Annual Report 2004

Evaluation of Apple Cultivars for Hard Cider Production

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Summary

A small variety trial of cider apples conducted at Mount Vernon from 1979-1994 provided preliminary observations on the potential of cider apple production. In recent years, with the encouragement of local hard cider makers, WSU's Northwest Washington Research & Extension Center at Mount Vernon (NWREC) has expanded research on apple varieties specifically bred for the characteristics needed in producing market quality hard cider. These varieties are distinct from "dessert" apples in having levels of tannins that make them less usable for other purposes, but enhance cider quality when fermented. Furthermore, growing these "bittersweet" and "bittersharp" varieties requires a close interaction between growers and cider producers in determining the desired variety mix in the final product.

In 2002 the first cider was pressed at Mount Vernon, under the direction of cider cooperator Drew Zimmerman, including 8 varietal and 4 blended ciders. In the summer of 2003 these ciders were evaluated and ranked by a diverse panel of tasters, and particular characteristics of each were noted. (See Evaluations below.)

In November 2003 the Northwest Cider Society sponsored an international cider competition that drew entrants from the U.S. and Canada, and was judged by a panel of experts, including Peter Mitchell, a cider consultant from Worcestershire, England. One of the Mount Vernon entries, "2002 WSU Mount Vernon Brown Snout Varietal," earned a certificate of commendation. In November 2003, May 2004 and November 2004 a series of Cider School classes, taught by Peter Mitchell, were conducted at NWREC. Emphasis was on hands-on experience of cider production, laboratory techniques, and post production quality analysis. Participants from the Pacific Northwest (eastern and western Washington, Oregon, Idaho and B.C., Canada) as well as from states as distant as Indiana, Michigan, Montana and Colorado attended the courses. Interest in these classes is still evident, therefore another Cider School session is scheduled for the week of April 25, 2005.

In 2004 the fruit harvest and pressing of cider was again supervised by Drew Zimmerman, drawing on the experience of previous seasons to improve techniques of production and handling. New cultivars planted in 2001-02 produced some fruit this year and harvest from these trees will increase in 2005. A row of single-tree specimens, including some early American hard cider varieties, was planted in 2003 for evaluation and possible inclusion in future trials. Some first sample fruit may be seen from these trees in 2005.

Methods

The cider apple trial plot consists of five single-tree replications of each cultivar to provide for sufficient fruit to make single-varietal cider as well as for blending. All trees are free-standing, with row spacing 18′ between rows, 12′ between trees. Trees planted in 1994 were grafted on MM 106 rootstock, with additions in 1999. Acquisitions in 2001-02 are grafted on MM 106 and M26 rootstock. Specific cultivars being evaluated are listed below. (See **Appendix**, Table 1.) A pretest varietal collection of 40 single trees was planted in 2003 for preliminary evaluation, from which replications can be made and added to the main trial if they show promise. Some new acquisitions are also in the nursery and will be planted out in spring 2005. (See **Appendix**, Tables 2 and 3.) This past year a collection of perry pears was also added. (See **Appendix**, Table 4.)

The new acquisitions include cultivars that have been selected for cider production in France and England not yet tested here that may be well adapted to our climate conditions. In addition, specimen trees of old American varieties used for farm cider in the 1800s and earlier are included, to rediscover and evaluate their unique cider heritage in this country.

In 2003–04 new trees were established and grafted on strongly dwarfing rootstocks M27 and M9, grafted to the cultivars Foxwhelp, Muscadet de Dieppe and Yarlington Mill (M27), Vilberie (M9) and Brown Snout (M27 and M9.) Planted at close spacing, the trees will be used in a cultural trial of hedgerow pruning for possible mechanized harvest methods, conditional on the amount of grant funding available.

Data collected includes bloom and harvest dates, productivity (yield), harvest fruit analysis (Brix and titratable acid), and observations relative to ease of culture such as disease susceptibility, vigor and growth habit.

Results

In 2004 the mature trees produced a full crop of fruit. Sufficient fruit for single varietal cider was not available from all cultivars of the younger trees but juice pressed from the fruit was included in the production of some blended ciders. Juice from dessert apple cultivars with characteristics adapted to hard cider fermentation was also used in blending of some ciders.

Fruit from the cider test plot was harvested, placed in storage, and then pressed for juice. Detailed notes were kept on the characteristics of the juice, the blends produced, and the fermentation methods used.

Table 2. Cider cultivars pressed at Mount Vernon in 2004 (***** indicates dessert apple cultivar). Press date for all was October 28, 2004.

#	Cultivar(s)	brix	specific gravity	pH	TA% malic	tannin %
1	Muscadet de Dieppe	13.8	1.055	4.27	0.35	0.08
	Alkmene*	13.3	1.055	3.72	0.61	0.05
2	Gravenstein*	13.0	1.055	4.27	0.35	0.08
3	Ashmead's Kernel	10.0	1.040	3.41	0.63	0.06
4	Gala, Brookfield*	11.8	1.045	3.85	0.34	0.03
5	Gravenstein*	13.0	1.055	4.27	0.35	0.08
	Muscadet de Dieppe (equal blend)	13.8	1.055	4.27	0.35	0.08
6	Orchard Blend (see Note, below)	11.8	1.050	3.15	—	—
7	Muscadet de Dieppe	13.8	1.055	4.27	0.35	0.08
8	Blend (malolactic acid)	10.8	1.044	3.27	0.58	0.04
9	Harry Masters' Jersey	—	1.024	3.40	0.63	0.20
10	Kingston Black	13.9	1.060	3.38	0.63	0.07
11	Yarlington Mill	10.7	1.040	4.00	0.46	0.10
12	Melrose*	11.0	1.045	3.27	—	—
	Michelin	12.2	1.050	3.81	0.50	0.06
13	Russet Blend (Golden, Roxbury, Princess)	15.0	1.065	3.45	0.62	0.05
14	Dabinett	14.0	1.061	4.06	0.43	0.15
15	Brown Snout	13.2	1.045	3.80	0.54	0.03
	Chisel Jersey	10.9		3.26		
	(equal blend of both)			3.56		
16	Belmac*/Yarlington Mill	13.3	1.053	3.44	0.47	0.05
17	Melrose*	11.0	1.045	3.27	0.50	0.06
18	Braeburn*	12.0	1.050	3.40	0.82	0.06
19	Sonata* (= Pinova, Corail)	13.1	1.055	3.36	0.91	0.05

NOTE: Orchard blend includes the following, bold indicates main juice components: Cap O'Liberty, Bramley's Seedling, **Tom Putt**, **Somerset Redstreak**, Bulmer's Norman, **Akane***, Medaille D'OR, **Mikki Life***.

Evaluation Of 2003 Ciders

The evaluation of ciders produced in 2003 was done by a panel primarily made up of graduates of a class in Sensory Evaluation of ciders taught by Peter Mitchell, cider expert and trainer, in May 2004. A summary of their evaluation and comments on each is shown below.

Ratings for acidity, bitterness, sweetness, astringency and body were on a scale of low (L) – medium (M) – high (H)

Vilberie Comments: Very bitter with high astringency. Bitterness harsh – best used in blending. If one likes a very stout cider, this is the one.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple, spicy, floral	M	H	L	H	M	bitterness dominated, estery, metal taste, tea bags, aftertaste copper penny, woody bark

Harry Masters' Jersey *Comments:* Good body and balance, good stand-alone varietal, fruity aroma

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	woody, apple, winelike, resinous, floral, pineapple, perfume	M	M	L	M	M	Melon, berries, butterscotch, pine needles, tart, nutty

Chisel Jersey *Comments:* Good balance, a little bland, would benefit from blending, nice nose

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
Amber	citrus, banana, butter, rummy	M	M	L	M	M	Citrus, apple, fresh cut grass, butterscotch, honey

Dabinett *Comments:* This cider has body and astringency, tannins are harsh and tend to dominate the flavor. Good alone for those whou would like a stout cider, otherwise blend to soften tannin; good nose. Mixed with NY 456 made a fruitier cider with body.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple, banana	M	M to H	L	H	M to H	Apple, raisins

Muscadet de Dieppe *Comments:* A lot of body, good balance. Very good single-varietal cider, even when fermented to dryness still gives a slightly sweet taste, mix of fruit & grass flavors.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
dark amber	apple, banana nutty, tropical grassy	M	M	L to M	M	H	Fruity, apple, spice, nutty, honey, syrup, fresh cut grass

WSU AxP Crab *Comments:* This is a great blender, provides a lot of mouth feel because of its astringency. Some like it as a single-varietal cider but probably best for blending.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
straw	apple, spicy, nutty, tropical, floral	H	M to H	L	H	M	Fruity, winelike, fresh cut grass, citrus, vanilla

Michelin *Comments:* This cider can stand alone but would benefit from blending. Good strong apple/berry aroma, tastes like cooked apple, bland.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency<	Body	Flavor
amber golden	apple, banana, nutty, berry, gooseberry, floral esters, caramelized apple	M	M	L	M	M	Fruity, apple, estery, berry, baked apple

Foxwhelp *Comments:* No outstanding character, will add some body and lots of acid to blends. Best use as blender to give more acidity & body to a cider; earthy tones.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	slightly spicy, banana, nutty	H	L to M	L	L to M	M	Apple, pear, sharp apple taste, butterscotch

Kingston Black *Comments:* Stand alone single-varietal cider, tannins are soft, good balance, wonderful flavor jumps all over the mouth.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
golden to amber	apple, spicy, nutty	M	M	L	M	M	Citrus, apple, butterscotch

Brown Snout *Comments:* Good stand alone single-varietal cider, good body, balance & mouth feel.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple, nutty, banana, maple, caramel, resinous	M	M	L	M	H	Apple, slight banana, nutty, butterscotch, winelike

Jonagold *Comments:* Jonagold adds fruit both in aroma and flavor – best if used to bring fruitiness to a cider apple with tannins & body.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
straw	winelike, apple, tropical, berry, floral	M to H	L	L	L	L	Winelike, apple, fruity, toast

McIntosh *Comments:* Brings aroma to a cider – great for blending to enhance the bouquet, but not good as a single-varietal cider, lacks body & tannin.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
straw	winelike, apple, tropical, berry, floral	M to H	L	L	L	L	Winelike, apple, fruity, toast

Tsugaru, Homei *Comments:* This cider has little aroma, bland taste. It is a low acid apple, suggested use in blending to reduce acids. Thin on everything.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
straw	winelike, resinous, asparagus	L	L	L	L	L	Fresh cut grass, raspberries, winelike

NY 486 *Comments:* Clear attractive light cider with little body. Has spicy aroma and apple flavor – best as a blender, acid too high.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
straw	tropical, spicy, licorice	M	L	L	L	L	Winelike, apple

Raven *Comments:* Not much aroma or flavor, bland, too acidic

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
golden	beach at low tide, resinous	M	L	L	L	L	Underripe apples

Yarlington Mill/Ashmead's Kernel ***Comments:*** Blend of 50% each. Good balanced blend, nice nose, good body

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
golden	winelike, apple, perfume, alcohol, caramelized apple	M	M	M	L to M	M	Apple, melon, banana, butterscotch

Muscadet de Dieppe/Foxwhelp ***Comments:*** Blend of 50% each. Muscadet de Dieppe greatly enhances Foxwhelp. Foxwhelp is bland but adds sharpness, lightens the color. Complex blend good paired with cheese. Foxwhelp actually seems to blow out the floral character of Muscadet de Dieppe with earth tones – not a good match.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple, nutty, resinous	M	M	L	M	M to H	Apple, nutty, butterscotch, citrus

Jonagold/Brown Snout ***Comments:*** This blend gives fruitiness and body, good balanced blend except may need acids lowered just a little.

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple, nutty	M	M	L	M	M	Fruity, apple, fresh cut grass

Orchard Blend ***Comments:*** This cider has body – Vilberie's harsher tannins are evident, which brings stoutness to the blend

Color	Aroma	Acidity	Bitterness	Sweetness	Astringency	Body	Flavor
amber	apple	M	H	L	H	H	Apple, nutty, fresh cut grass

Discussion

Preliminary results at this point would suggest use of the cultivars Brown Snout (which won an award at the 2003 North American Cider Competition), Yarlington Mill, Vilberie, Muscadet de Dieppe, Foxwhelp and Dabinett, all of which have shown themselves to be promising in terms of productivity and/or cider making quality. Recommended best uses for different varieties are shown in Table 2, below.

Good Stand Alone Single-Varietal	**Single-Varietal Stout**	**Good Varieties for Blending**
Brown Snout	Vilberie (very bitter)	Vilberie (adds stout-type character)
Harry Masters' Jersey	Dabinett (bitter)	Dabinett
Muscadet de Dieppe		Chisel Jersey
Kingston Black		WSU AxP Crab (very good blender)
Yarlington Mill		Michelin
Michelin		Foxwhelp
Jonagold (back sweetened)		Ashmead's Kernel
		McIntosh (adds aroma)
		Jonagold
		Tsugaru Homei
		NY 486

Stand alone single-varietal ciders include those recommended for high quality ciders without the need for blending. Note that most ciders can be handled as stand alone single varietals if innovative techniques of cider making are employed, such as sweetening back with fresh juice and adjusting pH to a target level of 3.5 to 3.7. The category of "Stouts" consists of varieties that have strong bitter components so their use as single varietals would be as ciders of the heavier type. Blending varieties include those which are best used in combination to produce a complex high quality cider. All varieties can be enhanced by careful blending, including blends of cider cultivars with existing dessert cultivars such as Jonagold, McIntosh and others. Future products in addition to hard (fermented) cider may include blends with other fruit juices (blueberry, strawberry etc.) and carbonated sweet ciders, either single-varietal or blended.

Acknowledgements

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Appendix

Table 1. Cider apple cultivar trial

Bittersweet:	Yarlington Mill	***Bittersharp***:	***Sharp:***
Brown Snout	Bulmer's Norman	Brown's Apple	Bramley's Seedling
Chisel Jersey	Medaille D'Or	Foxwhelp	Tom Putt
Dabinette	Redstreak	Kingston Black	***Sweet:***
Harry Masters' Jersey	Reine des Hatives	Breakwell's Seedling	Taylor's
Muscadet de Dieppe	Reine des Pommes	***Bitter:***	***Other:***
Michelin	Tremlett's Bitter	Frequin Rouge	Golden Russet
Vilberie			

Table 2. New acquisitions 2003 (single trees)

Amere de Berthcourt	Frequin Tardif	Porter's Perfection
American Forestier	Granniwinkle	Red Jersey
Blanc Mollet	Grindstone	Royal Jersey
Brown Thorn	Harrison	Roxbury Russet
Bouteville	Harrison SS	Smith's Cider
Campfield	Harrison #2	Soulard Crab
Cap O'Liberty	Jouveaux	Sweet Alford

Cimitiere	Lambrook Pippin	Sweet Coppin
Coat Jersey	Major	Taliaferro (Colaw)
Court Pendu Plat	Metais	Taylor’s
Court Pendu Rose	Muscadet de Dieppe	Whidbey
Crow Egg	Muscat de Bernay	Zabergau Reinette
Ellis Bitter	Nehoe	
Frequin Audievre	Peau de Vache	

Table 3. New acquisitions 2004 (to be planted spring 2005)

Bedan de Parts	Grimes Golden	Ross Nonpareil
Bramtot	Maude	Stembridge Jersey
Claygate Pearmain	Nelson County Crab	Stoke Red
Doux Normandie	Pethyre	Vagner Ascher
Fillbarrel		

Table 4. Perry pears (single trees, planted fall 2004, source NCGR Corvallis OR)

Barland	Gin	Schweizer Wasserbirne
Barnet	Huffcap, Hendre	Taynton Squash
Blakeney Red	Huffcap, Yellow	Thielersbirne
Butt	Normannischen Ciderbirne	Thorn
Gelbmostler	Romania Perry Pear	Winnals Longdon