



**Annual Report 2008: Hard Cider**  
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**TITLE : Evaluation of Apple Cultivars for Hard Cider Production**

**PERSONNEL:**

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**OBJECTIVES:**

1. To evaluate hard cider apple cultivars and determine productivity (fruit yield and quality) in northwest Washington.
2. To produce ciders for evaluation and describe the ciders using sensory evaluation criteria.
3. Provide professional development and make results available to growers and cider producers.

**SUMMARY:** In 2009 juice of 35 apple varieties grown in a block at WSU Mount Vernon NWREC was analyzed for percent tannin, brix, pH and titratable acid. Some varieties showed high levels of tannin, with a range of tannins and titratable acids that provides a diverse selection for cider makers. Ciders were produced from 4 promising varieties, with each cultivar kept separate at crush. Bottling of 2007 ciders was done in December 2008 and sensory evaluation was completed in March 2009. Peter Mitchell of Worcestershire, England, an international cider judge and expert, led our Cider School June 23-27, 2008, in cooperation with WSU Mount Vernon NWREC and the WSU Learning Center at Skagit Valley College. There were 18 participants from the U.S. and Canada. The intensive laboratory course featured hands-on training in the methods of cider production and quality analysis.

**METHODS:**

An unreplicated study of 6 cultivars with 5 trees per cultivar was established in 1994, 14 cultivars were added and one removed in 1999-2002, and 7 cultivars were added in 2005 so the planting now includes 25 cultivars. A cultivar screening study consisting of 35 single tree specimens was planted in 2004, and includes classic American cider cultivars and other cultivars from the European cider making centers of England and France. Observations for cultivars not previously evaluated included recording of bloom date and density once a week, beginning in late April to the end of May 2008. Fruit maturity was evaluated weekly during the harvest season using the

starch conversion iodine test as a ripeness indicator for picking. Juice of 35 varieties was analyzed for brix, titratable acid, pH and tannins.

The methods utilized for cider fermentation, sensory analysis, and evaluation followed those developed by Peter Mitchell of Mitchell F & D Limited, Worcestershire, England. Mitchell is a professional cider consultant and sensory trainer and has taught courses in cider production and food technology at Worcestershire Agricultural College for many years. His methods are currently used in classes at Cornell University, Geneva, NY as well as at WSU Mount Vernon NWREC. Mitchell has developed an analytic method for the exact description of cider characteristics using sensory evaluation.

Professional Cider School sessions, taught by Peter Mitchell, were conducted emphasizing hands-on experience of cider production, laboratory techniques, and sensory analysis of cider products. Staff and cooperating cider makers were trained to evaluate ciders. Workshops and field days to familiarize growers with basic information on cider varieties, orcharding, and production were held. Annual reports were made public through the Fruit Horticulture web pages and information disseminated at field days.

#### **RESULTS AND DISCUSSION:**

*Objective 1. To evaluate hard cider apple cultivars and determine productivity (fruit yield and quality) in northwest Washington.*

In 2008 many of the newer acquisitions were productive in the field for the first time. Observations made in May 2008 of bloom dates and bloom density indicated that some varieties bloomed abundantly while others had poor or no set (Table 1). Some of the non-blooming varieties may be simply slower to begin production, while others such as Amere de Berthcourt, which produced ample fruit for testing in 2007, appear to have a tendency to alternate bearing. At least 2 more years of observation will be needed to evaluate these varieties accurately. Early blooming varieties such as Granniwinkle, Jouveaux, and Golden Russet are of special interest as their early bloom date makes them less susceptible to fire blight (*Erwina amylovora*) infection than late bloomers; this is of particular importance in areas such as Central and Eastern Washington where that disease is problematic. Harvested fruit was processed, and fruit juice analyzed (Table 2). Varieties with higher tannins tend to impart more body and viscosity to ciders when blended with standard dessert apples.

*Objective 2. To produce ciders for evaluation and describe the ciders using sensory evaluation criteria.ualities.*

In 2008 fruit of 4 cultivars were harvested and pressed for cider: Breakwell Seedling, Bulmer's Norman, Freyberg (a dessert apple), and Redstreak. These 4 cultivars were selected because they had not been evaluated previously and they produced enough fruit for cider evaluations in 2008. Juice samples were taken from each cultivar and fermented. Bottling of 2008 ciders was done in January 2010, and evaluation will follow in July 2010. Ciders pressed in 2007 and bottled in December 2008 were Amere de Berthcourt, Frequin Rouge, Kermerrien, and Reine des Pommés. The evaluation and description of these ciders was completed in March 2009, and will be included in the Extension Manual "*Hard Cider Production and Cider Orchard Management*" (in press, 2010).

*Objective 3. To make results available to growers and cider producers.*

A Cider School session was conducted June 23-27, 2008 by Peter Mitchell in coordination with the WSU Learning Center. Staff of WSU Mount Vernon NWREC were trained in laboratory evaluations and sensory evaluation techniques. In addition, cider professionals were trained in sensory evaluations and will serve as an evaluation panel for future studies. Workshops to familiarize growers with basic information on cider varieties, orcharding, and production continue to be held. Annual reports were made public through the Fruit Horticulture web pages and information disseminated at field days.

This research has provided growers with information on the characteristics of apple cultivars selected for hard cider production. Several local commercial cideries have been established, and plantings of cider cultivars were initiated in 2008. The Cider School classes in June 2008 drew participants from Washington, Oregon, and British Columbia, also from more distant states.

#### **ACKNOWLEDGEMENTS**

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#### **OUTSIDE PRESENTATIONS OF RESEARCH:**

Moulton, G.A. 2008. Potential Alternative Fruit Crops, workshop, Sequim, WA, March 25, 2008.

Moulton, G.A., 2008. Class and Field Demonstration, "Orchard Technology in Hard Cider Production," workshop class, June 23, 2008.

Moulton, G.A. and D. Zimmerman. 2008. Presentation of hard cider and wine products, "WSU at Benaroya Hall: In Concert with Communities" program, Benaroya Hall, Seattle, August 25, 2008.

Moulton, G.A. 2008. Basics of Hard Cider Making and Orchardling, workshop for commercial and private cider makers, Sultan, Snohomish County, November 11, 2008.

#### **FUND STATUS**

Wine Advisory Board, Washington State Department of Agriculture - \$ 4,000

WA State Dept. of Agriculture, Nursery Fund - \$1,650

Northwest Cider Society - \$1,500

**Table 1.** Observed full bloom date and bloom abundance<sup>1</sup> of cider apple cultivars at WSU Mount Vernon NWREC in 2008. Cultivars listed chronologically in order of full bloom<sup>2</sup>.

<b>Cultivar</b>	<b>Full Bloom</b>	<b>Abund</b>	<b>Cultivar</b>	<b>Full Bloom</b>	<b>Abund</b>
Granniwinkle	5-May	5.0	Bulmer's Norman	16-May	5.0
Grindstone	7-May	2.0	Redstreak	16-May	4.0
Jouveaux	7-May	5.0	Peau de Vache	18-May	5.0
Track Zero (Ross sdlg)	9-May	3.0	Finkenwerder		
Golden Russet	10-May	5.0	Herbstprinz	18-May	3.0
Roxbury Russet	10-May	4.0	Harrison	18-May	3.0
Harrison SS	13-May	3.0	Muscadet de Dieppe	18-May	4.0
Bouteville	13-May	4.0	Coat Jersey	18-May	1.0
Tom Putt	16-May	3.5	Chisel Jersey	18-May	5.0
Bramley's Seedling	16-May	2.0	Yarlington Mill	18-May	4.5
Crow Egg	16-May	2.0	Michelin	18-May	3.5
Zabergau Reinette	16-May	3.0	Reine des Hatives	18-May	2.0
Taliaferro	16-May	2.0	Breakwell Seedling	22-May	5.0
Cap of Liberty	16-May	3.0	Red Jersey	25-May	4.0
Whidbey	16-May	2.0	Kingston Black	25-May	2.5
Sweet Alford	16-May	2.0	Dabinett	25-May	2.5
Major	16-May	1.0	Court Pendu Plat	30-May	3.0
Kermerrien	16-May	2.5	Court Pendu Rose	30-May	3.0
Frequin Rouge	16-May	4.0	Cimitiere	30-May	2.0
Tremlett's Bitter	16-May	3.5	Vilberie	30-May	3.0
			Harry Masters' Jersey	30-May	2.5

<sup>1</sup>Abundance rating: 1= Very few blooms  
2= Light bloom, below needed amount to set commercial crop  
3= Normal bloom, enough flowers to set commercial crop  
4= Abundant bloom, between normal and snowball- thinning may be required  
5= Snowball bloom, very abundant, may cause alternate bearing if not thinned early.

<sup>2</sup> Cultivars with no observed bloom set in 2008: Amere de Berthcourt, American Forestier, Blanc Mollet, Brown Thorn, Frequin Audievre, Frequin Tardif, Lambrooke Pippin, Metais, Muscat de Bernay, Royal Jersey, Smith's Cider, and Sweet Coppin.

**Table 2.** Analysis of tannin %, average brix, pH, and titratable acid (grams/liter) of apple juice at harvest at WSU Mount Vernon NWREC in 2008, listed in descending order by % tannin.

<b>Sample</b>	<b>Tannin %</b>	<b>Brix</b>	<b>pH</b>	<b>Malic Acid</b>
Vilberie	0.41	14.2	3.89	3.86
Kermerrien	0.34	14.0	4.00	2.23
Stoke Red	0.30	13.0	3.50	7.50
Red Jersey	0.26	11.0	4.38	1.72
Domains	0.24	16.0	4.16	2.79
Dabinett	0.23	14.2	4.47	1.93
Nehoe	0.22	15.0	4.01	3.81
Major	0.22	14.8	4.42	1.82
Dymock Red	0.19	14.4	4.29	2.03
Frequin Rouge	0.19	10.8	4.20	2.73
Cap of Liberty	0.18	12.0	3.38	13.67
Tremlett's Bitter	0.17	12.2	3.44	10.34
Bulmer's Norman	0.17	11.8	4.06	1.77
Kingston Black	0.13	13.0	3.70	5.90
Breakwell Seedling	0.12	10.4	3.43	6.97
Ribston Pippin	0.11	14.8	3.48	6.54
Bramley's Seedling	0.11	12.8	3.35	10.29
Yarlington Mill	0.11	11.0	4.04	2.68
Golden Russet	0.10	18.0	3.72	6.38
Zabergau Reinette	0.10	16.4	3.66	8.95
Crows Egg	0.10	14.0	3.66	5.63
Reine des Hatives	0.10	14.0	4.34	2.47
Peau de Vache	0.09	12.4	4.08	2.52
Jouveaux	0.08	13.6	4.14	2.57
Brown Snout	0.08	13.0	4.10	2.95
Tom Putt	0.08	11.2	3.52	7.24
Chisel Jersey	0.08	10.8	3.42	6.54
Roxbury Russet	0.07	17.0	3.85	5.41
Whidbey	0.07	14.4	3.53	8.30
Court Pendu Rose	0.07	13.0	3.41	10.02
Sweet Alford	0.06	14.6	4.32	2.89
Finkenwerder Herbstprinz	0.06	14.0	3.44	10.13
Red Streak	0.06	12.0	3.36	9.86
Granniwinkle	0.05	12.0	3.80	3.48
Freyberg*	0.01	14.0	3.96	3.48

\*dessert apple