)[i]	19.6 (0.9)	20.1 (1.2)	—	17.6 (1.1)
Cluster width (cm)	6.9 (0.2)	7.2 (0.2)	—	7.4 (0.3)
Yield/vine (kg)	3.1 (0.1)	3.7 (0.6)	5.6 (0.3)	3.6 (0.1)
Soluble solids (%)	—	—	19.0 (0.8)	15.93 (0.2)
Juice pH	—	—	3.1	3.1
Titratable acidity (g/L)[ii]	—	—	3.3 (0.2)	3.1 (0.1)
Color luminosity (L*)	37 (0.6)	—	—	38.5 (0.2)
Hue	45.3	—	—	47.0
Chroma	11.7	—	—	12.6

[i] Mean (*SD*) calculated 'Blanc Du Bois' and 'Blanc Du Soleil for 2019–21.
[ii] Tartaric acid equivalents.

Table 4. Chemical composition of 'Blanc Du Soleil' wines produced in Texas and Florida, USA.

	Texas		Florida		
Wine parameter	2018	2019	2021	2020	2019
Alcohol (%)	10.6	11.4	9.8	12.5	12.5
Glucose (g/L)	0.0	1.4	0.0	0.2	0.1
Fructose (g/L)	0.4	3.9	0.0	0.1	0.1
pH	3.09	3.11	3.15	3.22	3.06
Titratable acidity (g/L)[i]	7.2	8.9	8.2	8.5	9.8
Volatile acidity (g/L)	0.4	0.4	0.5	0.2	0.4
L-Malic acid (g/L)	1.4	1.9	0.1	2.6	2.2
L-Lactic acid (g/L)	0.0	0.0	1.3	0.0	0.1
Intensity	0.12	0.13	0.21	0.18	0.26

[i] Tartaric acid equivalents.

1.31 and 1.41 kg in 2018 and 2019, respectively vs. 1.79 kg/vine for 'Blanc Du Bois' in 2018. In Goliad, magnesium deficiency was observed in both 'Blanc Du Soleil' and 'Blanc Du Bois' and confirmed with tissue testing, but visual deficiency symptoms appeared to be worse in 'Blanc Du Soleil', suggesting that it may be more prone to magnesium deficiency when grown on its own roots.

The growth habit of 'Blanc Du Soleil' is semierect and is suitable for low- or mid-wire training systems with VSP and high-wire systems. The cold hardiness of 'Blanc Du Soliel' has not been evaluated, but in 2021, winter temperatures reached –11 °C in Goliad with no injury observed to buds and canes.

The most valuable characteristic of 'Blanc Du Soleil' is its survival capacity and high fruit and wine quality potential in the Gulf Coast, a region of the United States that has extreme pressure from PD (Kamas 2014). Although formal testing for PD tolerance has not occurred, its survival and lack of symptoms for 23 years suggests tolerance or some level of resistance. Vine survival at all sites was 100% over the course of evaluation. Furthermore, both parents of 'Blanc Du Soleil' are tolerant to PD.

There are no substantial data to support fungal disease resistance of 'Blanc Du Soleil' to common diseases such as black rot, powdery and downy mildews, or anthracnose, but observations in Texas and Florida suggest that 'Blanc Du Soleil' has better resistance to downy mildew than 'Blanc Du Bois'. In Goliad, downy mildew was observed in 'Blanc Du Bois' after periods of intense pressure, but 'Blanc Du Soleil' had few visible symptoms.

Wine characteristics. Observational data on wines produced suggests that 'Blanc Du Soleil' has high wine quality potential with no off flavors or "hybrid" characteristics. Wine flavor was compared with 'Pinot Gris' with flavors of pear, apple, peach, and pineapple commonly noted. Wine flavor was described as distinct from 'Blanc Du Bois', which is known for producing aromatic wines.

'Blanc Du Soleil' should be considered for white wine production in the southern United States. Its excellent quality potential and disease resistance are primary attributes. PD tolerance or resistance is a major positive characteristic and should be of value to grape growers in areas where this disease poses a significant risk.

Availability. Florida A&M University is the assignee for the US patent of the 'Blanc Du Soleil' grapevine (Ren et al. 2022). Nurseries interested in propagating these cultivars must sign a license agreement with the Florida A&M Technology Transfer, Licensing and Commercialization Office (https://www.famu.edu/administration/research/office-of-technology-transfer-and-export-control/index.php). Contact the Technology Transfer, Licensing and Commercialization Office, to inquire about the propagation of 'Blanc Du Soleil' grapevine or FAMU/Center for Viticulture (www. famu.edu/viticulture) for any additional information as needed.

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