1995

USDA-ARS

Hop Research Data Summary

1995

Annual Research Summary

HOP BREEDING, GENETICS, CHEMISTRY

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Hop Growers of America, Inc.

1994 - 1995
ANNUAL STATISTICAL REPORT

Presented:
January 26, 1996
40th Annual HGA Convention
Portland, Oregon

HGA Statistical Snapshot

	1993	1994	1995	% Diff. '94 vs '95
Hop Production (million lbs.)				
U.S.	76.1	74.6	78.8	5.6%
Germany *	93.6	62.7	76.5	22.0%
World *	304.6	262.1	283.6	8.2%
Hop Yields (lbs. per acre)				
U.S.	1,767	1,758	1,826	3.9%
Germany *	1,646	1,156	1,414	22.3%
World *	1,326	1,191	1,281	7.6%
Hop Acreage				
U.S.	43,100	42,412	43,189	1.8%
Germany	56,875	54,189	54,078	-0.2%
World *	229,595	219,851	221,326	0.7%
U.S. Crop Quality (weighted average)				
Leaf & Stem Content	0.79%	0.75%	0.80%	-
Seed Content	0.91%	0.54%	0.62%	-
Alpha Acid Production (1,000 lbs.)				
U.S.	7,767	7,086	7,086	0.0%
Germany *	5,970	2,335	2,368	1.4%
World *	20,946	16,530	n/a	-
Alpha Acid Consumption (1,000 lbs.)				
World *	17,416	17,315	17,264	-0.3%
Beer Production (million barrels)				
U.S.	201.8	203	199.1	-1.9%
World *	1,013.0	1,041.0	1,057.0	1.5%
U.S. Hop Exports (1,000 lbs.)				
Germany	9,259	5,306	7,629	43.8%
Brazil	5,823	6,575	9,739	48.1%
Mexico	6,020	8,242	5,567	-32.5%
Total Exports	43,785	42,812	51,084	19.3%
U.S. Imports of Hops (1,000 lbs.)				
Germany	3,794	7,888	7,579	-3.9%
Czech Republic	1,817	1,984	1,901	-4.2%
China	1,102	0	42	-
Total Imports	9,264	13,185	12,767	-3.2%

*1995 figures are estimates.

U.S. HOP PRODUCTION BY STATE AND VARIETY 1991 - 1995

STATE & VARIETY	HOP PRODUCTION - (Pounds) 1991	1992	1993	1994	1995
IDAHO					
Aquila	155,500	165,200	*	*	*
Banner	265,400	331,900	258,900	249,200	*
Chinook	567,300	690,700	480,200	648,800	563,000
Cluster	1,504,700	1,302,800	1,457,400	1,816,100	1,664,300
Galena	793,100	905,900	984,200	1,103,700	982,400
Other Varieties	2,144,800	2,149,900	2,264,000	2,346,800	2,759,300
Total	5,430,800	5,546,400	5,444,700	6,164,600	5,969,000
OREGON					
Chinook	*	*	*	*	96,000
Fuggle	375,000	353,400	455,700	601,600	634,500
Galena	201,000	130,000	125,000	136,000	*
Mt. Hood	71,900	82,800	288,000	475,700	413,300
Nugget	3,042,500	4,736,300	4,361,000	5,488,000	6,125,600
Perle	171,700	376,200	451,500	249,400	264,900
Tettnang	732,800	425,500	605,000	841,700	780,800
Willamette	5,014,400	4,968,000	5,119,800	5,408,600	4,948,800
Other Varieties	564,600	611,800	444,000	519,100	518,500
Total	10,173,900	11,684,000	11,850,000	13,720,100	13,782,400
WASHINGTON					
Aquila	865,000	834,200	152,900	*	*
Banner	841,800	858,900	475,000	*	*
Cascade	2,542,000	2,772,000	3,095,400	2,574,600	2,436,500
Chinook	3,780,500	4,626,000	5,050,000	4,356,500	4,622,300
Cluster	13,020,700	13,157,200	12,171,100	11,253,000	10,543,200
Eroica	827,800	922,800	944,200	842,900	979,000
Galena	15,332,300	16,760,900	16,672,700	16,173,900	16,465,300
Liberty	*	*	*	111,900	167,000
Mt. Hood	877,400	1,573,400	2,239,800	2,418,700	1,772,900
Northern Brewer	*	*	*	101,500	128,200
Nugget	6,678,300	8,070,800	8,964,600	8,264,600	11,379,800
Olympic	667,300	595,900	550,600	393,800	326,400
Perle	1,023,300	937,400	1,071,500	401,100	339,800
Tettnang	2,727,300	1,542,500	2,135,800	2,354,400	2,596,900
Willamette	4,055,300	4,116,200	4,649,300	4,136,200	4,699,000
Other Varieties	311,700	338,100	676,100	1,291,900	2,644,700
Total	53,550,700	57,106,300	58,849,000	54,675,000	59,101,000
UNITED STATES	**69,155,400**	**74,336,700**	**76,143,700**	**74,559,700**	**78,852,400**

SOURCE: U.S.D.A. Prepared by Hop Growers of America, Inc.

* Included in the category "other varieties" to avoid disclosure of individual operations.

U.S. HOP ACREAGE & YIELDS BY STATE AND VARIETY 1991 - 1995

STATE & VARIETY	ACRES HARVESTED					YIELD (lbs/acre)				
	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
IDAHO										
Aquila	103	103	*	*	*	1,510	1,600	*	*	*
Banner	145	162	137	138	*	1,830	2,050	1,890	1,806	*
Chinook	465	451	318	351	341	1,220	1,530	1,510	1,848	1,651
Cluster	734	627	694	821	826	2,050	2,080	2,100	2,212	2,015
Galena	517	512	635	616	608	1,530	1,770	1,550	1,792	1,616
Other Varieties	2,154	2,145	2,177	2,111	2,152	910	1,000	1,040	1,112	1,278
Total	4,118	4,000	3,961	4,037	3,927	1,319	1,387	1,375	1,527	1,520
OREGON										
Chinook	*	*	*	*	60	*	*	*	*	1,600
Fuggle	487	570	465	470	547	770	620	980	1,280	1,160
Galena	99	100	85	80	*	2,030	1,300	1,470	1,700	*
Mt. Hood	47	90	240	265	287	1,530	920	1,200	1,795	1,440
Nugget	1,695	2,300	2,450	2,450	3,025	1,790	2,060	1,780	2,240	2,025
Perle	177	285	272	175	154	970	1,320	1,660	1,425	1,720
Tettnang	577	575	545	655	976	1,270	740	1,110	1,285	800
Willamette	3,590	3,600	3,482	3,570	3,260	1,400	1,380	1,470	1,515	1,518
Other Varieties	518	380	361	335	332	1,090	1,610	1,230	1,549	1,562
Total	7,190	7,900	7,900	8,000	8,641	1,415	1,479	1,500	1,715	1,595
WASHINGTON										
Aquila	346	344	72	*	*	2,500	2,430	2,120	*	*
Banner	366	363	182	*	*	2,300	2,370	2,610	*	*
Cascade	1,240	1,261	1,365	1,334	1,128	2,050	2,200	2,270	1,930	2,160
Chinook	2,112	2,179	2,427	2,305	2,277	1,790	2,120	2,080	1,890	2,030
Cluster	6,230	6,452	5,983	5,308	5,143	2,090	2,040	2,030	2,120	2,050
Eroica	398	373	446	446	443	2,080	2,470	2,120	1,890	2,210
Galena	7,628	8,356	8,464	8,252	8,358	2,010	2,010	1,970	1,960	1,970
Liberty	*	*	*	119	138	*	*	*	940	1,210
Mt. Hood	820	1,429	1,828	1,805	1,115	1,070	1,100	1,230	1,340	1,590
Northern Brewer	*	*	*	57	58	*	*	*	1,780	2,210
Nugget	2,955	3,606	4,060	4,541	5,149	2,260	2,240	2,210	1,820	2,210
Olympic	337	291	261	225	160	1,980	2,050	2,110	1,750	2,040
Perle	758	725	670	382	248	1,350	1,290	1,600	1,050	1,370
Tettnang	2,254	2,127	2,190	2,160	2,278	1,210	730	980	1,090	1,140
Willamette	2,583	2,627	2,843	2,776	2,797	1,570	1,570	1,640	1,490	1,680
Other Varieties	218	233	448	665	1,329	1,430	1,450	1,510	1,940	1,990
Total	28,245	30,366	31,239	30,375	30,621	1,896	1,881	1,884	1,800	1,930
UNITED STATES	**39,553**	**42,266**	**43,100**	**42,412**	**43,189**	**1,748**	**1,759**	**1,767**	**1,758**	**1,826**

SOURCE: U.S.D.A. Prepared by Hop Growers of America, Inc.

* Included in the category "other varieties" to avoid disclosure of individual operations.

1995 U.S. Hop Production by Variety (from HGA Statistics)

Variety	State			Total Acres Harvested	Yield	Total Production	% of US crop
	WA	OR	ID		lb/acre	lbs	
	----------acres----------						
Cascade	1128	--	--	1128	2160	2,436 500	3.09
Chinook	2277	60	341	2678	1972	5,281 300	6.70
Cluster	5143	--	826	5969	2045	12,207 500	15.48
Eroica	443	--	--	443	2210	979 000	1.24
Fuggle	--	547	--	547	1160	634 500	0.81
Galena	8358	*	608	8964	1946	17,447 700	22.13
Liberty	138	--	--	138	1210	167 000	0.21
Mt. Hood	1115	287	--	1402	1559	2,186 200	2.77
US No. Brewer[1]	58	--	--	58	2210	128 200	0.16
Nugget	5149	3025	--	8174	2142	17,505 400	22.20
Olympic	160	--	--	160	2040	326 400	0.41
Perle	248	154	--	402	1504	604 700	0.77
Tettnanger	2278	976	--	3254	1038	3,377 700	4.28
Willamette	2797	3260	--	6059	1592	9,647 800	12.24
Other[2]	1329	332	2152	3813	1553	5,922 500	7.51
Total	30621	8641	3927	43189	1826	78,852 400	100.00

* Included in "other" to avoid disclosure of single operation.

[1] mixed rootstock including Cluster, Fuggle and others.

[2] includes northern Idaho (about 1400 acres Saazer, 500 acres Hallertau mittelfrüh, 4 acres Saazer); about 20 acres Crystal in OR, Tettnanger- and Saazer-type experimental selections, and probably Chelan and Columbia in Washington.

U.S. / GERMAN / IHGC ALPHA ACID PRODUCTION 1980 - 1995

(1,000 pounds)

Year	United States	Crop Average	Germany 1/	Crop Average	IHGC Other	Total IHGC
1980	5,302	7.0%	3,397	5.7%	4,707	13,406
1981	5,556	7.0%	4,451	6.0%	5,732	15,739
1982	5,893	7.5%	4,824	5.1%	5,957	16,674
1983	5,525	8.1%	3,397	4.2%	5,141	14,063
1984	4,718	8.4%	5,068	6.5%	5,836	15,622
1985	3,926	7.9%	4,178	5.3%	4,769	12,873
1986	4,755	9.7%	4,407	5.9%	4,381	13,543
1987	4,630	9.3%	4,403	6.5%	4,769	13,801
1988	4,850	8.9%	3,574	5.4%	4,795	13,219
1989	5,260	8.9%	4,114	5.9%	4,418	13,792
1990	4,958	8.7%	3,232	4.8%	3,657	11,848
1991	6,277	9.1%	5,042	6.3%	5,084	16,402
1992	6,953	9.4%	3,053	4.8%	3,979	13,986
1993	7,767	10.2%	5,970	6.4%	4,879	18,616
1994	7,086	9.5%	2,335	3.7%	3,887	13,307
1995 2/	7,387	9.4%	4,012	5.3%	4,107	15,507

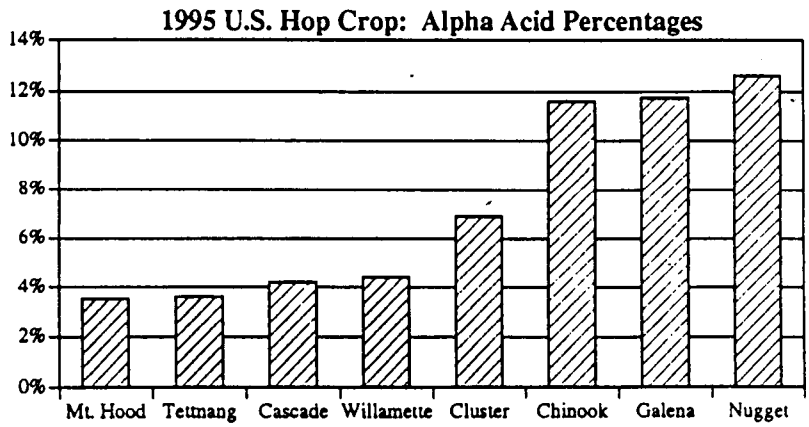
Source: U.S. hop merchants; IHGC report - November 1995. Prepared by Hop Growers of America, Inc.

1/ 1980 - 1989 German alpha figures reflect West German production only.

2/ '95 U.S. alpha tonnage measured at harvest (ASBC Spectrophotometric). '95 German and IHGC figures are estimates only.

ALPHA ACID PERCENTAGES BY VARIETY - 1995 U.S. HOP CROP

Variety	Average Alpha *
Cascade	4.20%
Mt. Hood	3.50%
Tettnang	3.60%
Willamette	4.40%
Cluster	6.90%
Chinook	11.60%
Galena	11.75%
Nugget	12.60%



Source: U.S. Hop Dealer's Trade Association.

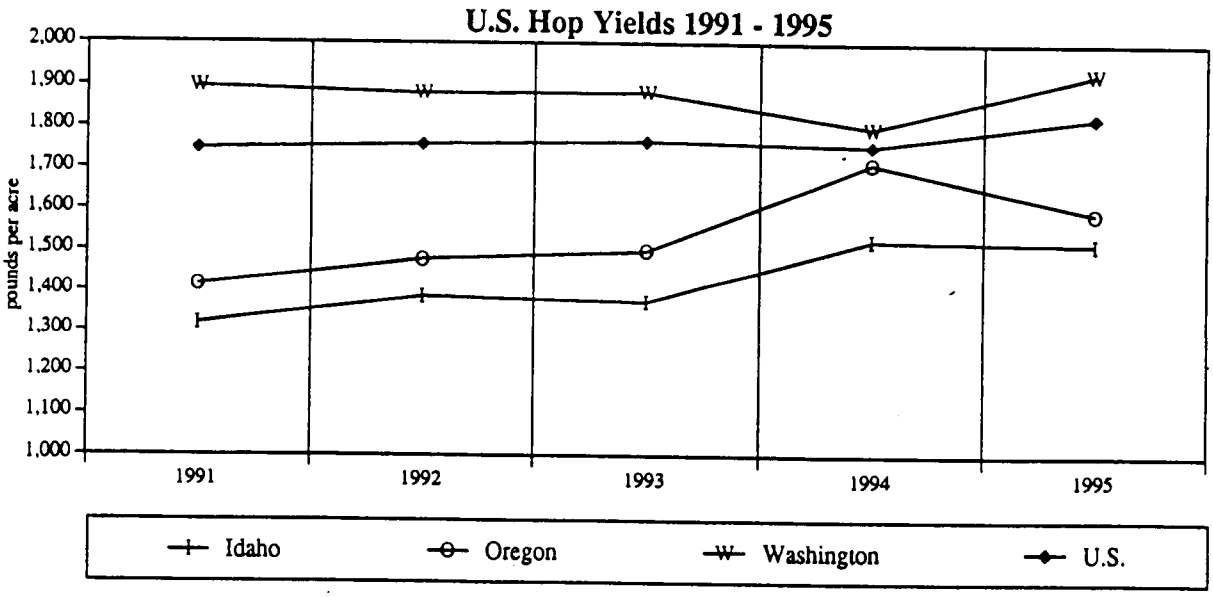
* Figures represent alpha percentages as of December 31, 1995 (ASBC-Spectrophotometric).

U.S. HOP YIELDS 1978 - 1995

(pounds per acre)

Year	Washington	Oregon	Idaho	United States *
1978	1,880	1,510	1,790	1,782
1979	1,800	1,540	1,710	1,727
1980	2,080	1,960	1,960	2,037
1981	1,900	1,720	1,650	1,836
1982	2,070	1,800	1,730	1,984
1983	1,930	1,590	1,740	1,846
1984	1,920	1,420	1,750	1,824
1985	1,870	1,470	1,620	1,764
1986	2,040	1,664	2,000	1,968
1987	1,860	1,470	1,750	1,770
1988	1,721	1,470	1,400	1,638
1989	1,782	1,600	1,461	1,717
1990	1,634	1,530	1,500	1,603
1991	1,896	1,415	1,319	1,748
1992	1,881	1,479	1,387	1,759
1993	1,884	1,500	1,375	1,767
1994	1,800	1,715	1,527	1,758
1995	1,930	1,595	1,520	1,826

Sources: U.S.D.A., U.S. Hop Administrative Committee. Prepared by Hop Growers of America, Inc.
*U.S. figures include California acreage yields (1978-1987).



U.S. HOP ACREAGE BY VARIETY 1986 - 1995

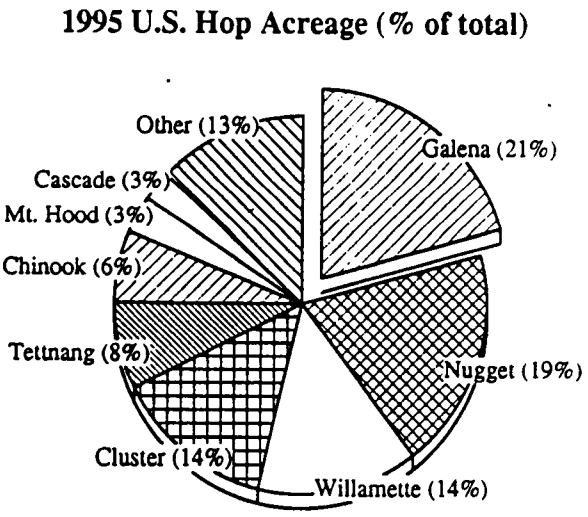
(Acres Harvested)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Alpha Varieties										
Galena	4,396	4,740	5,570	6,424	6,788	8,244	8,968	9,184	8,948	8,966
Nugget	2,951	2,850	3,270	3,519	4,220	4,650	5,906	6,510	6,991	8,174
Chinook	231	980	1,220	1,489	1,746	2,577	2,630	2,745	2,656	2,678
Eroica	1,470	1,170	1,070	822	756	641	373	446	446	443
Olympic	218	230	270	279	280	337	291	261	225	160
Other	199	309	334	363	265	529	552	597	634	763
SubTotal	9,465	10,279	11,734	12,896	14,055	16,978	18,720	19,743	19,900	21,184
Cluster 1/	9,419	10,410	8,440	6,864	6,614	6,964	7,079	6,677	6,129	5,969
Total - Alpha	18,884	20,689	20,174	19,760	20,669	23,942	25,799	26,420	26,029	27,153
Aroma Varieties										
Willamette	2,114	2,745	5,880	6,299	6,463	6,173	6,227	6,325	6,346	6,057
Tettnang	-	650	2,670	2,941	2,980	2,831	2,702	2,735	2,815	3,254
Mt. Hood	-	-	-	-	560	867	1,519	2,068	2,070	1,402
Cascade	2,241	1,650	920	1,297	1,270	1,240	1,261	1,365	1,334	1,128
Fuggle	967	920	850	801	608	487	570	465	470	547
Perle	-	410	910	1,064	932	935	1,010	942	557	402
Liberty	-	-	-	-	-	-	-	-	119	138
Banner	-	-	340	466	468	511	525	319	138	-
Aquila	-	-	320	466	451	449	447	72	-	-
Other	794	1,236	1,336	1,454	1,062	2,118	2,206	2,389	2,534	3,108
Total - Aroma	6,116	7,611	13,226	14,788	14,794	15,611	16,467	16,680	16,383	16,036
US TOTALS	25,000	28,300	33,400	34,548	35,463	39,553	42,266	43,100	42,412	43,189

Source: U.S.D.A., U.S. Hop Administrative Committee reports. Prepared by Hop Growers of America, Inc.
1/ 1986 Cluster acreage totals include the variety Talisman.

U.S. Hop Acreage by State 1981 - 1995

Year	Acres Harvested Wash.	Oregon	Idaho	U.S. *
1981	31,300	7,200	3,400	43,100
1982	28,100	7,300	3,700	39,600
1983	27,000	6,300	3,600	36,900
1984	22,700	4,900	3,100	30,800
1985	19,500	5,500	3,100	28,100
1986	17,400	5,100	2,500	25,000
1987	20,100	6,000	2,200	28,300
1988	23,100	7,500	2,800	33,400
1989	24,336	7,412	2,800	34,548
1990	25,663	7,100	2,700	35,463
1991	28,245	7,190	4,118	39,553
1992	30,366	7,900	4,000	42,266
1993	31,239	7,900	3,961	43,100
1994	30,375	8,000	4,037	42,412
1995	30,621	8,641	3,927	43,189

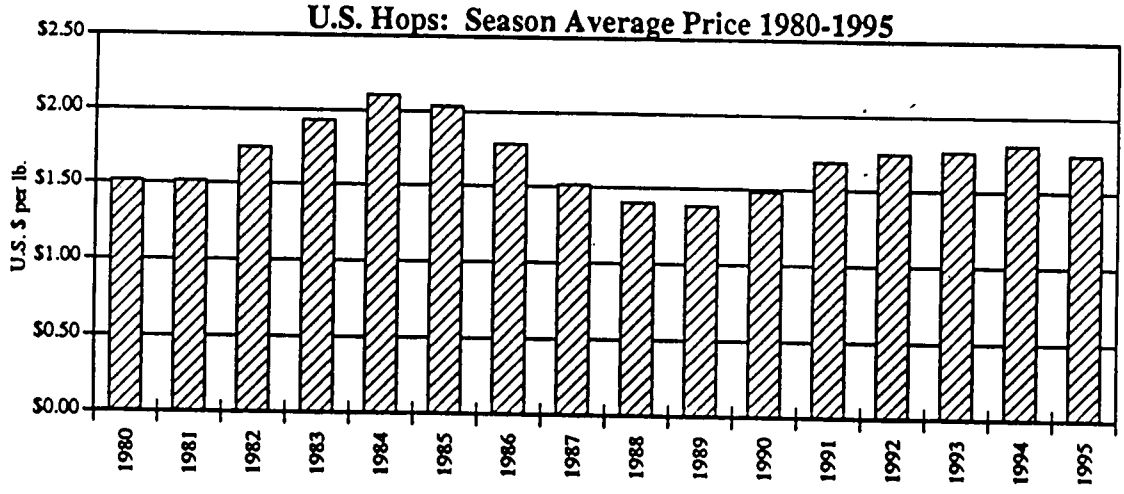


Source: U.S.D.A., Hop Administrative Committee reports. Prepared by Hop Growers of America, Inc.
* U.S. totals include California acreage (1981-1987).

U.S. HOPS: SEASON AVERAGE PRICES & TOTAL CROP VALUE

Mktg Year	SEASON AVERAGE PRICE ($ / pound) Wash.	Oregon	Idaho	U.S.	U.S. Production (1,000 lbs)	Total Crop Value (x 1,000)
1980	$1.54	$1.44	$1.42	$1.51	75,560	$114,194
1981	$1.50	$1.47	$1.65	$1.51	79,144	$119,220
1982	$1.60	$1.97	$2.48	$1.74	78,550	$136,884
1983	$1.80	$2.15	$2.62	$1.93	68,111	$131,483
1984	$1.99	$2.10	$2.92	$2.10	56,167	$117,701
1985	$1.80	$2.36	$3.18	$2.03	49,713	$98,433
1986	$1.59	$2.08	$2.59	$1.78	49,062	$87,087
1987	$1.32	$1.78	$2.74	$1.51	50,048	$75,578
1988	$1.36	$1.64	$1.09	$1.40	54,696	$76,415
1989	$1.33	$1.58	$1.26	$1.38	59,326	$81,583
1990	$1.44	$1.63	$1.50	$1.48	56,855	$84,178
1991	$1.68	$1.71	$1.59	$1.68	69,155	$115,997
1992	$1.72	$1.86	$1.69	$1.74	74,337	$129,096
1993	$1.72	$1.95	$1.77	$1.76	76,144	$133,965
1994	$1.77	$1.96	$1.79	$1.81	74,560	$134,701
1995	$1.70	$1.90	$1.73	$1.74	78,852	$136,985

Source: U.S.D.A., Hop Administrative Committee reports. Prepared by Hop Growers of America, Inc.



1995 U.S. SOLD AHEAD SURVEY 1/

Year	Pounds Contracted	% of Crop Sold 2/
1995	68,074,883	91.3%
1996	59,624,593	80.0%
1997	40,942,276	54.9%
1998	33,431,262	44.8%
1999	14,825,036	19.9%
2000	10,197,151	13.7%

Source: U.S.D.A. Prepared by Hop Growers of America, Inc.
1/ Survey based on responses from 72% of U.S. hop growers, representing 70% of the 1995 acreage strung for harvest.
2/ % of crop sold = pounds contracted divided by average U.S. hop crop over the last 5 years (1991-1995).

IHGC SOLD AHEAD SURVEY 1995 - 1999

Country	Average Crop Production 1/ (x 1,000 lbs.)	1995	1996	1997	1998	1999
		(percent of crop sold)				
USA	74,600	91%	80%	55%	45%	20%
Germany	75,500	71%	54%	n/a	n/a	n/a
Czech Republic	20,500	70%	60%	43%	32%	27%
United Kingdom	11,000	55%	30%	23%	8%	8%
Slovenia	7,500	60%	47%	29%	17%	14%
Poland	5,700	87%	77%	67%	67%	58%
Ukraine	5,500	8%	n/a	n/a	n/a	n/a
France	2,500	95%	95%	77%	32%	24%
Slovakia	2,200	60%	50%	50%	40%	35%
New Zealand	1,600	93%	93%	64%	29%	23%
Belgium	1,200	43%	14%	11%	9%	4%

Source: IHGC report - March 1995; U.S.D.A. Prepared by Hop Growers of America.
1/ Average crop production = current acreage x average yields over the last 5 years (1991-1995).

1995 U.S. HOP INSPECTION REPORT

Prepared by U.S.D.A. Federal Grain Inspection Service

TABLE 1 : Total Number of Bales * Inspected (Weighted Average of Leaf & Stem in Parenthesis)

	Washington (%)	Oregon (%)	Idaho (%)	Total U.S. (%)
1988	200,584 (0.92)	55,716 (1.28)	18,992 (1.01)	275,327 (1.00)
1989	216,188 (0.96)	63,000 (0.63)	19,881 (1.20)	299,069 (0.95)
1990	212,271 (1.01)	56,859 (1.35)	19,033 (1.11)	288,163 (1.09)
1991	267,705 (0.78)	52,811 (1.39)	25,371 (0.35)	345,887 (0.85)
1992	291,526 (0.96)	59,718 (1.62)	27,732 (1.02)	378,976 (0.93)
1993	293,215 (0.71)	60,686 (1.16)	26,340 (0.87)	380,241 (0.79)
1994	268,326 (0.62)	66,741 (1.12)	30,822 (0.99)	365,889 (0.75)
1995	297,225 (0.73)	66,211 (1.02)	28,839 (0.97)	392,275 (0.80)

TABLE 2 : 1995 Number of Bales * in Each Leaf & Stem Category (Percent of Total in Parenthesis)

	0%	1%	2%	3%	4%	5%	6%	7% +	Total
Washington	130,515 (44)	124,487 (42)	34,563 (12)	6,267 (2)	1,118	153	122	0	297,225 (100)
Oregon	25,741 (39)	23,121 (35)	10,233 (16)	4,815 (7)	1,849 (3)	272	180	0	66,211 (100)
Idaho	4,057 (14)	21,697 (75)	3,035 (11)	47	3	0	0	0	28,839 (100)
Total	160,313	169,305	47,831	11,129	2,970	425	302	0	392,275
% of Total	41%	43%	12%	3%	1%	-	-	-	100%

TABLE 3 : 1995 Number of Bales * in Each Seed Category (Percent of Total in Parenthesis)

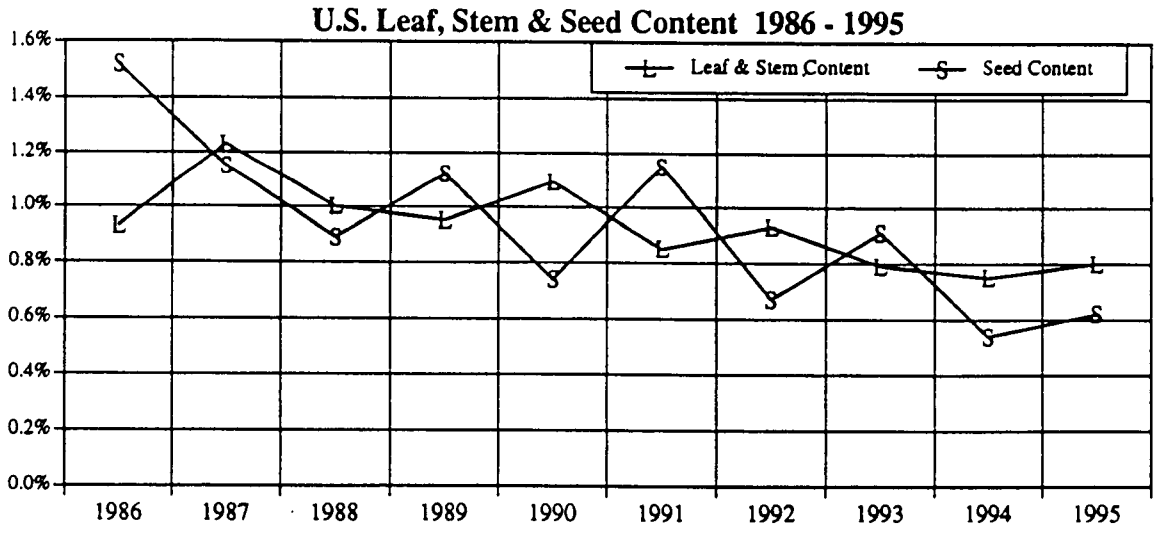
	0%	1%	2%	3%	4%	5%	6%	7% +	Total
Washington	230,911 (78)	45,701 (15)	12,006 (4)	5,073 (2)	1,384 (1)	619	341	1,190	297,225 (100)
Oregon	22,032 (33)	17,655 (20)	5,690 (9)	4,070 (6)	4,522 (7)	2,072 (3)	2,247 (3)	7,923 (12)	66,211 (100)
Idaho	28,839 (100)	0	0	0	0	0	0	0	28,839 (100)
Total	281,782	63,356	17,696	9,143	5,906	2,691	2,588	9,113	392,275
% of Total	72%	16%	5%	2%	2%	1%	1%	2%	100%

* Bale weight equals 200 lbs. or 90 kilograms.

U.S. HOP INSPECTION REPORTS 1976-1995
LEAF, STEM & SEED CONTENT (%)

Year	WASHINGTON Leaf & Stem	OREGON Leaf & Stem	IDAHO Leaf & Stem	U.S. AVERAGE* Leaf & Stem	U.S. AVERAGE* Seed Content
1976	1.23	1.43	1.16	1.24	1.18
1977	1.46	1.91	1.15	1.49	1.52
1978	1.38	2.19	1.34	1.48	0.98
1979	1.92	2.32	1.38	1.93	1.07
1980	2.57	2.19	1.84	2.43	1.40
1981	1.93	2.49	1.60	2.01	1.55
1982	1.13	1.80	1.24	1.26	1.38
1983	1.25	1.44	1.20	1.28	1.02
1984	1.07	1.77	1.27	1.18	1.12
1985	1.25	1.56	1.16	1.16	0.67
1986	0.95	0.92	0.73	0.93	1.52
1987	1.14	1.55	1.28	1.23	1.15
1988	0.92	1.28	1.01	1.00	0.89
1989	0.96	0.83	1.20	0.95	1.12
1990	1.01	1.35	1.11	1.09	0.74
1991	0.78	1.39	0.35	0.85	1.15
1992	0.96	1.62	1.02	0.93	0.67
1993	0.71	1.16	0.87	0.79	0.91
1994	0.62	1.12	0.99	0.75	0.54
1995	0.73	1.02	0.97	0.80	0.62

Source: U.S.D.A. Federal Grain Inspection Service. Prepared by Hop Growers of America, Inc.
* U.S. Averages include California crop figures 1976-1986.



DISPOSITION OF PRODUCTION

SALABLE HOP PRODUCTS (1,000 lbs.)

	Exports (+)	Net Domestic Usage of U.S. Hops* (+)	Plus (minus) Unaccountable Difference (+)	Increase (Decrease) Domestic Stocks	Salable (=) Product	
1980-81	41,965	28,346	2,580	1,520	74,411	(100%)
1981-82	43,725	24,493	-1,892	12,600	78,926	(100%)
1982-83	34,733	26,689	2,673	14,050	78,145	(100%)
1983-84	32,181	29,195	-402	7,016	67,990	(100%)
1984-85	31,352	26,691	-4,354	2,364	56,053	(100%)
1985-86	26,091	22,168	866	490	49,615	(100%)
1986-87	28,380	29,159	-8,239	-320	48,980	(100%)
1987-88 1/	30,155	32,578	-2,055	-10,630	50,048	(100%)
1988-89 1/	41,660	29,283	-8,009	-8,300	54,634	(100%)
1989-90 1/	42,878	24,274	-8,016	190	59,326	(100%)
1990-91 1/	31,300	21,810	1,435	2,310	56,855	(100%)
1991-92 1/	48,493	22,997	-4,385	2,050	69,155	(100%)
1992-93	43,786	31,227	-2,486	1,810	74,337	(100%)
1993-94 2/	42,812	27,555	836	4,940	76,143	(100%)
1994-95	51,084	32,934	-2,358	-7,100	74,560	(100%)

Source: U.S.D.A. Hop Market News, FAS. Prepared by Hop Growers of America, Inc.

* Total usage less imports, adjusted for year end inventory changes.

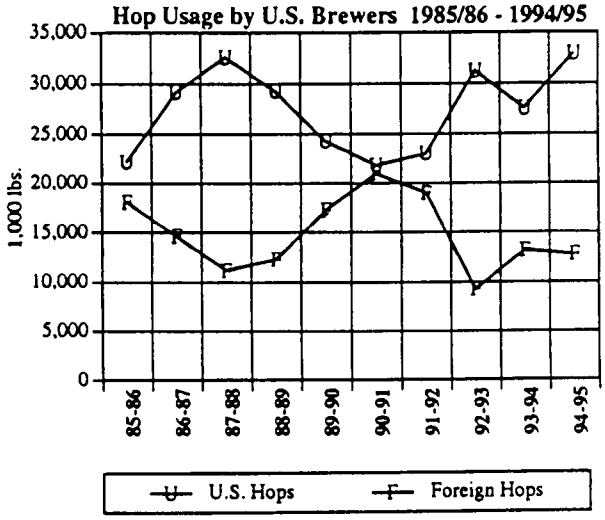
1/ 1987-92 hop extract ratios were revised: domestic extract = 4 lbs. hops to 1 lb. extract; extract shipped overseas = 3.1 to 1.

2/ 1993-94 export figures were revised down from 51 million lbs. to 42.8 million lbs.

U.S. BREWERY USAGE (1,000 lbs.)

	Net Usage U.S. Hops	Net Usage Foreign Hops
1982-83	26,689 (65%)	14,349 (35%)
1983-84	29,195 (65%)	15,672 (35%)
1984-85	26,691 (64%)	14,774 (36%)
1985-86	22,168 (55%)	18,039 (45%)
1986-87	29,159 (67%)	14,626 (33%)
1987-88	32,578 (75%)	11,138 (25%)
1988-89	29,283 (70%)	12,302 (30%)
1989-90	24,274 (58%)	17,243 (42%)
1990-91	21,810 (51%)	20,974 (49%)
1991-92	22,997 (55%)	18,946 (45%)
1992-93	31,227 (77%)	9,264 (23%)
1993-94	27,555 (68%)	13,186 (32%)
1994-95	32,934 (72%)	12,767 (28%)

Source: U.S.D.A. Hop Market News



SUPPLY AND DISPOSITION 1986/87 - 1994/95 (1,000 lbs.)

SUPPLY:	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Carry-in Stock 1/	70,950	70,630	60,000	51,700	51,890	54,200	56,250	58,060	63,000
Salable Product	48,980	50,048	54,634	59,326	56,855	69,155	74,337	76,143	74,560
Imports	14,626	11,138	12,302	17,243	20,974	18,946	9,264	13,186	12,767
TOTAL	134,556	131,816	126,936	128,269	129,719	142,301	139,851	147,389	150,327
DISPOSITION:									
Brewery Usage 2/	43,785	43,716	41,585	41,517	42,784	41,943	40,491	40,741	45,701
Exported 2/ 3/	28,380	30,155	41,660	42,878	31,300	48,493	43,786	42,812	51,084
Carry-out Stocks 1/	70,630	60,000	51,700	51,890	54,200	56,250	58,060	63,000	55,900
Balancing Item	-8,239	-2,055	-8,009	-8,016	1,435	-4,385	-2,486	836	-2,358
TOTAL	134,556	131,816	126,936	128,269	129,719	142,301	139,851	147,389	150,327
HOPPING RATE: 4/	**0.224**	**0.233**	**0.220**	**0.207**	**0.210**	**0.207**	**0.201**	**0.201**	**0.214**

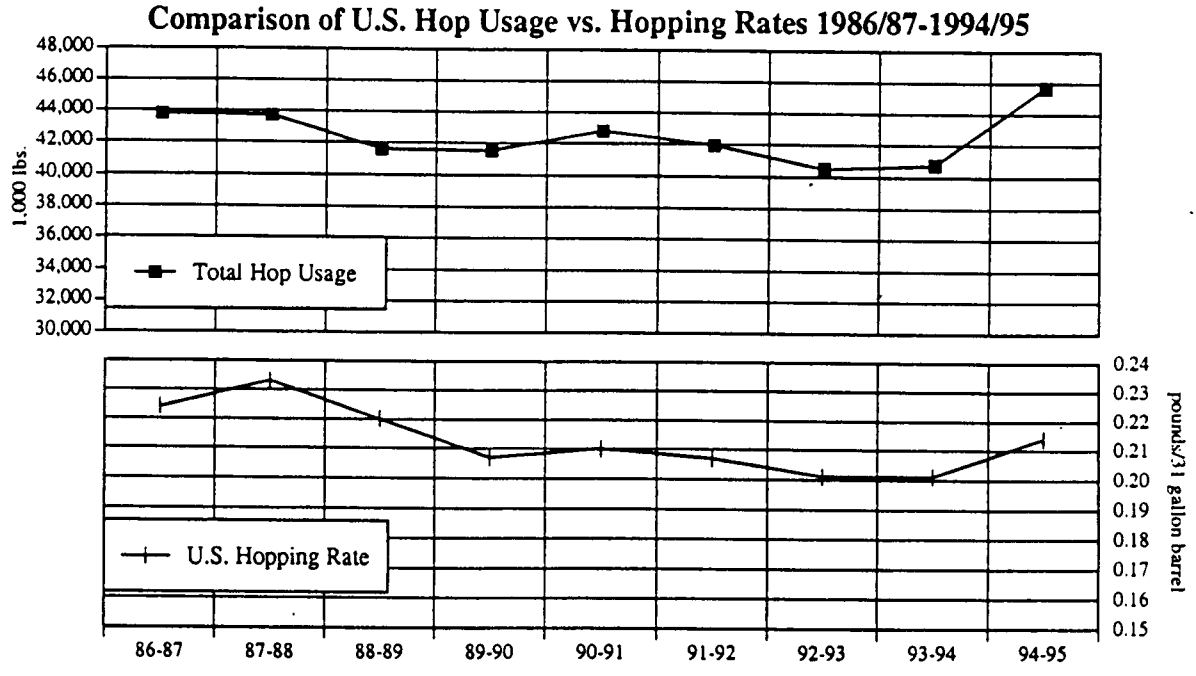
Source: U.S.D.A. Hop Market News. Prepared by Hop Growers of America, Inc.

1/ Brewer, dealer and grower stocks as of September 1.

2/ 1987-92 hop extract ratios were revised: domestic extract = 4 lbs. hops to 1 lb. extract; extract shipped overseas = 3.1 to 1.

3/ 1993-94 export figures were revised down from 51 million lbs. to 42.8 million lbs.

4/ Hopping rate = pounds of hops used per barrel of beer.



BREAKDOWN OF BREWERY CONSUMPTION AND EXPORTS OF U.S. HOPS (1,000 lbs.)

Marketing Year	EXTRACT CONVERSION 1/		U.S. BREWERY CONSUMPTION			U.S. HOP EXPORTS				
	Domestic	Export	Cones/ Pellets	Extract (Hop Equiv.)	Total Consump.	Cones	Pellets	Total Hops/ Pellets	Extract (Hop Equiv.)	Total Exports
1978-79	4.4-1	4.0-1	32,632	7,321	39,953	-	-	17,336	15,207	32,543
1979-80	4.4-1	4.0-1	35,582	6,883	42,465	-	-	17,045	19,692	36,737
1980-81 2/	3.5-1	4.0-1	35,331	7,616	42,947	-	-	19,605	22,360	41,965
1981-82	4.4-1	4.0-1	34,644	7,195	41,839	-	-	21,713	22,012	43,725
1982-83	5.0-1	4.0-1	34,476	6,562	41,038	-	-	16,817	17,925	34,742
1983-84 3/	5.1-1	4.0-1	35,078	6,294	41,372	4,785	5,955	10,740	21,441	32,181
1984-85	4.7-1	4.0-1	35,451	6,014	41,465	4,162	5,906	10,068	21,284	31,352
1985-86	5.6-1	4.0-1	34,617	5,590	40,207	3,438	4,365	7,803	18,288	26,091
1986-87	6.6-1	4.0-1	36,220	7,567	43,787	4,997	3,983	8,980	19,400	28,380
1987-88	4.0-1	3.1-1	36,894	6,822	43,716	5,293	6,705	11,998	18,157	30,155
1988-89	4.0-1	3.1-1	34,341	7,244	41,585	4,310	16,977	21,287	20,373	41,660
1989-90	4.0-1	3.1-1	34,485	7,032	41,517	4,902	16,535	21,437	21,441	42,878
1990-91	4.0-1	3.1-1	35,467	7,318	42,785	2,725	12,412	15,137	16,163	31,300
1991-92	4.0-1	3.1-1	34,194	7,749	41,943	5,589	10,933	16,522	31,971	48,493
1992-93	4.0-1	3.1-1	32,055	8,436	40,491	5,769	11,288	17,057	26,729	43,786
1993-94 4/	4.0-1	3.1-1	32,018	8,723	40,741	4,403	9,319	13,722	29,090	42,812
1994-95	4.0-1	3.1-1	36,553	9,148	45,701	5,494	15,212	20,706	30,378	51,084

Source: U.S.D.A. Hop Market News. Prepared by Hop Growers of America, Inc.

1/ 1987-92 hop extract ratios were revised: domestic extract = 4 lbs. hops to 1 lb. extract; extract shipped overseas = 3.1 to 1.

2/ 1980-81 figures include 5 million pounds minus adjustment to reflect more accurate export extract figure.

3/ 1983-84 includes 3.5 million pounds minus adjustment to reflect more accurate domestic extract consumption figure.

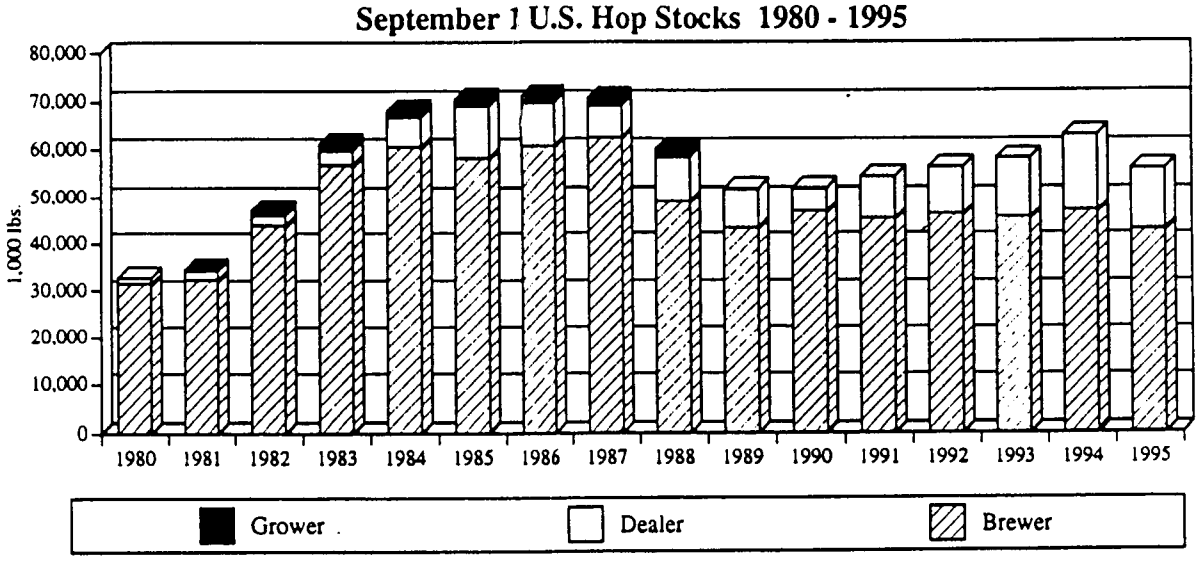
4/ 1993-94 export figures were revised down from 51 million lbs. to 42.8 million lbs.

SEPTEMBER 1 U.S. HOP STOCKS 1976 - 1995

(1,000 lbs.)

Year	Brewer	Dealer	Grower	TOTAL
1976	48,050	1,960	390	50,400
1977	48,520	1,580	380	50,480
1978	45,430	1,730	380	47,540
1979	35,270	2,930	0	38,200
1980	31,420	1,380	0	32,800
1981	32,240	1,950	240	34,430
1982	43,740	2,090	1,200	47,030
1983	56,700	3,000	1,380	61,080
1984	60,480	6,256	1,360	68,096
1985	58,130	10,930	1,400	70,460
1986	60,630	8,930	1,390	70,950
1987	62,430	6,580	1,620	70,630
1988	49,090	9,160	1,750	60,000
1989	43,200	8,500	1/	51,700
1990	46,810	5,080	1/	51,890
1991	45,200	9,000	1/	54,200
1992	46,270	9,980	1/	56,250
1993	45,520	12,540	1/	58,060
1994	47,070	15,930	1/	63,000
1995	42,800	13,100	1/	55,900

Source: U.S.D.A. Prepared by Hop Growers of America, Inc.
1/ Included in dealer stocks to avoid disclosure of individual operations.



U.S. HOP EXPORTS: September 1994 - August 1995 (pounds)

Country / Region	Cones	Pellets	Extract (Hop Equiv.)	Total	% of Total Exports
Canada	149,912	3,046,758	75,178	3,271,848	6.4%
Mexico	416,669	134,480	5,016,349	5,567,498	10.9%
NORTH AMERICA	**566,581**	**3,181,238**	**5,091,527**	**8,839,346**	**17.3%**
Honduras	6,614	0	703,929	710,543	1.4%
Guatemala	0	0	136,685	136,685	0.3%
Costa Rica	0	0	136,685	136,685	0.3%
Nicaragua	0	77,162	0	77,162	0.2%
Other: Central America	22,046	4,410	82,011	108,467	0.2%
CENTRAL AMERICA	**28,660**	**81,572**	**1,059,310**	**1,169,542**	**2.3%**
Dominican Republic	0	138,890	314,377	453,267	0.9%
Jamaica	112,435	0	0	112,435	0.2%
Other: Caribbean	0	6,615	198,203	204,818	0.4%
CARIBBEAN	**112,435**	**145,505**	**512,580**	**770,520**	**1.5%**
Brazil	372,577	6,236,711	3,130,089	9,739,377	19.1%
Colombia	180,777	961,205	2,925,067	4,067,049	8.0%
Peru	52,910	66,138	806,443	925,491	1.8%
Chile	0	0	300,706	300,706	0.6%
Argentina	0	103,617	478,401	582,018	1.1%
Other: South America	46,297	182,981	498,903	728,181	1.4%
SOUTH AMERICA	**652,561**	**7,550,652**	**8,139,609**	**16,342,822**	**32.0%**
Germany	2,442,697	921,522	4,264,580	7,628,799	14.9%
United Kingdom	921,524	892,862	1,715,404	3,529,790	6.9%
Belgium	0	401,237	1,113,985	1,515,222	3.0%
Netherlands	2,205	94,798	1,353,181	1,450,184	2.8%
Ireland	0	39,683	847,450	887,133	1.7%
Other: Europe	213,846	271,167	1,421,533	1,906,546	3.7%
EUROPE	**3,580,272**	**2,621,269**	**10,716,133**	**16,917,674**	**33.1%**
Togo	0	0	109,349	109,349	0.2%
South Africa	30,864	0	0	30,864	0.1%
Other: Africa	2,205	0	27,339	29,544	0.1%
AFRICA	**33,069**	**0**	**136,688**	**169,757**	**0.3%**
Korea	103,617	30,864	2,125,453	2,259,934	4.4%
Japan	324,075	996,479	293,874	1,614,428	3.2%
Philippines	0	116,846	888,460	1,005,306	2.0%
Hong Kong	8,818	315,257	444,230	768,305	1.5%
China	8,818	110,231	47,839	166,888	0.3%
Other: Asia	74,959	41,888	293,879	410,726	0.8%
ASIA	**520,287**	**1,611,565**	**4,093,735**	**6,225,587**	**12.2%**
All Others	0	19,841	628,750	648,591	1.3%
GRAND TOTAL	**5,493,865**	**15,211,642**	**30,378,332**	**51,083,839**	**100%**

Source: USDA Hop Market News. Prepared by Hop Growers of America, Inc.

SUMMARY OF U.S. HOP EXPORTS BY COUNTRIES & REGIONS (x 1,000 lbs.)

	'85-86	'86-87	87-88 *	88-89 *	89-90 *	90-91 *	91-92 *	92-93	'93-94	'94-95
Canada	2,071	2,005	2,797	9,779	4,191	2,782	3,092	2,842	3,016	3,272
Mexico 1/	5,028	6,555	5,369	5,897	6,781	3,051	5,251	6,020	8,242	5,567
NORTH AMERICA	**7,099**	**8,560**	**8,166**	**15,676**	**10,972**	**5,833**	**8,343**	**8,862**	**11,258**	**8,839**
Belize	12	0	0	6	0	0	2	20	11	4
Costa Rica	36	88	90	68	0	41	82	71	144	137
El Salvador	33	40	115	0	0	44	55	44	84	49
Guatemala	139	15	110	121	121	131	278	230	212	137
Honduras	70	0	0	40	50	48	61	48	178	711
Nicaragua	0	0	0	0	46	51	233	79	64	77
Panama	32	184	47	74	59	0	0	0	171	55
CENTRAL AMERICA	**322**	**327**	**362**	**309**	**276**	**315**	**711**	**492**	**864**	**1,170**
Bahamas	0	28	8	22	25	27	34	21	41	7
Barbados	7	16	13	9	6	4	7	14	0	7
Dominican Republic	197	179	365	329	536	283	644	618	251	453
Jamaica	84	79	219	323	117	130	332	250	75	112
Leeward & Windward	4	8	8	28	28	139	30	14	9	64
Trinidad - Tobago	17	48	44	40	70	16	27	48	99	66
Other	0	8	8	18	34	37	21	93	68	62
CARIBBEAN	**309**	**366**	**665**	**769**	**816**	**636**	**1,095**	**1,058**	**543**	**771**
Argentina	700	709	222	0	186	303	554	437	789	582
Bolivia	13	70	220	108	40	34	264	187	168	157
Brazil	4,848	6,012	7,104	7,985	9,732	7,566	5,659	5,823	6,575	9,739
Chile	247	304	582	431	543	567	670	459	413	301
Colombia	5,411	2,358	2,914	2,865	3,893	555	972	2,118	711	4,067
Ecuador	498	577	223	0	272	394	112	117	150	368
Paraguay	52	52	28	47	102	34	123	127	175	18
Peru	656	848	589	643	754	226	484	636	425	925
Uruguay	49	92	103	45	56	81	88	120	177	40
Venezuela	487	887	202	257	501	451	433	1,088	1,081	119
Other	1	24	75	52	103	185	27	29	31	27
SOUTH AMERICA	**12,962**	**11,933**	**12,262**	**12,433**	**16,182**	**10,396**	**9,386**	**11,141**	**10,695**	**16,343**
Belgium	77	144	108	589	962	1,601	2,000	1,235	1,532	1,515
Bulgaria	8	0	0	0	0	0	0	0	271	40
Denmark	0	0	0	0	0	2	124	123	7	35
Finland	0	0	28	6	2	9	4	82	41	43
France	0	0	34	0	2	499	0	68	27	513
Greece	0	0	0	0	0	0	0	0	64	0
Hungary	0	0	0	0	0	0	0	0	82	236
Ireland	0	456	516	921	1,182	575	869	64	156	887
Italy	0	37	15	0	0	22	55	86	59	97
Netherlands	834	996	1,203	1,675	1,417	1,267	2,092	1,999	2,392	1,450
Portugal	0	0	0	15	66	49	0	157	109	170
Spain	220	0	56	74	136	367	516	519	267	182
Switzerland	0	124	0	0	0	22	31	79	33	99
United Kingdom	103	546	688	655	445	892	1,968	2,650	2,418	3,530
Germany	1,020	797	1,687	4,200	5,076	5,619	10,137	9,259	5,306	7,629
Russia	0	0	0	661	1,265	0	3,743	0	44	447
Other	0	0	35	0	270	119	10	68	6	45
EUROPE	**2,262**	**3,100**	**4,370**	**8,796**	**10,823**	**11,043**	**21,549**	**16,389**	**12,814**	**16,918**

* 1987-92 export figures were revised to reflect an extract ratio of 3.1 lbs. of raw hops to 1 lb. of hop extract.

1/ 1993-94 Mexico exports were revised.

SUMMARY OF U.S. HOP EXPORTS BY COUNTRIES & REGIONS (x 1,000 lbs.)

	'85-86	'86-87	'87-88*	'88-89*	'89-90*	'90-91*	'91-92*	'92-93	'93-94	'94-95
Cameroon	0	272	233	211	174	147	110	93	0	21
Ghana	0	116	158	62	16	14	75	0	15	0
Nigeria	980	980	828	786	201	24	248	242	161	7
South Africa	160	196	55	150	51	108	160	153	106	31
Togo	0	0	102	22	34	154	62	0	116	109
Zaire	40	28	34	0	0	55	0	0	0	0
Other	60	23	102	6	70	9	129	0	88	2
AFRICA	**1,240**	**1,615**	**1,512**	**1,237**	**546**	**511**	**784**	**488**	**486**	**170**
Bangladesh	2	28	9	0	0	2	7	0	0	0
China	0	0	0	13	0	77	53	38	7	167
Hong Kong	205	271	136	71	50	95	158	336	341	768
Indonesia	0	52	47	56	19	82	27	62	50	50
Japan	683	1,069	639	333	364	287	426	1,136	1,474	1,614
Korea	119	77	52	94	35	79	2,366	1,763	1,167	2,260
Malaysia	220	192	177	161	31	169	118	43	62	107
Philippines	329	596	1,235	1,247	2,337	920	1,989	923	1,484	1,005
Singapore	292	80	124	171	180	172	175	206	49	61
Taiwan	0	0	9	150	0	571	617	448	397	23
Other	0	0	0	0	34	0	7	0	36	170
ASIA	**1,850**	**2,365**	**2,428**	**2,296**	**3,050**	**2,454**	**5,943**	**4,955**	**5,067**	**6,225**
Australia	16	64	0	6	28	14	89	283	588	234
Pakistan	31	30	22	22	23	9	9	26	29	0
Papua New Guinea	0	0	0	96	129	89	41	55	103	62
Sri Lanka	0	0	0	7	7	0	11	15	0	0
Thailand	0	12	51	7	0	0	386	0	41	332
Other	0	8	0	0	0	0	7	22	105	11
AUST-OCEANIA	**47**	**114**	**73**	**138**	**187**	**112**	**543**	**401**	**866**	**639**
Iraq	0	0	317	0	26	0	0	0	0	0
Israel	0	0	0	6	0	0	0	0	0	7
Egypt	0	0	0	0	0	0	137	0	219	0
Saudi Arabia	0	0	0	0	0	0	2	0	0	2
MIDDLE EAST	**0**	**0**	**317**	**6**	**26**	**0**	**139**	**0**	**219**	**9**
GRAND TOTAL	26,091	28,380	30,155	41,660	42,878	31,300	48,493	43,786	42,812	51,084

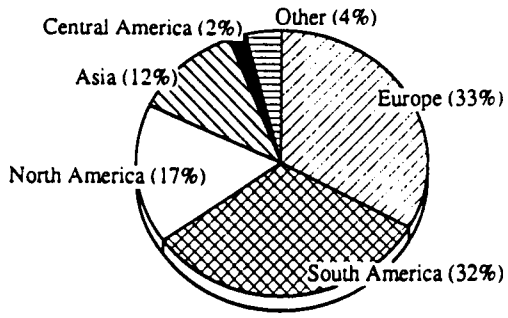
Source: U.S.D.A. Hop Market News. Prepared by Hop Growers of America, Inc.

* 1987-92 export figures were revised to reflect an extract ratio of 3.1 lbs. of raw hops to 1 lb. of hop extract.

Top 5 Regions for U.S. Hop Exports '94 vs.'95

Region	% of total U.S. exports 93/94	94/95
1. Europe	30%	33%
2. South America	25%	32%
3. North America	26%	17%
4. Asia	12%	12%
5. Central America	2%	2%

Top 5 Regions for U.S. Hop Exports 1994/95



U.S. IMPORTS OF HOPS, PELLETS & HOP EXTRACT (1,000 lbs.)

CONES

Mktg Yr	Aust	Belg	Canada	China	Czech	France	Gemany	N.Zeal.	Poland	U.K.	Yugo	Other	Total
1985-86	160	25	67	0	2,713	320	13,422	0	440	3	60	2	17,212
1986-87	0	0	115	0	5,071	280	7,330	0	957	2	0	11	13,766
1987-88	0	0	97	0	1,166	401	8,794	0	320	7	0	7	10,792
1988-89	7	24	359	0	761	591	8,779	0	1,041	4	201	26	11,793
1989-90	0	88	904	62	2,561	560	11,311	0	599	0	40	60	16,185
1990-91	0	95	769	5,245	2,366	441	9,625	18	520	18	0	40	19,137
1991-92	11	0	358	4,489	4,550	586	6,014	55	871	4	0	0	16,938
1992-93	227	0	472	1,102	1,810	567	2,919	0	518	4	110	0	7,729
1993-94 1/	265	0	628	0	1,931	1,082	6,228	300	602	28	0	5	11,069
1994-95 2/	280	0	536	0	1,892	1,177	5,974	0	240	62	13	20	10,194

PELLETS

Mktg Yr	Aust	Belg	Canada	China	Czech	France	Gemany	N.Zeal.	Poland	U.K.	Yugo	Other	Total
1985-86	0	0	8	0	28	0	587	0	0	0	190	5	818
1986-87	0	24	0	0	287	0	445	31	0	2	0	71	860
1987-88	7	0	0	0	2	0	168	31	0	0	88	6	302
1988-89	0	0	0	0	0	0	287	60	0	2	148	4	501
1989-90	306	0	0	0	0	0	252	115	0	2	373	0	1,048
1990-91	276	0	0	110	0	0	375	31	0	37	287	0	1,116
1991-92	723	84	0	44	24	0	750	119	0	42	178	0	1,964
1992-93	9	0	0	0	7	0	831	340	4	79	0	0	1,270
1993-94	0	0	0	0	53	0	1,634	150	0	201	0	0	2,038
1994-95	4	0	0	42	9	47	1,605	410	0	357	0	2	2,476

EXTRACT - HOP EQUIVALENT (Actual x 4)

Mktg Yr	Aust	Belg	Canada	China	Czech	France	Gemany	N.Zeal.	Poland	U.K.	Yugo	Other	Total
1985-86	0	0	0	0	0	0	0	0	0	0	0	9	9
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	44	0	0	0	0	0	44
1988-89	0	0	0	0	0	0	8	0	0	0	0	0	8
1989-90	0	0	0	0	0	0	10	0	0	0	0	0	10
1990-91	370	0	0	0	0	0	264	0	0	87	0	0	721
1991-92	0	0	0	0	0	0	28	0	0	16	0	0	44
1992-93	0	0	18	0	0	0	44	0	0	203	0	0	265
1993-94	0	0	0	0	0	0	26	0	0	53	0	0	79
1994-95	0	0	0	0	0	0	0	0	0	97	0	0	97

TOTAL HOP IMPORTS

Mktg Yr	Aust	Belg	Canada	China	Czech	France	Gemany	N.Zeal.	Poland	U.K.	Yugo	Other	Total
1985-86	160	25	75	0	2,741	320	14,009	0	440	3	250	16	18,039
1986-87	0	24	115	0	5,358	280	7,775	31	957	4	0	82	14,626
1987-88	7	0	97	0	1,168	401	9,006	31	320	7	88	13	11,138
1988-89	7	24	359	0	761	591	9,074	60	1,041	6	349	30	12,302
1989-90	306	88	904	62	2,561	560	11,573	115	599	2	413	60	17,243
1990-91	646	95	769	5,355	2,366	441	10,264	49	520	142	287	40	20,974
1991-92	734	84	358	4,533	4,574	586	6,792	174	871	62	178	0	18,946
1992-93	236	0	490	1,102	1,817	567	3,794	340	522	286	110	0	9,264
1993-94	265	0	628	0	1,984	1,082	7,888	450	602	282	0	5	13,186
1994-95	284	0	536	42	1,901	1,224	7,579	410	240	516	13	22	12,767

Source: U.S.D.A. Hop Market News. Prepared by Hop Growers of America, Inc.

1/ '93-94 raw hop figures for Germany, Australia, France, N. Zealand & U.K. include ground or powdered hop cones/lupulin.

2/ '94-95 German cone figures include 1.2 million lbs. that were classified as "other".

VALUE OF IMPORTS AND U.S. HOP EXPORTS 1974 - 1995

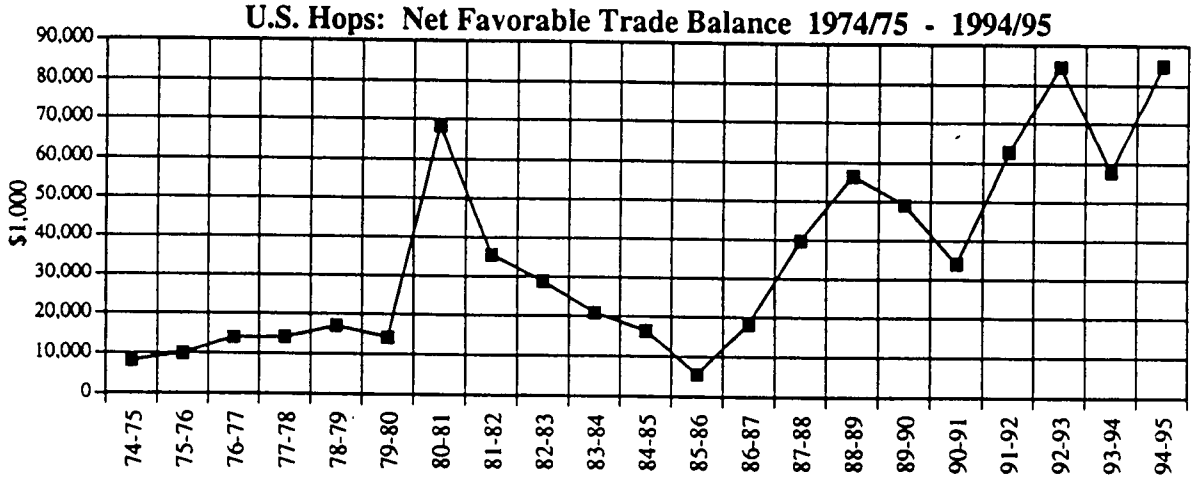
Year	Value of Hop Imports 1/	Value of U.S. Hop Exports 2/	Net Favorable Trade Balance
	(x US$1,000)		
1974-75	$17,718	$25,920	$8,202
1975-76	$16,616	$26,625	$10,009
1976-77	$15,522	$29,591	$14,069
1977-78	$12,754	$27,008	$14,254
1978-79	$16,969	$34,147	$17,178
1979-80	$37,065	$51,365	$14,300
1980-81	$34,240	$102,669	$68,429
1981-82	$36,944	$72,456	$35,512
1982-83	$33,842	$62,755	$28,913
1983-84	$37,280	$58,191	$20,911
1984-85	$37,611	$54,150	$16,539
1985-86	$47,909	$53,551	$5,642
1986-87	$36,416	$54,795	$18,379
1987-88	$21,891	$61,704	$39,813
1988-89	$27,960	$84,446	$56,486
1989-90	$31,557	$80,643	$49,086
1990-91	$39,787	$73,852	$34,065
1991-92	$41,226	$103,914	$62,688
1992-93	$23,661	$108,275	$84,614
1993-94 *	$40,668	$98,400	$57,732
1994-95	$41,415	$126,400	$84,985

Source: U.S.D.A. Hop Market News. Prepared by Hop Growers of America, Inc.

1/ Import price is defined generally as market value in foreign country excluding import duties, ocean freight and marine insurance.

2/ Export price is value of exportation based on selling price, inland freight, insurance and other charges to port.

* Value of 1993/94 U.S. hop exports was revised from $103.8 to $98.4 million.

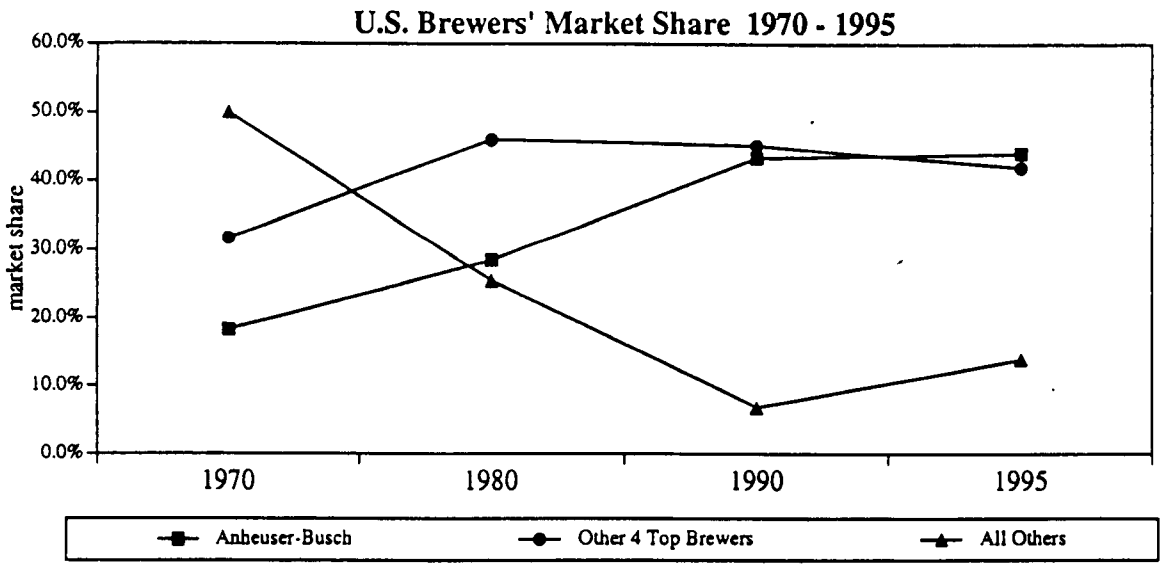


Major U.S. Brewers:

TOP U.S. BEER SUPPLIERS IN 1995 1/

Company	Shipments (barrels x 1,000) 1994	1995	Change '94 vs. '95 Barrels	Percentage	Market Share 2/ 1993	1994	1995
Anheuser-Busch, Inc. 3/	88,529	87,750	-779	-0.9%	44.1%	44.4%	44.1%
Miller Brewing Co. 4/	45,200	45,000	-200	-0.4%	22.2%	22.6%	22.6%
Coors Brewing Co.	20,200	20,100	-100	-0.5%	10.1%	10.1%	10.1%
The Stroh Brewery Co.	11,850	10,780	-1,070	-9.9%	6.4%	5.9%	5.4%
G. Heileman Brewing Co.	8,315	7,635	-680	-8.9%	4.5%	4.2%	3.8%
Pabst Brewing Co.	6,630	6,550	-80	-1.2%	3.5%	3.3%	3.3%
Heineken N.V.	2,775	2,900	125	4.3%	1.3%	1.4%	1.5%
Labatt USA 5/	1,865	2,275	410	18.0%	0.9%	0.9%	1.1%
Others	14,222	15,840	1,618	10.2%	6.0%	7.1%	7.9%
TOTAL	199,586	198,830	-756	-0.4%			
<minus> U.S. Exports	7,300	8,600	1,300	15.1%			
U.S. MARKET	192,286	190,230	-2,056	-1.1%			

Source: Beer Marketer's Insights.
1/ 1995 figures are estimates only.
2/ Market share figures for major brewers include exports while import shares include U.S. shipments only.
3/ A-B's 1994-95 figures include contract-brewed Kirin Ice.
4/ Molson USA shipments included with Miller's 1993-95 figures.
5/ Labatt USA figure for 1994 excludes Wisdom brands.



INTERNATIONAL HOP GROWERS CONGRESS - ECONOMIC COMMITTEE REPORT

November 15, 1995 • Nürnberg, Germany

	1995 Hop Acreage			1995 Production (1,000 lbs)*			Alpha Acid *	'96 Acreage Estimates			
Country	Aroma	Alpha	Total	Aroma	Alpha	Total	(1,000 lbs.)	Aroma	Alpha	Total	
USA †	16,049	27,381	43,430	22,870	55,226	78,096	7,055	16,049	27,381	43,430	
Germany	33,581	20,497	54,078	45,671	30,805	76,476	4,012	33,450	20,418	53,868	
Czech Republic	24,883	-	24,883	21,929	-	21,929	702	24,636	-	24,636	
U.K.	3,583	4,077	7,660	3,756	4,783	8,540	742	3,459	3,954	7,413	
Slovenia	5,634	222	5,856	8,042	357	8,400	471	5,634	222	5,856	
Top 5 Producers	83,730	52,178	135,907	102,269	91,171	193,440	12,982	83,228	51,975	135,203	
Ukraine	11,448	988	12,437	7,637	705	8,343	257	11,448	988	12,437	
Poland	5,048	885	5,933	5,855	1,342	7,197	336	5,295	1,008	6,304	
Australia Δ	217	2,385	2,602	52	5,916	5,968	611	217	2,385	2,602	
Spain	-	3,385	3,385	-	4,564	4,564	365	-	3,385	3,385	
France	1,463	195	1,658	2,118	327	2,445	91	1,532	208	1,740	
Top 10 Producers	101,907	60,016	161,922	117,931	104,025	221,957	14,641	101,721	59,949	161,670	
Slovakia	2,718	-	2,718	2,205	-	2,205	71	2,471	-	2,471	
New Zealand Δ	190	687	877	355	1,333	1,688	216	190	687	877	
Yugoslavia Δ	655	828	1,483	467	1,108	1,575	62	655	828	1,483	
Belgium	195	729	924	268	1,277	1,545	114	185	717	902	
Bulgaria Δ	507	964	1,470	305	727	1,032	71	507	964	1,470	
95 IHGC Totals	**106,171**	**63,223**	**169,394**	**121,531**	**108,470**	**230,001**	**15,175**	**105,729**	**63,144**	**168,873**	
94 IHGC Totals	107,209	62,336	169,545	108,272	97,904	206,176	13,247	106,171	63,223	169,394	1/
Diff. '95 vs. '94	-1,038	887	-151	13,259	10,566	23,825	1,928	-442	-79	-521	2/
% Diff. '95 vs. '94	-1.0%	1.4%	-0.1%	12.2%	10.8%	11.6%	14.6%	-0.4%	-0.1%	-0.3%	

Source: IHGC Economic Committee meeting - November 15,1995.

* 1995 production figures are estimates only.

† '95 US alpha acid figures were not available when this report was compiled. The 7.05 mill. lbs. represents '94 totals.

Δ Member country did not submit a report, so data was taken from previous year.

1/ 1994 acreage totals.

2/ Difference '94 acreage vs '95 acreage ests.

IHGC AROMA ACREAGE 1/

Year	Australia	Belgium	Bulgaria	Germany	Czech/Slo	U.K.	Spain	France	Slov/Yugo	Poland	USA	N. Zealand	Ukraine	Total 2/
1986	59	319	1,320	27,616	29,528	4,534	77	596	8,083	5,720	5,955	-	-	84,351
1987	59	314	1,186	28,288	29,405	4,319	74	771	7,900	5,720	7,497	-	-	85,990
1988	133	319	1,186	30,277	29,528	3,966	49	857	7,878	5,572	13,343	-	-	93,503
1989	124	331	897	31,545	29,506	3,632	12	1,001	6,457	5,491	14,883	-	-	94,143
1990	86	336	897	32,437	29,281	3,264	7	1,085	6,590	5,231	14,683	-	-	94,030
1991	99	329	897	32,385	28,614	3,197	0	1,253	6,180	5,103	15,609	44	16,358	110,179
1992	175	282	872	34,265	28,664	2,777	0	1,384	6,210	5,095	16,467	77	15,548	111,841
1993	158	242	655	34,683	28,663	3,160	0	1,436	6,417	5,147	16,679	163	15,221	112,624
1994	165	188	593	33,618	28,169	3,571	0	1,450	6,400	5,024	16,383	200	11,448	107,209
1995	217	195	507	33,581	27,601	3,583	0	1,463	6,289	5,048	16,036	190	11,448	106,158

IHGC ALPHA ACREAGE 1/

Year	Australia	Belgium	Bulgaria	Germany	Czech/Slo	U.K.	Spain	France	Slov/Yugo	Poland	USA	N. Zealand	Ukraine	Total 2/
1986	1,806	1,107	1,063	26,793	0	5,923	4,159	887	0	292	19,045	-	-	61,797
1987	1,829	764	1,161	25,268	0	5,528	3,954	610	0	321	20,803	-	-	61,053
1988	2,538	714	1,161	24,337	0	5,617	3,904	351	0	321	20,056	-	-	59,827
1989	2,627	665	1,161	23,235	0	5,614	3,830	299	1,460	371	19,663	-	-	59,750
1990	2,595	576	1,408	22,909	0	5,248	3,583	227	1,255	346	20,781	-	-	59,738
1991	2,681	638	1,359	23,400	0	5,483	3,385	190	1,282	395	23,944	405	1,334	65,302
1992	2,679	694	1,359	22,414	0	5,654	3,385	203	1,070	494	25,800	571	988	66,065
1993	2,753	768	1,063	22,192	0	5,172	3,385	227	1,011	761	26,420	628	988	65,368
1994	2,629	759	1,001	20,571	0	4,292	3,385	205	1,063	761	26,029	652	989	62,336
1995	2,385	729	964	20,497	0	4,077	3,385	195	1,050	885	27,153	687	988	62,995

IHGC TOTAL ACREAGE 1/

Year	Australia	Belgium	Bulgaria	Germany	Czech/Slo	U.K.	Spain	France	Slov/Yugo	Poland	USA	N. Zealand	Ukraine	Total 2/
1986	1,865	1,426	2,383	54,409	29,528	10,457	4,236	1,483	8,083	6,012	25,000	-	-	146,148
1987	1,888	1,078	2,347	53,556	29,405	9,847	4,028	1,381	7,900	6,041	28,300	-	-	147,043
1988	2,671	1,033	2,347	54,614	29,528	9,583	3,953	1,208	7,878	5,893	33,399	-	-	153,330
1989	2,751	996	2,058	54,780	29,506	9,246	3,842	1,300	7,917	5,862	34,546	-	-	153,893
1990	2,681	912	2,305	55,346	29,281	8,512	3,590	1,312	7,845	5,577	35,464	-	-	153,768
1991	2,780	967	2,256	55,785	28,614	8,680	3,385	1,443	7,462	5,498	39,553	449	17,692	175,481
1992	2,854	976	2,231	56,679	28,664	8,431	3,385	1,587	7,280	5,589	42,267	648	16,536	177,906
1993	2,911	1,010	1,718	56,875	28,663	8,332	3,385	1,663	7,428	5,908	43,099	791	16,209	177,992
1994	2,794	947	1,594	54,189	28,169	7,863	3,385	1,655	7,463	5,785	42,412	852	12,437	169,545
1995	2,602	924	1,471	54,078	27,601	7,660	3,385	1,658	7,339	5,933	43,189	877	12,436	169,153

Source: IHGC Economic Committee meeting - November 1995. '95 U.S. acreage was revised to reflect figures published in Jan. 16th U.S.D.A. report.

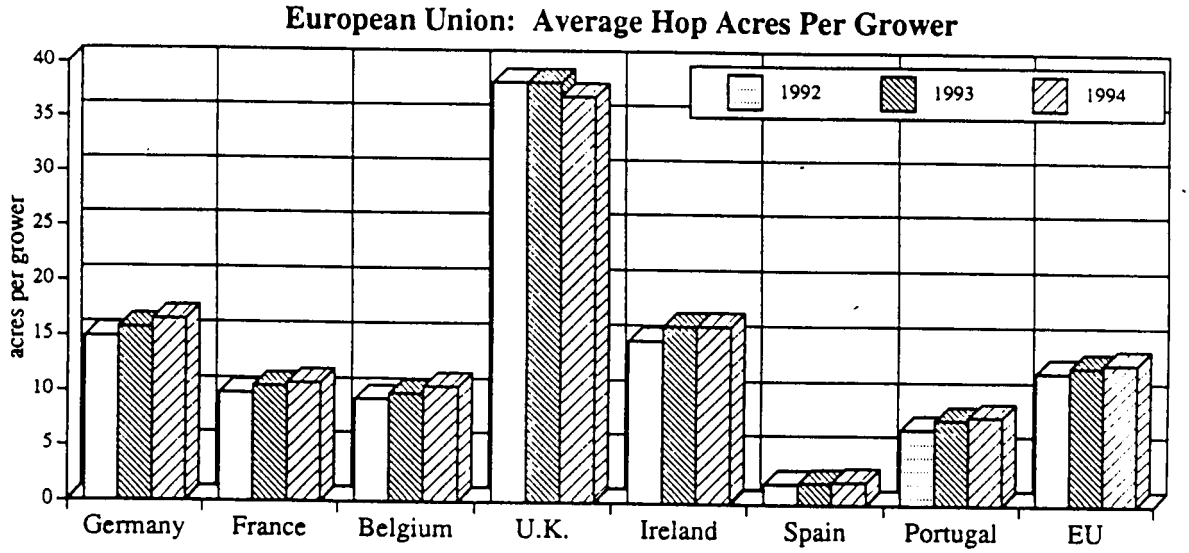
1/ 1986 - 1992 totals include Hungarian hop acreage.

2/ Numbers may not add due to rounding.

EUROPEAN UNION HOP GROWERS 1992 - 1994

Country	Number of Growers 1992	1993	1994	% Diff. 93 vs 94	Total Hop Acres 1992	1993	1994	Acres / Grower 1992	1993	1994
Germany	3,794	3,613	3,282	-9.2%	56,680	56,870	54,189	14.9	15.7	16.5
France	161	157	153	-2.5%	1,579	1,656	1,656	9.8	10.5	10.8
Belgium	105	103	90	-12.6%	974	1,011	949	9.3	9.8	10.5
United Kingdom	220	215	211	-1.9%	8,434	8,226	7,801	38.3	38.3	37.0
Ireland	2	2	2	0.0%	30	32	32	14.8	16.1	16.1
Spain	1,549	1,498	1,447	-3.4%	2,837	2,822	2,856	1.8	1.9	2.0
Portugal	33	31	31	0.0%	225	237	247	6.8	7.7	8.0
Austria	n/a	n/a	81	-	n/a	n/a	588	n/a	n/a	7.3
European Union	5,864	5,619	5,297	-5.7%	70,757	70,853	68,318	12.1	12.6	12.9

Source: Report of the European Council, June 1995. Prepared by Hop Growers of America, Inc.



EUROPEAN UNION HOP GROWING STATISTICS

HOP GROWING SUBSIDIES 1989 - 1994

(1996 U.S. dollars per acre) 1/

Variety	1989	1990	1991	1992	1993	1994
Aroma	$168	$168	$168	$168	$168	$252
Bitter	$199	$199	$199	$199	$199	$271
Other	$204	$173	$173	$143	$156	$187
Experimental	$204	$173	$173	$143	$156	$187

HOP PRODUCTION COSTS 1990-1994

(1996 U.S. dollars per acre) 1/

Country	1990	1991	1992	1993	1994	% Change ('93 vs. '94)
Germany	$3,941	$3,931	$3,862	$3,820	$3,803	-0.5%
France	$3,364	$3,359	$3,219	$3,417	$3,459	1.2%
Belgium	$4,530	$4,645	$4,747	$4,815	$4,855	0.8%
United Kingdom	$4,842	$4,946	$4,235	$4,847	$4,461	-8.0%
Ireland	$3,432	$3,597	$3,668	$3,520	$3,389	-3.7%
Spain	$2,177	$2,331	$2,242	$2,033	$2,361	16.1%
Portugal	$2,152	$2,391	-	$2,209	$2,302	4.2%
European Union	$3,951	$3,976	$3,838	$3,448	$3,444	-0.1%

RETURN ON HOP ACREAGE IN FULL PRODUCTION 1990 - 1994 2/

(1996 U.S. dollars per acre) 1/

Country	1990	1991	1992	1993	1994	% Change ('93 vs. '94)
Germany	$2,859	$2,778	$2,453	$2,229	$2,081	-6.7%
France	$3,793	$2,806	$3,218	$3,459	$3,519	1.7%
Belgium	$5,681	$3,020	$3,361	$1,689	$2,167	28.3%
United Kingdom	$2,859	$3,672	$2,751	$2,445	$2,761	12.9%
Ireland	$5,507	$4,022	$4,610	$3,619	$2,749	-24.1%
Spain	$2,269	$2,261	$1,326	$2,495	$2,238	-10.3%
Portugal	$1,691	$873	$761	$612	$715	16.8%

SOURCE: Report of the European Council, June 1995.

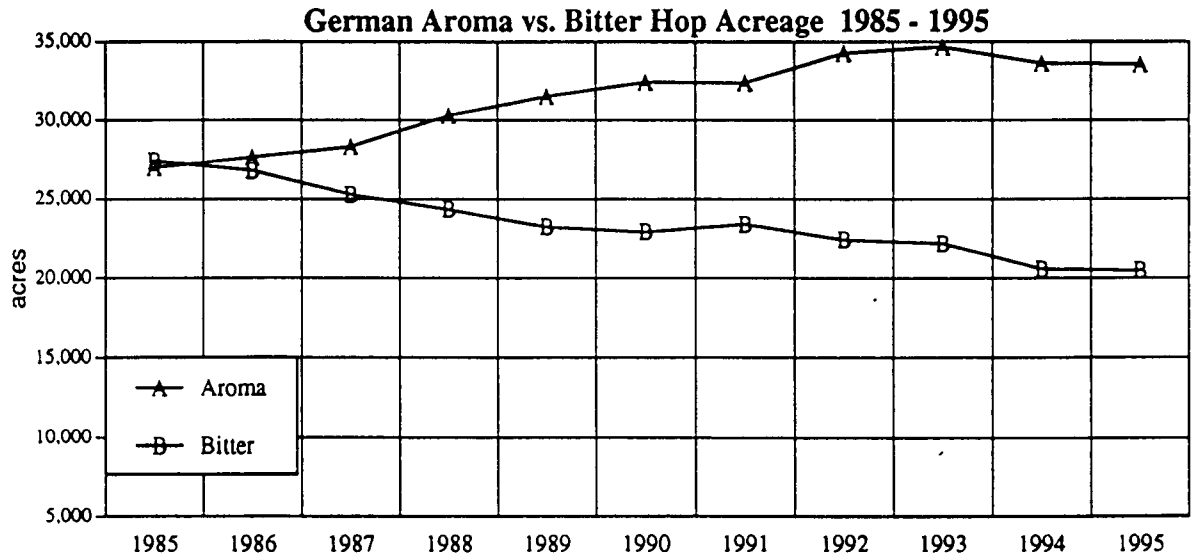
1/ All figures expressed in 1996 US Dollars. Conversion Rate: 1 ECU = 1.258 US $ (Wall Street Journal 1/18/96).

2/ Acreage planted in 1994 and 1993 are rated at 40% and 65% of maximum production, respectively.

Varietal Conversion Programs Submitted by EU Members (1995 crop)

	TYPE OF VARIETY BEING CONVERTED TO:		
Country	Aroma Varieties	Alpha Varieties	Total Conversions
Belgium	101	504	605
Germany	1,067	1,404	2,471
Spain	0	447	447
France 1/	0	0	420
Ireland	-	-	0
Portugal	-	247	247
United Kingdom	806	1,567	2,372
European Union	**1,974**	**4,169**	**6,563**

Source: Report of the European Council, June 1995. Prepared by Hop Growers of America, Inc.
1/ The EC report did not break out France's acreage conversions by aroma and alpha varieties.



WORLD HOP ACREAGE & PERCENT SHARE (Acres)

COUNTRY	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 1/
Germany 1/	54,224	54,297	54,404	54,409	53,545	54,614	54,851	55,269	55,785	56,680	56,875	54,189	54,078
	22%	24%	25%	25%	25%	24%	24%	25%	24%	24%	25%	25%	24%
England	14,500	13,457	11,730	10,586	9,946	9,859	9,686	9,180	8,896	8,431	8,332	7,863	7,660
	6%	6%	5%	5%	5%	4%	4%	4%	4%	4%	4%	4%	3%
Czech/Slovakia	29,281	29,528	28,804	29,528	29,528	29,528	29,528	29,281	28,738	28,664	28,663	28,169	27,601
	12%	13%	13%	14%	14%	13%	13%	13%	12%	12%	12%	13%	12%
Europe (rest)	75,090	72,705	70,586	69,989	68,320	68,051	68,333	67,443	66,025	65,696	57,948	52,541	51,698
	31%	32%	32%	32%	32%	30%	30%	30%	28%	28%	25%	24%	23%
USA	36,900	30,800	28,100	25,000	28,300	33,400	34,548	35,463	39,553	42,266	43,100	42,412	43,189
	15%	13%	13%	12%	13%	15%	15%	16%	17%	18%	19%	19%	20%
China 3/	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	19,700	19,700	20,000	20,000
	-	-	-	-	-	-	-	-	-	8%	9%	9%	9%
World (rest)	34,925	29,010	26,882	26,084	23,741	28,211	28,169	27,552	35,140	14,630	14,977	14,677	17,100
	14%	13%	12%	12%	11%	13%	13%	12%	15%	6%	7%	7%	8%
World Totals	244,920	229,797	220,506	215,596	213,380	223,663	225,115	224,188	234,137	236,067	229,595	219,851	221,326

WORLD HOP PRODUCTION & PERCENT SHARE (1,000 Pounds)

COUNTRY	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 2/
Germany 1/	81,240	78,374	78,705	75,288	68,453	66,139	77,162	66,765	80,367	64,239	93,626	62,687	76,476
	27%	28%	28%	29%	26%	25%	30%	27%	28%	24%	31%	24%	27%
England	18,739	17,416	14,330	11,133	11,464	10,803	10,362	10,103	13,265	11,084	12,364	10,709	8,540
	6%	6%	5%	4%	4%	4%	4%	4%	5%	4%	4%	4%	3%
Czech/Slovakia	25,684	23,920	28,219	22,046	26,235	33,841	27,117	23,517	24,471	20,393	23,243	22,642	24,134
	9%	9%	10%	9%	10%	13%	11%	9%	9%	8%	8%	9%	9%
Europe (rest)	65,477	69,115	69,225	64,595	65,147	60,407	48,281	49,961	54,500	51,572	49,564	40,258	45,000
	22%	25%	25%	25%	25%	23%	19%	20%	19%	19%	16%	15%	16%
USA	68,123	56,200	49,714	49,053	50,045	54,634	59,326	56,855	69,155	74,337	76,144	74,560	78,852
	23%	20%	18%	19%	19%	21%	23%	23%	24%	28%	25%	28%	28%
China 3/	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	26,455	29,762	38,500	36,000
	-	-	-	-	-	-	-	-	-	10%	10%	15%	13%
World (rest)	36,707	36,266	39,352	36,266	38,250	40,675	33,731	44,326	45,540	20,598	19,865	12,700	14,611
	12%	13%	14%	14%	15%	15%	13%	18%	16%	8%	7%	5%	5%
World Totals	295,970	281,291	279,545	258,381	259,594	266,499	255,979	251,527	287,298	268,678	304,568	262,056	283,613

SOURCE: U.S.D.A., IHGC, Lupofresh, Brauwelt and S.S. Steiner reports. Prepared by the Hop Growers of America, Inc.

1/ 1983 - 1988 figures include former East German acreage and production.

2/ 1995 hop production figures for Germany, England, Czech/Slovakia and USA were taken from the Dec '94 IHGC report and are considered post harvest estimates. Production figures Production figures for the categories "Europe (rest)" and "World (rest)" are pre-harvest estimates.

3/ 1992-1995 Chinese acreage and production figures are estimates.

WORLD BEER PRODUCTION 1987 - 1994

(million barrels)

Country/Region	1987	1988	1989	1990	1991	1992	1993	1994	% Diff 93 vs 94
Germany	100.3	99.7	100.6	102.3	100.6	102.4	98.9	101.1	2.2%
Great Britain	51.1	51.3	51.2	50.8	51.8	47.6	46.8	46.7	-0.2%
Spain	21.3	22.7	23.2	23.3	22.5	22.0	20.7	21.3	2.9%
Netherlands	14.9	14.9	16.0	17.0	17.0	17.6	17.4	18.9	8.8%
Russia 1/	n/a	n/a	n/a	n/a	n/a	n/a	20.9	18.7	-10.2%
Czech Republic	n/a	n/a	n/a	n/a	n/a	n/a	15.2	15.4	1.7%
France 2/	17.0	17.0	17.8	18.2	19.5	15.8	15.6	15.1	-3.3%
Belgium	11.9	11.8	11.2	12.1	12.0	12.2	12.1	12.6	4.2%
Poland	9.9	10.4	10.6	10.4	10.2	12.0	10.8	11.8	9.4%
Italy	9.5	9.5	8.9	9.5	9.1	9.3	10.0	10.3	3.4%
Austria	7.6	7.7	7.8	8.2	8.7	8.5	8.4	8.7	4.1%
Denmark	7.0	7.3	7.3	7.2	7.4	7.2	7.2	8.0	11.9%
(former) USSR	42.6	46.0	47.7	42.6	42.6	42.6	-	-	-
(former) Czechoslovakia	18.9	19.3	19.3	20.0	20.4	19.9	-	-	-
Other	56.8	59.7	62.4	65.3	58.6	58.9	87.7	81.8	-6.7%
Europe Total	**368.8**	**377.5**	**384.1**	**386.9**	**380.4**	**376.0**	**371.5**	**370.6**	**-0.2%**
USA	195.4	197.3	199.1	203.6	202.2	202.2	202.2	202.1	-0.1%
Brazil 3/	40.5	40.7	46.9	49.4	55.4	48.8	48.6	53.3	9.6%
Mexico	26.8	29.1	33.0	33.8	34.7	36.0	37.3	38.5	3.2%
Canada	19.7	20.3	19.3	19.3	18.9	18.4	19.5	19.5	0.0%
Colombia	15.0	15.3	15.3	14.9	20.5	14.1	16.6	17.9	7.7%
Venezuela	10.3	11.1	9.4	9.4	11.0	13.6	13.2	13.1	-0.6%
Argentina	4.9	5.1	5.2	5.9	7.1	8.1	8.8	9.6	9.7%
Other:	22.8	21.4	21.1	20.9	23.1	26.5	25.4	25.5	0.6%
Americas Total	**335.5**	**340.3**	**349.3**	**357.2**	**372.9**	**367.6**	**371.7**	**379.6**	**2.1%**
China	42.6	46.9	51.1	59.7	68.2	76.7	104.4	119.3	14.3%
Japan	45.6	49.0	52.0	55.9	57.9	59.4	58.8	61.8	5.1%
South Korea	7.5	8.9	8.9	10.8	14.0	12.5	13.0	14.6	11.8%
Philippines	8.7	10.7	11.6	12.8	13.1	11.9	11.5	12.5	8.9%
Other	11.3	11.8	12.7	14.8	13.4	15.6	17.0	19.8	16.7%
Asia Total	**115.7**	**127.2**	**136.4**	**154.0**	**166.6**	**176.2**	**204.7**	**228.0**	**11.4%**
South Africa	15.3	16.4	17.9	19.2	19.2	19.2	19.2	20.0	4.4%
Australia	15.9	16.6	15.9	16.7	16.2	15.9	15.4	14.9	-3.1%
Turkey	2.1	2.3	2.1	3.2	2.6	4.0	4.6	5.1	11.1%
Nigeria	6.0	6.2	6.0	6.8	7.1	5.5	5.7	4.7	-17.9%
Other	30.3	30.3	29.4	29.1	28.2	27.0	21.1	18.3	-12.9%
Total	**69.7**	**71.8**	**71.3**	**74.9**	**73.2**	**71.6**	**65.9**	**63.1**	**-4.3%**
WORLD TOTALS:	**889.8**	**916.7**	**941.1**	**973.0**	**993.1**	**991.3**	**1,013.8**	**1,041.2**	**2.7%**

Source: Barth Report (1987-1995). Prepared by Hop Growers of America, Inc.

1/ Other sources list Russia's 1994 production as 14.8 million barrels.

2/ Other sources list France's production as 17.4 mill. barrels in 1994 and 17.8 mill. barrels in 1993.

3/ Brazil's 1993 production is estimated.

TOP 20 BREWERS WORLDWIDE

(Millions of Barrels)

Rank	Brewer	Headquarters	Shipments 1992	Shipments 1993	Shipments 1994	% Diff. 93 vs 94	1994 World Market Share *
1	Anheuser-Busch, Inc.	USA	89.0	89.7	91.3	1.8%	8.6%
2	Heineken N.V. 1/	Netherlands	45.8	47.7	51.5	8.0%	4.8%
3	Miller Brewing Company 2/	USA	42.8	44.7	46.1	3.1%	4.3%
4	Kirin Brewery Co., Ltd.	Japan	29.9	29.2	30.4	4.1%	2.9%
5	Foster's Brewing Group	Australia	28	28.2	29.4	4.3%	2.8%
	Total Top 5		**235.5**	**239.5**	**248.7**	**3.8%**	**23.3%**
6	South Africa Breweries Ltd.	South Africa	21.0	25.1	28.6	13.9%	2.7%
7	Carlsberg Ltd. 3/	Denmark	18.1	23.4	25.7	9.8%	2.4%
8	Companhia Cervejaria Brahma	Brazil	21.0	22.3	25.6	14.8%	2.4%
9	Danone Groupe (Kronenbourg) 4/	France	24.0	23.6	23.7	0.4%	2.2%
10	Cerveceria Modelo SA	Mexico	18.7	19.9	21.6	8.5%	2.0%
	Total Top 10		**338.3**	**353.8**	**373.9**	**5.7%**	**35.1%**
11	Santo Domingo Group (Bavaria)	Colombia	20.0	20.0	21.2	6.0%	2.0%
12	Coors Brewing Company 6/	USA	20.3	20.1	20.8	3.5%	2.0%
13	Guinness PLC 5/	U.K.	18.7	19.5	20.5	5.1%	1.9%
14	FEMSA (Cuauhtemoc) 7/	Mexico	17.2	17.4	17.0	-2.3%	1.6%
15	Companhia Antartica Paulista	Brazil	13.6	14.2	16.9	19.0%	1.6%
	Total Top 15		**428.1**	**445.0**	**470.3**	**5.7%**	**44.1%**
16	Asahi Breweries, Ltd.	Japan	14.0	13.9	15.9	14.4%	1.5%
17	Interbrew 8/	Belgium	14.3	13.7	14.2	3.6%	1.3%
18	San Miguel Corp.	Philippines	11.7	11.7	12.4	6.0%	1.2%
19	Stroh Brewery Co.	USA	14.0	12.8	12.0	-6.3%	1.1%
20	Cerveceria Polar CA	Venezuela	11.7	12.0	11.9	-0.8%	1.1%
	Total Top 20 Δ		**493.8**	**509.1**	**536.7**	**5.4%**	**50.4%**

* Market shares overstated because some agency/license brands are double counted.

Δ Addition of columns may not agree because of rounding.

1/ 1993 includes the acquisitions made through the joint venture with Asian Pacific Breweries.

2/ 1993 includes 1.6 million barrels of Molson Breweries U.S.A.

3/ 1993 includes joint venture in the U.K. with Allied-Lyons PLC.

4/ Name changed from Groupe BSN to Danone Group in May 1994.

5/ 1993 includes acquisitions of Desmoes & Geddes, Seychelles Brewery Co.

6/ 1993 excludes production of Zima.

7/ Formerly Fomenta Proa

8/ 1992 includes the acquisition of Borsodi Sorgyuar.

SOURCE: Impact's 1995 Annual Beer Study.

Published by M. Shanken Communications, Inc. 387 Park Ave. South, NY, NY 10016 (212) 684-4224.

MEMORANDUM OF AGREEMENT
Between
the United States Department of Agriculture (ARS), and
Busch Agricultural Resources, Inc. (BARI)

The United States Department of Agriculture, by and through the Agricultural Research Service (ARS), and

Busch Agricultural Resources, Inc. (BARI)

enter this memorandum of agreement for the purpose of facilitating cooperative cultivation, research, and evaluation of experimental hop strains for the benefit of the U.S. hop industry.

The parties agree that:

1. The U.S. Department of Agriculture, ARS, authorizes BARI to plant the experimental hop selections USDA 21660, 21662 and 21663, from virus-free plants being maintained at WSU Prosser, in 10-hill plots in both Oregon and Washington.

2. BARI or its designated grower (henceforth called "grower") shall plant, cultivate, and maintain the rhizomes and rootstock as directed by ARS.

3. Grower shall not propagate additional hop plants for his own use and shall not sell, remove, or otherwise dispose of the rhizomes or rootstock without prior written authorization by ARS; grower may not harvest and market the hop cones from the experimental planting for his own use, but shall provide the total production of this experimental planting to BARI.

4. At any time during cultivation of the experimental hop strain, the ARS and their officers, employees, agents, and representatives, shall have access to grower's test hop plants and of grower's performance under this agreement, and for all other purposes consistent with this agreement.

5. In the event of disease or infestation of the rhizomes, rootstock, or plants, ARS may prune, treat, destroy, remove, or otherwise dispose of the hop plants as ARS deems necessary, without compensation to the grower.

6. At any time during cultivation of the experimental hop plants, ARS, after consultation with BARI, may remove rhizomes from grower's test plot for propagation purposes.

7. If and when the experimental hop selection is released as a named variety, BARI, in conjunction with ARS, may remove all rhizomes for distribution to U.S. hop growers; provided:

(a) Upon removal, grower may retain all planted crowns and

(b) Grower shall be entitled to his share of rhizomes distributed to U.S. hop growers on a pro-rated basis depending on demand.

8. Any party may terminate this agreement by providing to all other parties written notice at least thirty (30) days prior to termination, provided,

(a) Termination during a growing season shall not be effective until completion of the growing season, and

(b) Should grower breach or terminate this agreement, ARS shall have the right to remove all rhizomes and established crowns from the test plot.

9. The parties may modify the terms of this contract by written mutual consent.

Busch Agricultural Resources, Inc. (BARI)

Name

VICE PRESIDENT, TECHNICAL OPERATIONS
Title

Date: 4-6-95

Grower - Oregon

Date: 4-17-95

The United States Department of Agriculture
Agricultural Research Service (ARS)

Name

Research Geneticist
Title

Date: 5/24/1995

Grower - Washington

Date: 4/18/95

ANNUAL RESEARCH PROGRESS REPORT
Report of Progress (AD-421)

Accession: 0144299 Year: 95 Project Number: 5358-21000-008-00 D
Mode Code: 5358-05-00 STP Codes: 2.1.2.4 50% 2.1.2.5 50%

Title: HOP GENETICS, PRODUCTION, AND UTILIZATION;
GERMPLASM IMPROVEMENT, EVALUATION, AND MAINTENANCE

Period Covered From: 01/95 To: 12/95

Progress Report

Two of the three Tettnanger-type selections (USDA 21664, 21665) were harvested from commercial plots and nursery test sites. Pilot brewing trials are in progress. USDA 21666 was discarded because of low alpha acid levels. USDA 21665 was reestablished at a second Oregon location. The original plot will be discarded because of soil problems. All seven Saazer-derived selections (3 triploids: 21683 to 21685; 4 diploids: 21686 to 21689) plus three new German aroma hops (Hallertauer Gold, Hallertauer Tradition, Spalter Select) were harvested from commercial and nursery plot tests. Six Saazer-type selection (21683 to 21688) were also harvested from 3-acre plots in northern Idaho. Laboratory and brewing evaluations are in progress. The high-alpha low CoH specialty hop USDA 21373 in northern Idaho was harvested commercially in cooperation with a large U.S. brewer. The Hallertauer-mittelfrueh derived triploid aroma selection USDA 21484 was released to the public and named Ultra. A 3-acre hop breeding nursery (goal: high alpha, high beta, low CoH) was established. About 150 seedlings with dark leaf and stem color were established in a special nursery for ornamentals potential evaluation. Four new Japanese hops (Eastern Green, Furano Ace, Sorachi Ace, Selection C 601) and Southern Cross from New Zealand were added to the USDA World Hop Cultivar collection.

Publications:

01. HAUNOLD, A., NICKERSON, G.B., GAMPERT, U. and KLING, D. 1995. Registration of Sunbeam ornamental hop. Crop Sci. 35(6):1708.

02. HAUNOLD, A., NICKERSON, G.B., KLING, D.S. and GAMPERT, U. 1995. Registration of Bianca ornamental hop. Crop Sci. 35(6):1708-1709.

Approved: ROBERT E. SOJKA Date: 02/96
Title: ACTING ASSOCIATE DIRECTOR

OFFICIAL

02/13/96

ANNUAL RESEARCH PROGRESS REPORT
Report of Progress (AD-421)

Accession: 0147812 Year: 95 Project Number: 5358-21000-008-02 S
Mode Code: 5358-05-00 STP Codes: 2.1.2.5 100% %

Title: MOLECULAR MARKERS FOR GENETIC IMPROVEMENT OF HOP

Period Covered From: 01/95 To: 12/95

Progress Report

Five random primers, C5, C6, C8, C9, and D3 (Operon Technologies, Alameda, California, USA), were used to identify differences among 56 hop cultivars. We also surveyed primer sets A, B, C, D, E, and F to find out if we could identify differences between male and female hop plants. We did not find a RAPD marker that differentiates between male and female plants. We used primers A11 and A17 to follow the segregation of four polymorphic RAPD markers in four families with a total of 136 progeny. The RAPD markers segregated in a Mendelian manner and all the markers were dominant. We also used results of primers A11 and A17 to demonstrate that a radiolabeled probe made from a single amplification product used in Southern blots of the amplified products hybridizes to comigrating fragments not visible with ethidium bromide and hybridizes to other amplified products differing in size from the labeled fragment.

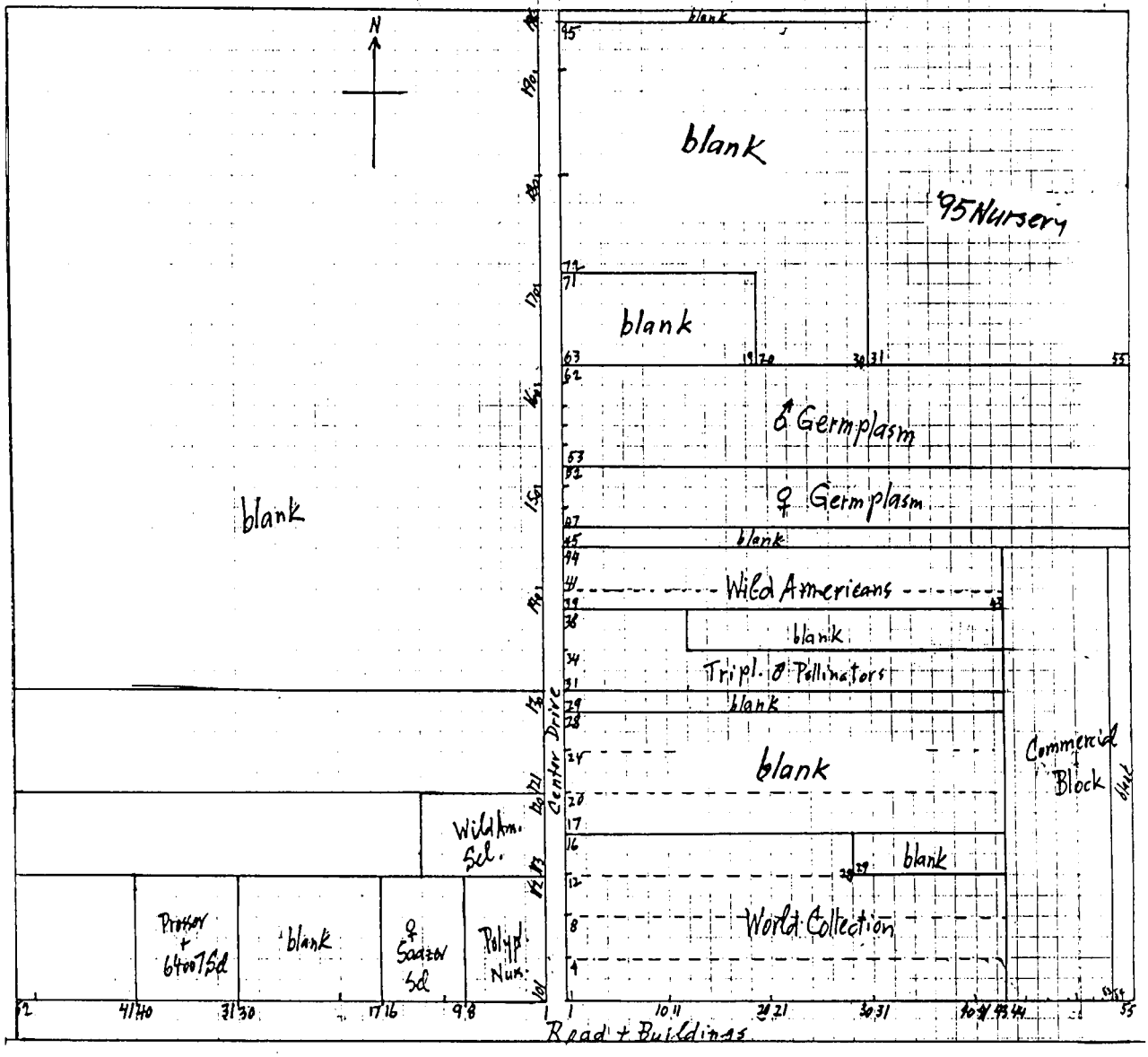
Publications:

01. PILLAY, M. and KENNY, S.T. 1995. Anomalies in direct pairwise comparisons of RAPD fragments for genetic analysis. Biotech. 19:694-698.

Approved: ROBERT E. SOJKA Date: 02/96
Title: ACTING ASSOCIATE DIRECTOR

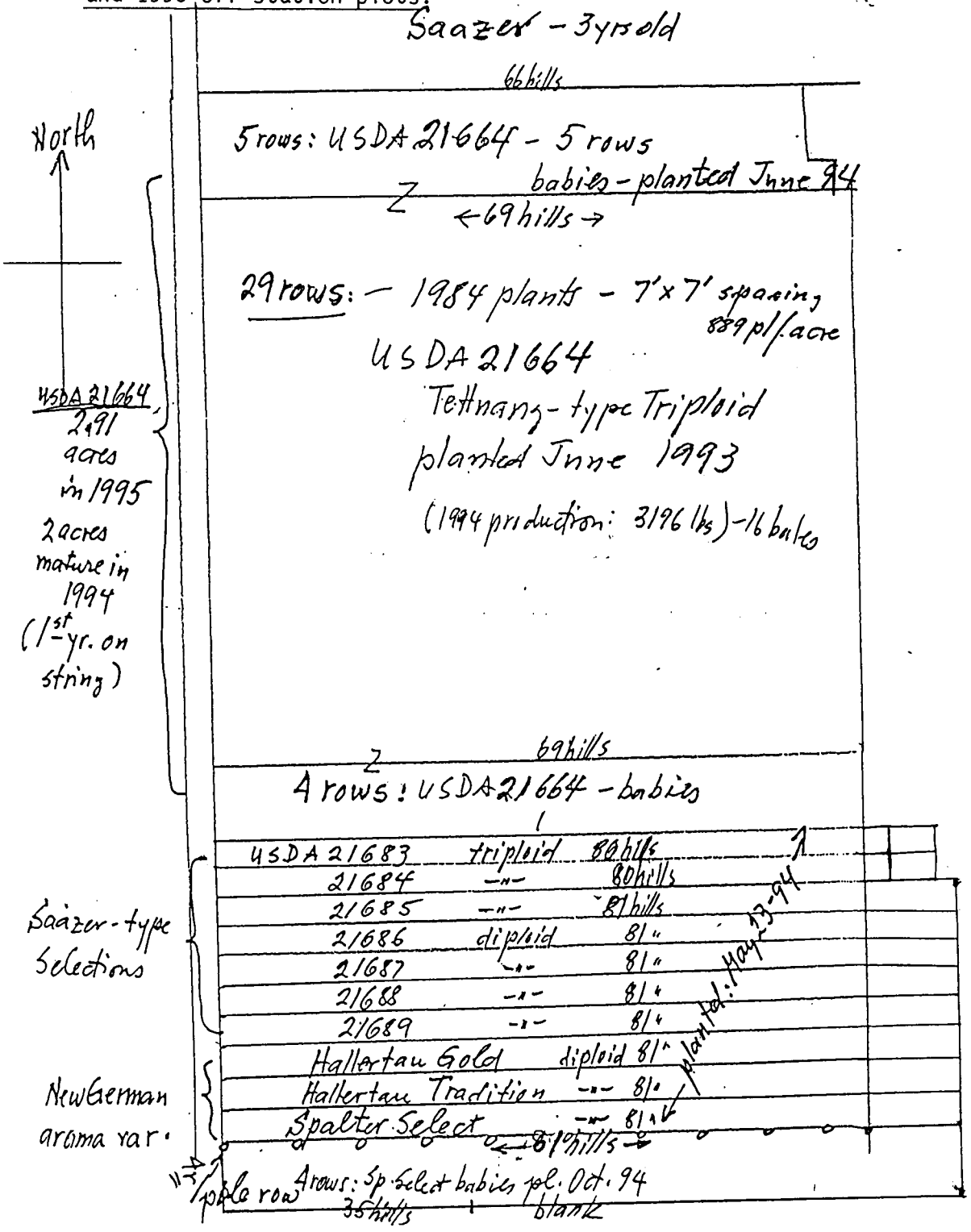
OFFICIAL

1995: USDA - OSU MAIN HOP YARD



1994: Coleman Farms: Arbor Grove Rd, Windburn

and 1995 off station plots.



1994-95 ANNUAL REPORT FORM — **Agricultural Research Foundation**

ACCOUNT: 3618 U.S. Hop Research Council — Date: Sept. 8, 1995

PROJECT LEADER: Haunold, Al DEPARTMENT: Crop Science

ACCOUNTING INFORMATION:

00.00	Beginning Balance (July 1, 1994)
31500.00	Contributions
(7534.65)	Disbursements
(16250.00)	Transfers (from one ARF account to another)
(1575.00)	Accounting
6140.35	Ending Balance (June 30, 1995)

INSTRUCTIONS:

1. Limit your report to no more than 100 words.
2. Describe the project and explain how funds were spent. If no funds were spent, describe the intent of the project.
3. Our office is required to report to the Board of Directors on all accounts for the 1994-95 Fiscal Year, including those accounts with low balances and no activity.
4. Return to: AGRICULTURAL RESEARCH FOUNDATION, Strand Agriculture Hall, Suite 100, before September 15, 1995.
5. If you have any questions, please call x7-3228.

DESCRIPTION OF PROJECT (Please type):

Seven Saazer-type aroma selections (USDA Nrs. 21683 to 21689) and three new German aroma varieties (Hallertauer Gold, Hallertauer Tradition, Spalter Select) were harvested from Oregon commercial plots. The two promising Tettnanger-type selections (Nrs. 21664, 21665) were harvested from 3-acre Oregon commercial plots. USDA 21666 was discarded. A second 3-acre commercial plot of USDA 21665 and a 2-acre plot of Spalter Select were established. A large breeding nursery from the 1994 hop crossing program was planted at the OSU East farm.

Use of funds: partial salary of the Research Assistant.

1994-95 ANNUAL REPORT FORM — **Agricultural Research Foundation**

ACCOUNT: 3625 Oregon Hop Commission — Date: Sept. 8, 1995

PROJECT LEADER: Haunold, Al DEPARTMENT: Crop Science

ACCOUNTING INFORMATION:

4613.16	Beginning Balance (July 1, 1994)
9000.00	Contributions
(1113.00)	Disbursements
00.00	Transfers (from one ARF account to another)
00.00	Accounting
12500.16	Ending Balance (June 30, 1995)

INSTRUCTIONS:

1. Limit your report to no more than 100 words.
2. Describe the project and explain how funds were spent. If no funds were spent, describe the intent of the project.
3. Our office is required to report to the Board of Directors on all accounts for the 1994-95 Fiscal Year, including those accounts with low balances and no activity.
4. Return to: AGRICULTURAL RESEARCH FOUNDATION, Strand Agriculture Hall, Suite 100, before September 15, 1995.
5. If you have any questions, please call x7-3228.

DESCRIPTION OF PROJECT (Please type):

Two ornamental hops (USDA 21697--Sunbeam; USDA 21698--Bianca) were released to the public. Experimental Tettnanger- and Saazer-type selections were harvested. Assistance was provided to the Oregon Hop Commission in establishing two additional commercial plots of the English aroma hop variety East Kent Golding.

Use of funds: hourly student help; supplies.

994-95 ANNUAL REPORT FORM — **Agricultural Research Foundation**

ACCOUNT: 3634 Miller Brewing Company

Date: Sept. 8, 1995

PROJECT LEADER: Haunold, Al DEPARTMENT: Crop Science

ACCOUNTING INFORMATION:

5643.00	Beginning Balance (July 1, 1994)
6000.00	Contributions
00.00	Disbursements
(3000.00)	Transfers (from one ARF account to another)
(300.00)	Accounting
8343.00	Ending Balance (June 30, 1995)

INSTRUCTIONS:

1. Limit your report to no more than 100 words.
2. Describe the project and explain how funds were spent. If no funds were spent, describe the intent of the project.
3. Our office is required to report to the Board of Directors on all accounts for the 1994-95 Fiscal Year, including those accounts with low balances and no activity.
4. Return to: AGRICULTURAL RESEARCH FOUNDATION, Strand Agriculture Hall, Suite 100, before September 15, 1995.
5. If you have any questions, please call x7-3228.

DESCRIPTION OF PROJECT (Please type):

Following extensive laboratory and pilot brewing work which led to new hop chemistry findings, Miller Brewing Co. discontinued USDA 21120, since large quantities of this zero-alpha hop were no longer needed. A large hop breeding nursery designed to combine high alpha with high beta resin content was established. USDA 21373, a high-alpha low cohumulone experimental hop was harvested from a 1-acre plot in northern Idaho and is scheduled for extensive pilot brewing trials.

Use of funds: Partial salary of research assistant.

1994-95 ANNUAL REPORT FORM — **Agricultural Research Foundation**

ACCOUNT: 4520 Miller Brewing Company

PROJECT LEADER: Haunold, Al & Nickerson, Gail DEPARTMENT: Agricultural Chemistry

ACCOUNTING INFORMATION:

15279.00	Beginning Balance (July 1, 1994)
11600.00	Contributions
(15260.54)	Disbursements
00.00	Transfers (from one ARF account to another)
(580.00)	Accounting
11038.46	Ending Balance (June 30, 1995)

INSTRUCTIONS:

1. Limit your report to **no more than 100 words.**
2. Describe the project and explain how funds were spent. If no funds were spent, describe the intent of the project.
3. Our office is required to report to the Board of Directors on all accounts for the 1994-95 Fiscal Year, including those accounts with low balances and no activity.
4. Return to: AGRICULTURAL RESEARCH FOUNDATION, Strand Agriculture Hall, Suite 100, before September 15, 1995.
5. If you have any questions, please call x7-3228.

DESCRIPTION OF PROJECT (Please type):

After Miller Brewing Company discontinued development of USDA 21120, Dr Haunold(cooperating USDA Hop Geneticist) made several crosses for high alpha with high beta. Three varieties were identified with characteristics suitable for Miller Brewing Company and progeny from crosses will be evaluated from 1995 crop. From the 1994 crop this laboratory analyzed 753 samples collected by Dr. Haunold and conducted storage tests on 494 samples. Steam-distilled hop oil was collected from 452 miniature bales and gas-liquid chromatography analyses on 416 samples. A formal report was presented to Miller Brewing Company in February.

This grant funded about 12% of the Hop Chemistry section's expenses.

1994-95 ANNUAL REPORT FORM **Agricultural Research Foundation**

ACCOUNT: 4522 Hop Research Council

PROJECT LEADER: Haunold, Al & Nickerson, Gail DEPARTMENT: Agricultural Chemistry

ACCOUNTING INFORMATION:

5693.03	Beginning Balance (July 1, 1994)
54600.00	Contributions
(25850.94)	Disbursements
(30665.00)	Transfers (from one ARF account to another)
(2730.00)	Accounting
1047.09	Ending Balance (June 30, 1995)

INSTRUCTIONS:

1. Limit your report to **no more than 100 words.**
2. Describe the project and explain how funds were spent. If no funds were spent, describe the intent of the project.
3. Our office is required to report to the Board of Directors on all accounts for the 1994-95 Fiscal Year, including those accounts with low balances and no activity.
4. Return to: AGRICULTURAL RESEARCH FOUNDATION, Strand Agriculture Hall, Suite 100, before September 15, 1995.
5. If you have any questions, please call x7-3228.

DESCRIPTION OF PROJECT (Please type):

From the 1994 crop this laboratory analyzed 753 samples collected by Dr. Haunold (cooperating USDA Hop Geneticist) and conducted storage tests on 494 samples. Steam-distilled hop oil was collected from 452 miniature bales and gas-liquid chromatography on 416 samples. Storage tests were conducted on 494 samples and oil collected from 262 samples.Selections from triploid Tettnanger and Saazer progenies were made on the basis of agronomic and chemical data. Three Tettnanger selections, USDA 21664, 21665, and 21666 were collected during the growing season to determine maturity and quality characteristics under commercial growing conditions.. A formal report was made to the Hop Research Council in February.

Use of funds: Approximately 60% of the Hop Chemistry section's salaries came from this grant.

United States Department of Agriculture
Agricultural Research Service
Pacific West Area

Forage Seed & Hop Research Unit
Dept. Crop and Soil Science
Crop Science Building 451B
Oregon State University
Corvallis, Oregon 97331-3002
Telephone: (503) 737-5841
FAX: (503) 737-1334

Oct. 5, 1995

To whom it may concern :

From: Dr. Alfred Haunold
Hop Research Project Leader
USDA Research Collaborator

Subject: OSU/USDA Hop Research Facility, East Farm

We lease 14 acres of land at the OSU East Farm, plus another 4 acres to grow seedless hops at the USDA Peoria Road Germplasm land.

All buildings, facilities, and equipment at both locations are either USDA/ARS property or are owned directly by the Hop Research Project. All utilities, repairs and costs of operation are paid either by USDA or by the hop project.

Responsibility of all field operations at both locations has been delegated to the Research Assistant (presently Mr. Ulrich Gampert) who serves as field manager. This includes supervision of temporary and student helpers.

The research assistant has full authority to act in behalf of the project leader in deciding on the types of field work, arranging the work, supervising temporary and hourly workers, purchasing items needed on a day to day basis. Purchases to be paid with federal funds require form AD 700 which must be signed by a federal employee, normally the project leader. The Research Assistant (a state employee) is not authorized to do that.

The project leader may from time to time offer suggestions regarding field operations, priorities, and types of work related to the overall operation of the project. This will normally be relayed to other employees on the project through the research assistant/field manager.

On a day to day basis, however, all instructions and directives related to smooth operations of the field-related hop research operations will come from the research assistant/field manager.

Table 1: Hop germplasm and plants, or cone samples distributed in 1995.

Recipient and address	Date sent	Variety or selection	Amount	Reason and remarks
Anderson, Wayne Corvallis, OR 97330	Mar. 27	Bianca, 21698 Sunbeam, 21697	5 5	orman.hop, propagation -"-
Beatson, Dr. Ron Riwaka Res. Station Moteuka, N. Zealand	Jan. 3	Crystal, 21490	10	variety testing
Becker, Hank USDA-ARS Infor. Ctr. Greenbelt, MD 20770	Mar. 16	Cascade, 56013	200g	loose cones + photo of Binaca. NY newspaper editors, demonstration
Blumberg, Jeff PO Box 124 Thetford, VT 05043	May 25	Bianca, 21698 21102M 31190M 21541M 21176M	5 8 8 8 6	demonstration plots triploid male -"- -"- -"-
Bogash, Steve Univ. Maryland Res. Ctr. Keedysville, MD 21756	Mar. 20	Galena, 21182 Cascade, 56013 Willamette, 21041 Nugget, 21193 Mt. Hood, 21455 Chinook, 21226	25 " " " " "	field observation trials -"- -"- -"- -"- -"-
Boston Beer co. c/o David Grinell Boston, MA 02130	Apr. 20	E. Kent Golding, 21680	10	observation plot (request by Hop Union USA)
Bowles, Marlin Morton Arboretum Lisle, IL 60532	June 5	Bianca, 21698	5	ornamental demonstration plot
Busch Ag. Resources c/o Darrell Smith Woodburn, OR 97071	Feb. 27	Color slides of hop selections	10	slides to be used for oral presentation
Butsch, Jeff Mt. Angel, OR 97362		Bianca, 21698 Sunbeam, 21697	4 4	ornam. hops, demonstra. -"-
CalMac Nursery Cullman, AL 35057	May 25	Bianca, 21698 Sunbeam, 21697	30 30	ornam. hops, propagation -"-
Coleman Farms, Inc. (John & Bill Coleman) St. Paul, OR 97137	Mar. 14 Mar. 21	Spalter Select, 21674 -"-	300 400	potted plants, increase -"-
-"-	Apr. 19	-"- Bianca, 21698	150 2	-"- potted plants, ornamental

Coleman Farms	May 22	USDA 21665	2000	potted pl., off station trial
Coleman Greenhouses	Feb. 15	E. Kent Golding, 21680	240	potted plants, propaga.
(Kevin & Craig Coleman)	Feb. 27	" "	240	-"-
Dayton, OR 97114	Mar. 28	Spalter Select, 21674	300	potted plants, increase
Coors Brewing Co.	May 8	Bianca, 21698	10	ornamental hops
c/o Bob Foster		Sunbeam, 21697	10	-"-
Golden, CO 80401				
Coors Brewing Co.	Nov. 20	21684, Saaz Sel.	18 lbs	dried cones, pilot brew.
c/o Jan Langan				
Golden, CO 80401		21689, -"-	20 lbs	-"-
Damkoehler, Lee	Apr. 18	Bianca, 21698	6	ornamental hops
Oconto, WI 54153		Sunbeam, 21697	6	-"-
Davidson, Charles	Apr. 19	Bianca, 21698	4	potted plants, ornamental
Gervais, OR 97071				
DeMoss, Gary	May 9	Blue No. Brewer, 21097	2	potted plants, ornamental
Bliss, ID 83314		Bianca, 21698	6	-"-
Dixon, Dan	May 1	21683, Saaz Selection	5	off station planting
Greenleaf, ID 83626		21684, -"-	5	-"-
		21687, -"-	14	-"-
		21689, -"-	6	-"-
Fishman, Marvin	May 3	Bullion, 64100	5	commercial testing
Ferrisburgh, VT 05473		Brewer's Gold, 19001	5	-"-
Food Science Dept.	Dec. 15	21664, Tett selection	1 lb	baled cones, pilot brewing
Oregon State University		21665, -"-	"	-"-
c/o Jeff Clawson				
Corvallis, OR 97331				
"		21683, Saaz Selection	1 lb	baled cones, pilot brewing
		21684, -"-	"	-"-
		21685, -"-	"	-"-
		21686, -"-	"	-"-
		21687, -"-	"	-"-
		21688, -"-	"	-"-
		21689, -"-	"	-"-
Girsberg, Dr. Wilfredo	Nov. 7	Misc. Wild American hop	10 g	seeds for Bolivia
Blawert		seeds		
United Nations				
Sarre-Union, France				
Gilbertie's Nursery	Mar. 30	Bianca, 21698	20	ornamental propagation
Easton, CT 06612				
Goschie Farms	Mar. 22	Bianca, 21698	2	ornamental hops
Silverton, OR 97381		Sunbeam, 21697	2	-"-

(Table 1 continued)

Grant, Bert Yakima Brewing Co. Yakima, WA 98909	Apr. 25	Bianca, 21698 Sunbeam, 21697	4 4	ornamental hops -"-
Haas, J.I., Inc. c/o Pete Vandeneynde Salem, OR 97305	April 25	Bianca, 21698 Sunbeam, 21697	6 6	ornamental hops -"-
Harris, Katherine Talent, OR 97540	Mar. 16	Bianca, 21698	4	ornamental hops
Hickey, Dr. Ken Univ. Pennsylvania Plant Path. Dept. College Park, PA	May 11	21683, Saaz Sel.	1 lb	baled cones, pilot brewing
Hop Union USA c/o Dr. Greg Lewis Yakima, WA 98902	Feb. 16	21664, Tettnang Sel. 21684, Saaz Sel. 21686, -"- 21688, -"- 21689, -"-	400 g 400 g " " "	baled cones, hand evaluation -"- -"- -"- -"-
Horvath. Dr Willie OR State University Corvallis, OR 97330	Mar. 17	Bianca, 21698	500 g	baled cones, trial brewing
Idaho Univ. of MMBB, Life Science c/o Trish Hartzell Moscow, ID 83844	Feb. 28	Galena, 21182 Willamette, 21041 Nugget, 21193	10 " "	demostration plots -"- -"-
Jillette, Chris Corvallis, OR 97330	Mar. 24	Cascade, 56013 Willamette, 21041	5 5	home gardening -"-
Kenny, Dr. Steven WSU Prosser IAREC Prosser, WA 99350	Mar. 23	Canterbury Goldg., 21681 C-601(Kirin Exptl.) Southern Cross, 21703	2 3 3	potted plants, germ pl. coll. -"- -"-
Kerr, Mike Capitol Farms Salem, OR 97303	Mar. 31 Apr. 19	Bianca, 21698 Sunbeam, 21697 Bianca, 21698 Sunbean, 21697	50 50 30 25	potted plants, ornamentals -"- -"- -"-
Kirin Brew. Co. Toyko, Japan (via Anh. Busch, BARI)	May 24	21664, Tettnang Sel. 21665, -"-	600 g 600 g	baled cones, lab evaluation -"-
Klein, Dr. Robert WSU Prosser, IAREC Prosser, WA 99350	Mar. 24	E. Kent Golding, 21680	6	virus testing (for Les Roy) and propagation

(Table 1 continued)

Knapp, Dr. Steve OSU Crop Science Corvallis, OR 97331	Apr. 26	Cascade, 56013 Willamette, 21041	4 4	hobby gardening -"-
Liebhardt, Armin Geisenhausen, Germany	Apr. 24	Bianca, 21698 Sunbeam, 21697	3 3	ornamental hops -"-
Loan, Konrad Kemptville, Ont. Canada	Apr. 24	Hop screen	1 pc	wire mesh for seed separation & cleaning
	May 23	Bianca, 21698	5	ornamental hop
Lupofresh Inc. c/o John Mueller Wapato, WA 98951	Mar. 16	Bianca, 21698 Sunbeam, 21697	4 4	ornamental hops -"-
Missouri Botan. Garden c/o Jane Huston St. Louis, MO 63166	Apr. 18	Blue No. Brewer, 21079 Bianca, 21698 Sunbeam, 21697	2 6 6	potted plants, ornamental rhizomes, -"- -"-
McGaughey, Nial Duvall, WA 98019	May 3	Bianca, 21698 Sunbeam, 21697	5 5 6	ornamental hops -"-
OR State University Plant Clinic Corvallis, OR 97331	Mar. 22	Hersbrucker-6, 21514	6	loc # 222:21-25, nematode testing (very few found)
	"	Tettnanger, 21015	6	loc # 222:1-5, nematode testing (very few found)
Owades, Dr. Joe Qruze Beverage Co. Sonoma, CA 95476	Apr. 24	Sunbeam, 21697	2	ornamental hops
Owsowitz, Judy Whitefish, MT 59937	Mar. 22	Bianca, 21698 Sunbeam, 21697	5 5	ornamental hops -"-
Peacock, Dr. Val Anheuser Busch, Inc. St. Louis, MO 63118	Jan. 20	21683, 94 crop, Saaz Sel. 21684, -"- -"- 21686, -"- -"- 21688, -"- -"- 21689, -"- -"-	300 g " " " "	dried cones, hand + lab eval. -"- -"- -"- -"-
Pendergast, Joe Corvallis, Or 97330	Mar. 17	Bianca, 21698	600 g	baled cones, trial brewing
Peters, Jack OR State University Seed Lab; Crop Science Dept. Corvallis, OR 97331	May 5	misc. hop seeds	20 g	student (class) project
Rhinefrank, Ken Corvallis, Or 97330	Apr. 3	Bianca, 21698 Sunbeam, 21697	6 6	ornamental hops -"-

(Table 1, concluded)

Sapporo Brewing Co. Ltd. c/o Hiro Hasebe Tokyo 150, Japan	Jan. 11	63015M 64033M 64037M 19058M 21055 21120	6 6 6 6 6 6	germplasm for breeding -"- -"- -"- -"- -"-
Scott, Fred Noblesville, IN 46060	Mar. 31	Bianca, 21698 Sunbeam, 21697	4 4	ornamental hops -"-
Signorotti, George Sloughhouse, CA 95683	May 3	Bianca, 21698 Sunbeam, 21697	10 10	ornamental hops -"-
Stelljes, Katherine USDA-ARS Info. office Albany, CA 94710	May 27	Bianca, 21698	2	ornamental hop
Steven, Dr. Fred OSU Ag Chemistry Corvallis, OR 97331	Dec. 15	21664, Tettnang Sel. 21665, -"-	600 g "	baled cones, lab evaluation
-"-		21683, Saaz Sel. 21684, -"- 21685, -"- 21686, -"- 21687, -"- 21688, -"- 21689, -"-	600 g " " " " " "	-"- -"- -"- -"- -"- -"- -"-
Steiner, S.S. c/o Dr. Darwin Davidson Yakima, WA 98909	Dec. 11	Hall. Gold, 21671 Hall. Tradition, 21672 Spalter Select, 21674	600 g " "	baled cones, hand + lab eval. -"- -"-
Schwartz, Dr. Paul No. Dakota State Univ. Dept. Cereal Science Fargo, ND 58105	Apr. 26	Cascade, 56013 Nugget, 21193	10 10	demonstration plots -"-
Whitney, Dori Brewers Digest Chicago, IL 60646	May 16	Bianca, 21698	4	ornamental hop
Wills, Dave Freshops Inc. Philomath, OR 97370	Mar. 15	19058M	5	male germplasm for breeding
Zimmermann, C.E. Prosser, WA 99350	Mar. 23	Hall. Gold, 21671 Brewer's Gold, 21116	3 10	potted plants, off sta. trial rhizomes, -"-
"	Mar 11	21543M 21620M 21106M 21105M Bianca, 21698 Hall. Tradition, 21672 Hall. Gold, 21671 Brewer's Gold, 21116	10 10 10 10 6 6 50 45	triploid male pollinator " " " ornamental hop potted plants, off sta. trial " " " "

Table 2: Hop Germplasm and cone samples received in 1995.

Supplier	Date received	Amount	Variety	Remarks
Bures, Ing. Emil Hop Servis, Holedec Czech Republic	Nov. 30	123g	Saazer, 21077	very late harvest (end Sept) loose, brown cones
	Dec. 5	197g	Saazer, 21077	normal harvest (early Sept) loose cones, green
Kirin Brewery Co. Ltd. Iwate Hop Center (A. Murakami) Japan	Dec. 30, 94	15g	C-601	new aroma hop, requested by BARI (Anh. Busch) new USDA Acc. # 21709
Steiner, S.S. Yakima, WA 98909	March 6	500g	21664	Tett.-type selection, Brewer Cut
		500g	21665	Tett.-type selection, Brewer Cut
	Oct. 10	500g	Tettnanger, 21015	WA grown, control

Table 3: New Accession number assigned in 1995

Accession number	1995 location	Source	Name or Pedigree	Remarks
21709	Greenhouse	Atsushi Murakami Kirin Brew. Co. Iwate-Ken, Japan	C-601 ↓ [Toyo x(KirII x No.Br.-Saaz100)]x[(Saaz-Saaz100)x OP] [21676 x(21286x64107-Saaz100)]x[(21077-Saaz100)x OP]	new aroma Sel.
21710	6:39-40	Wild American Sel. 9019-27	Mohall W-2	α 4.1, β 4.0 high CoH, early
21711	12:39-40	Wild American Sel. 9030-37	Oxbow S-2	α 4.1, β 3.6 high CoH, early
21712	13:39-40	Wild American Sel. 9030-55	Oxbow S-2	α 6.1, β 4.9 high CoH, early, compact cone
21713	116:3-4	Wild American Sel. 8901-25	Souris - 25	early, ♂♀, α 4.9, β 2.8, high CoH
21714	118:3-4	Wild American Sel. 8913-01	Burlington A1	early, α 2.4, β 2.4, high CoH
21715	119:3-4	Wild American Sel. 8918-12	Burlington C12	early, α 3.5, β 2.8, high CoH
21716	120:3-4	Wild American Sel. 8918-41	Burlington C41	early, high yld., α 5.4, β 2.7, high CoH
21717	115:5-6	Wild American Sel. 8923-09	Mohall A9	early, high yld., α 5.4, β 2.7, high CoH
21718	119:5-6	Wild American Sel. 8936-22	Northgate B22	early, ♂♀, high yld., α 6.9, β 4.3, high CoH
21719	120:5-6	Wild American Sel. 8936-28	Northgate B28	early, ♂♀, compact cone, α 4.5, β 6.5, high CoH
21720	113:7-8	Wild American Sel. 8940-01	Oxbow A1	early, α 2.3, β 2.5, CoH 58

Table 3 continued

Accession Number	1995 location	Source	Name or Pedigree	Remarks
21721	114:7-8	Wild American Sel. 8940-10	Oxbow A10	early, α 3.7, β 3.3, CoH 52
21722	115:7-8	Wild American Sel. 8943-10	Oxbow D10	early, high yld., α 3.2, β 2.8, CoH 58
21723	116:7-8	Wild American Sel. 8951-02	Indian Head C2	early, ♂♀, α 3.2, β 2.8, CoH 71
21724	114:11-12	Wild American Sel. 9004-72	Logan W4E	red stem, ♂♀, high yld., α 2.5, β 1.7, high CoH
21725	115:11-12	Wild American Sel. 9008-10	Minot E4S	high α/β, α 8, β 3.7, high CoH
21726	116:11-12	Wild American Sel. 9008-42	Minot E4S	early, compact c., yld., α 4.2, β5.1, high CoH
21727	117:11-12	Wild American Sel. 9010-43	Minot W1	high yld., α 3.8, β 3.5, high CoH
21728	118:11-12	Wild American Sel. 9011-64	Minot W2	♂♀, male + female fertile, 28% seed set, high yld, α 4.1, β 2.1, high CoH
21729	119:11-12	Wild American Sel. 9017-13	White Earth S3	red stem, red strig, yld., α 6.2, β 2.9, high α/β, high CoH
21730	120:11-12	Wild American Sel. 9019-25	Mohall W2	♂♀, male + female fertile, 33% seed set, α 1.9, β 2.1, high CoH
21731	217:31-35	Sel. 8808-74	21120 x 19046M ↓ [(LGpS x Fu-FuS)x(LCS-FuS)] x (LCS-FuS)	zero alpha: α 0.5, β 8.9, CoH 60-70
21732	219:31-35	Sel. 8808-142	21120 x 19046M ↓ [(LGpS x Fu-FuS)x(LCS-FuS)] x (LCS-FuS)	zero alpha: α 0-0.3, β 10-11, CoH 30-40

Table 3 continued

Accession number	1995 location	Source	Name or Pedigree	Remarks
21733	213:36-40	Sel. 8809-105	21120 x 21119M [(LGpS x Fu-FuS)x(LCS-FuS)] x ⊗	zero alpha, yield, compact c., α 0.5, β 5-7, CoH 40-50 brother-sister mating
21734	214:36-40	Sel. 8809-132	21120 x 21119M [(LGpS x Fu-FuS)x(LCS-FuS)] x ⊗	zero alpha; α 0.4, β 7-10, CoH 30-50 brother-sister mating

Table 4: Hop genotypes discarded in 1995.

Accession Number	1995 Location	Name or Pedigree	Reason
21577M	20:39-40	Montana 5	poor vigor, lost in the field
21131M	31:57-58	YC x 64037M	short arms, no pollen

Table 5. Potential new hop varieties from the USDA-ARS Corvallis program 1988 to 1995.

Genotype Accession No.	Pedigree[1]	Cross made	Yield potential	α	β	CoH	oil	M^2	C	F	H	H/C	Status
		year	lbs/Acre	%	%	%	ml/100g	%	%	%	%	ratio	
	TETTNANGER TYPES												
21660	dipl. Tett x 21618M	1988	1200-2000	4-6	5-6	22	1.40	55	4	9	15	3.40	triploid, small off station and nursery plots
21662	-"-	-"-	1000-1600	6-8	5-7	23	1.30	42	5	11	19	3.60	-"- -"-
21663	-"-	-"-	1500-2000	6-7	6-7	25	1.50	60	5	7	17	3.20	-"- -"-
21664	-"-	-"-	1500-2000	6-7	6-7	22	1.50	35	6	13	22	3.50	triploid, 3rd yr. commercial, 2nd yr. pilot brewing
21665	-"-	-"-	1200-1800	6-7	5	21	1.20	55	5	9	18	3.50	-"- -"-
	SAAZER TYPES												
21683	tetr.Saaz x 21088M	1990	1600-2000	4-5	4	22	1.10	55	5	12	16	3.20	triploid, 2nd yr. commercial, 1st yr. pilot brewing
21684	-"- x 64037M	-"-	1300-1800	6	5	24	1.10	55	4	10	16	3.50	-"- -"-
21685	-"-	-"-	1200-1600	5	5	27	0.90	45	5	10	18	3.50	-"- -"-
21686	dipl. Saaz x 64035M	-"-	1200-1600	4	5-6	25	0.90	45	6	18	22	3.50	diploid, 2nd yr. commercial, 1st yr. pilot brewing
21687	-"-	-"-	700-1200	5-7	4-5	24	0.90	40	6	21	24	3.60	-"- -"-
21688	-"-	-"-	1300-1800	6	5	22	0.80	55	5	12	16	3.30	-"- -"-
21689	-"- x 21361M	-"-	1600-2000	7-9	5	23	1.10	45	6	16	20	3.20	-"- -"-

[1] 21618M (tetrapl. ♂): Hall. m.f., Cascade, B. Gold
21088M (diploid ♂): Yugoslavian Sel. 5/9
64035M (-"): Hall/Saaz seedling
64037M (-"-): -"-
21361M (-"-): Cascade, B. Gold, Hall/Saaz

[2] M, C, F, H = myrcene, caryophyllene, farnesene, humulene

INFORMATION SHEET USDA 21662

(Selection No. 8802-45)

Pedigree: 61021 (diploid) x 21618M (tetraploid)
Swiss Tettnanger x [tet. Hallertau mf x (Casc x 65009-64035M)]
Sister of USDA 21664

Genetic Composition: 1/2 Swiss Tettnanger, 1/4 Hallertau mf, 1/8 Cascade, 1/16 German Zattler Seedling, 1/32 Brewer's Gold, 1/64 Early Green, 1/64 unknown. Triploid; chromosome No. 2n=3x=30.

Maturity: Medium early (about Aug. 22-25 in western Oregon).

History:

1988: Cross 8802 made at Corvallis, OR, between diploid female and tetraploid male produced 2.5 g (about 1,000 total) seeds. Many were empty and did not germinate.

1989: 68 seedlings (mostly triploids) transplanted to the field from greenhouse pots (single hill nursery).

1990: 61 triploid selections of cross 8802 established in 4-hill plots, OSU main yard, from soft wood cuttings after roottip analysis.

1991: 14 triploid selections, including 8802-45, established in 5-hill seedless yard near Corvallis.
Selection 8802-45 receives permanent USDA Accession Number 21662 and is identified for possible off-station trials.
ELISA tests at Prosser, WA (Dr. Klein) find original nursery mother plant (hill 137:07) slightly infected with Hop Mosaic and Hop Latent virus. However, hills 4:22 and 4:23 of the 4-hill plot established in 1990 are free of all viruses.

1992: Second year's ELISA tests of hills 4:22 and 4:23 confirm that these two plants are free of all hop viruses. These plants are used for propagation.
Small field increase plot established at Corvallis, OR.
Propagation started at Prosser, WA (40 hills).
Stroh Brewing Company (President Joe Hertrich) identifies USDA 21662 for possible off-station testing.

1993: Corvallis propagation plot discontinued due to lack of commercial interest.
4-hill nursery plots discontinued at Corvallis. Genotype is established in 2-hill observation plot in the main yard (hills 116:1-2).

1995: 10-hill off-station observation plot established by S. S. Steiner, Inc., in the Yakima Valley using planting stock from the Prosser propagation plot. Remainder of Prosser planting stock is discarded.
No additional off station plots planned at this time.

Pruning and Training: No special precautions needed. Erect shoots are easy to train and readily climb a supporting string.

Picking and Drying: Very good, no shatter, good cleanup.

Cone type: Medium to medium large when stimulated by pollen from fertile males; small to medium small in seedless location. Due to the triploid condition, cones are nearly seedless even when grown in the presence of fertile diploid males.

Storage Stability: Fair; retained from 46 to 62 percent of the original alpha acids after 6 months room temperature storage.

Diseases: Moderately resistant to hop downy mildew; no problems with verticillium wilt. Propagation plot (Prosser) free of all 5 major hop viruses.

Other Comments: Proposed as an off-station plot as replacement for USDA 21666 which had very low alpha acids and significant amounts of male flowers in its first year of Oregon and Washington commercial testing in 1994.

USDA 21662: Yield and Quality

Nursery Plots - Oregon

Year	Plot	Yield[1]	α	ß	Ratio	CoH	Storage α remain	Oil	Remarks
		lb/A	%	%			%	ml/100g	
1989	single hill			new planting on May 18					baby
1990	"	1536	8.3	5.2	61	23	37	1.35	
1991	"	1621	8.4	5.5	60	22	56	1.14	
1991	4 hills	1077	8.9	7.0	56	23	46	0.96	
1992	"	853	7.9	5.0	61	17	55	1.57	
1992	"	267	5.7	4.6	55	21	56	1.23	
1994	"	853	6.8	7.8	47	25	62	1.26	
1994	2 hills	500e	7.7	6.4	42	23			baby
Average (Excl. babies)		1035	7.2	5.9	55	22	52	1.25	

[1] Calculated from 1- or 4-hill plot, respectively; e = visual estimate

Oil Composition - Oregon

Year	Plot	Oil	Myrcene	Caryophyllene	Farnesene	Humulene	H/C	Major hydrocarbons
		ml/100mg	%		%	%		%
1990	single hill	1.35	43.8	5.3	11.0	19.2	3.62	79.3
1991	"	1.14	32.5	7.5	10.8	23.7	3.16	74.5
1991	4 hills	0.96	51.8	5.1	9.2	17.6	3.43	83.7
1992	"	1.57	37.3	6,1	12.3	23.0	3.79	78.7
1992	"	1.23	54.8	4.4	9.2	15.9	3.58	84.3
1994	"	1.26	46.9	3.9	9.6	13.8	3.55	74.2
Average		1.25	44.5	5.4	10.4	18.9	3.52	79.1

1995 Crop Extra Bales

1 lb

Variety	Location	Extra Bales
21683	224:26-30	7
21684	232:26-30	8
21686	237:26-30	5
21687	241:26-30	2
21688	Coleman	23
21689	Coleman	47
21671 (Ha Gold)	Coleman	15
21672 (Ha Tradition)	Coleman	12
21674 (Spalter Select)	Coleman	16
9039-034	235:36-40	2
9039-041	108:17-18	2
21683	105:09-10	2?
21689	231:21-35	10
21683	Coleman	17
21685	Coleman	9
21686	Coleman	13

Copy to Darrell Smith (AB) on 9/28, 1995.

1995 Crop Extra Bales

Coleman location

Variety	Location	Extra Bales	USED	
21683	224:26-30	7		
21683	105:09-10	2?		
21683	Coleman	17		
21684	232:26-30	7	18 lbs	Coors
21684	Coleman	9		
21685	Coleman	9		
21686	237:26-30	5		
21686	Coleman	13		
21687	241:26-30	2		
21688	Coleman	22	20 lbs	Coors
21689	Coleman	47		
21689	231:21-35	10		
21671 (Ha Gold)	Coleman	15		
21672 (Ha Tradition)	Coleman	12		
21674 (Spalter Select)	Coleman	16		
9039-034	235:36-40	2		
9039-041	108:17-18	2		

~ 1/2 # left

Copy to Darrell Smith 9/28/95

1995 Off Station Samples

			Dry Weight Basis				at 8% mc		
Variety	Picking Date	%Dry Matter or Moisture Content	mg DM /cone	% Alpha	% Beta	HSI	CoH	% Alpha	% Beta	Lab No
Hallertau Gold	8/21/95	24.10	109	9.7	6.9	0.196	20	8.9	6.3	95101
Bale (USDA 21671)	8/24/95	12.10				0.230	19	9.0	6.0	103
Hallertau Tradition	8/21/95	23.10	140	7.5	5.4	0.203	27	6.9	5.0	95098
Bale (USDA 21672)	8/24/95	11.35				0.220	25	7.2	4.8	104
Spalter Select	8/21/95	23.45	101	7.4	5.9	0.204	21	6.8	5.4	95102
Bale (USDA 21674)	8/24/95	12.15				0.230	22	6.9	5.0	105
USDA 21664	8/17/95	15.60	132	5.9	7.6	0.187	20	5.4	7.0	95078
USDA 21664	8/21/95	17.90	111	6.8	7.3	0.183	23	6.3	6.7	95099
5E-205-X (26 bales)		6.55		5.9	7.9	0.213	24	5.4	7.3	95140
USDA 21665	8/18/95	18.15	199	7.4	6.2	0.208	19	6.8	5.7	95082
USDA 21665	8/24/95	20.25	151	7.2	5.2	0.217	21	6.6	4.8	95121
5E-218-A32 (17 bales)		6.20		5.3	7.2	0.227	22	4.9	6.6	95158
Saazer (Bale)	8/16/95	8.35				0.270	24	4.3	4.2	106
USDA 21683	8/17/95	15.00	108	5.8	7.8	0.191	19	5.3	7.2	95079
USDA 21683	8/24/95	19.60	142	7.2	7.9	0.195	22	6.6	7.3	95122
USDA 21683	8/31/95	20.36	131	3.5	4.4	0.185	20	3.2	4.0	95151
Bale	9/7/95	11.50				0.210	21	4.4	5.6	497
USDA 21684	8/18/95	15.50	75	3.2	3.5	0.232	13	2.9	3.2	95083
USDA 21684	8/24/95	17.10	96	4.6	4.4	0.202	17	4.2	4.0	95123
USDA 21684	8/31/95	20.45	120	6.9	5.9	0.195	24	6.3	5.4	95152
Bale	9/7/95	9.40				0.230	26	5.8	5.4	498

1995 Off Station Samples

				Dry Weight Basis				at 8% mc		
Variety	Picking Date	%Dry Matter or Moisture Content	mg DM /cone	% Alpha	% Beta	HSI	CoH	% Alpha	% Beta	Lab No
USDA 21685	8/18/95	18.00	128	6.0	5.9	0.201	22	5.5	5.4	95084
USDA 21685	8/24/95	19.70	130	6.8	5.4	0.222	23	6.3	5.0	95124
USDA 21685	8/31/95	18.95	112	3.8	4.6	0.180	26	3.5	4.2	95153
Bale	9/7/95	13.10				0.220	26	2.6	4.6	499
USDA 21686	8/18/95	18.40	71	2.6	5.5	0.190	20	2.4	5.1	95085
USDA 21686	8/24/95	18.30	113	3.7	4.5	0.215	24	3.4	4.1	95125
USDA 21686	8/31/95	22.82	98	3.0	7.4	0.178	24	2.8	6.8	95154
Bale	9/7/95	10.60				0.200	25	3.3	6.5	500
USDA 21687	8/21/95	20.70	84	3.8	3.2	0.199	22	3.5	2.9	95100
USDA 21687	8/28/95	22.86	114	4.8	3.8	0.217	25	4.4	3.5	95133
Bale	8/30/95	10.80				0.230	27	4.3	3.9	458
USDA 21688	8/17/95	18.60	59	5.3	5.5	0.214	21	4.9	5.1	95080
USDA 21688	8/28/95	23.09	75	5.8	4.7	0.207	24	5.3	4.3	95134
Bale	8/30/95	8.65				0.220	24	6.9	5.9	167
USDA 21689	8/17/95	17.50	65	7.9	4.9	0.244	20	7.3	4.5	95081
USDA 21689	8/21/95	18.15	90	9.9	5.8	0.204	22	9.1	5.3	95097
USDA 21689	8/28/95	22.82	99	10.9	5.1	0.216	24	10.0	4.7	95135
Bale	8/30/95	8.85				0.220	26	4.2	5.4	166

Will rerun another miniature bale.

1995 Oregon Off-station Selections

Variety	Picking Date	(Moisture Content)	As Is Basis % Alpha	% Beta	Oil Content mL/100g	CoH	HSI	Hop Oil Composition (Area %) % Myrcene	% Caryophyllene	% Farnesene	% Humulene	H/C	F/C	Lab No
Tettnanger Progeny														
21664 (5E-205-X)		(6.55)	5.5	7.4	1.53	24	0.21	21.6	8.2	16.1	28.7	3.50	1.96	95140/107
21665 (5E-218-A32)		(6.20)	6.8	5.3	1.41	22	0.23	45.0	5.3	10.7	19.0	3.58	2.02	95158/318
Saazer Progeny														
21683	9/7/95	(11.50)	4.2	5.4	1.42	21	0.21	58.6	4.1	8.3	15.3	3.73	2.02	497
21684	9/7/95	(9.40)	5.7	5.3	0.91	26	0.23	70.9	2.1	7.5	7.3	3.48	3.57	498
21685	9/7/95	(13.10)	2.4	4.3	0.95	26	0.22	71.7	3.8	9.2	13.6	3.58	2.42	499
21686	9/7/95	(10.60)	3.2	6.3	1.23	25	0.20	49.7	3.6	18.2	12.7	3.53	5.06	500
21687	8/30/95	(10.80)	4.2	3.7	0.57	27	0.23	52.6	3.5	14.0	13.5	3.86	4.00	458
21688	8/30/95	(8.65)	6.9	5.8	0.68	24	0.22	59.8	2.6	9.8	9.4	3.62	3.77	167
21689	8/30/95	(8.00)	6.4	5.3	1.45	26	0.23	51.6	4.4	16.6	15.7	3.57	3.77	166

1995

Nov. 1995

1995 crop: Aroma selections and foreign introductions for pilot brewing.

Variety	Picking Date	(Moisture Content) %Dry Matter	mg DM /cone	Dry Weight Basis % Alpha	% Beta	HSI	CoH	at 8% mc % Alpha	% Beta	Lab No
Hallertau Gold	8/21/95	24.10	109	9.7	6.9	0.20	20	8.9	6.3	95101
Bale	8/24/95	12.10		9.8	6.5	0.23	19	9.0	6.0	103
Hallertau Tradition	8/21/95	23.10	140	7.5	5.4	0.20	27	6.9	5.0	95098
Bale	8/24/95	(11.35)		7.8	5.2	0.22	25	7.2	4.8	104
Spalter Select	8/21/95	23.45	101	7.4	5.9	0.20	21	6.8	5.4	95102
Bale	8/24/95	(12.15)		7.5	5.4	0.23	22	6.9	5.0	105
USDA 21664 ✓	8/17/95	15.60	132	5.9	7.6	0.19	20	5.4	7.0	95078
USDA 21664	8/21/95	17.90	111	6.8	7.3	0.18	23	6.3	6.7	95099
5E-205-X (26 bales)		(6.55)		5.9	7.9	0.21	24	5.4	7.3	95140
	8/25/95	(6.60)		5.8	7.5	0.24	23	5.3	6.9	107
USDA 21665 ✓	8/18/95	18.15	199	7.4	6.2	0.21	19	6.8	5.7	95082
USDA 21665	8/24/95	20.25	151	7.2	5.2	0.22	21	6.6	4.8	95121
5E-218-A32 (17 bales)		(6.20)		7.2	5.6	0.23	22	6.6	5.2	95158
	8/31/95	(5.85)		6.5	5.7	0.26	22	6.0	5.2	318
Saazer	8/16/95	(8.35)		4.7	4.3	0.27	24	4.3	4.0	106
USDA 21683 ✓	8/17/95	15.00	108	5.8	7.8	0.19	19	5.3	7.2	95079
USDA 21683	8/24/95	19.60	142	7.2	7.9	0.20	22	6.6	7.3	95122
USDA 21683	8/31/95	20.36	131	3.5	4.4	0.19	20	3.2	4.0	95151
Bale	9/7/95	(11.50)		4.8	6.1	0.21	21	4.4	5.6	497
USDA 21684 ✓	8/18/95	15.50	75	3.2	3.5	0.23	13	2.9	3.2	95083
USDA 21684	8/24/95	17.10	96	4.6	4.4	0.20	17	4.2	4.0	95123
USDA 21684	8/31/95	20.45	120	6.9	5.9	0.20	24	6.3	5.4	95152
Bale	9/7/95	(9.40)		6.3	5.9	0.23	26	5.8	5.4	498

11/22/95

✓ = to Jeff Clawson - for pilot brewing

also for HRC tasting Jan 29, 96

GBN will coordinate it

1995

Variety	Picking Date	(Moisture Content) %Dry Matter	mg DM /cone	Dry Weight Basis % Alpha	% Beta	HSI	CoH	at 8% mc % Alpha	% Beta	Lab No
USDA 21685	8/18/95	18.00	128	6.0	5.9	0.20	22	5.5	5.4	95084
USDA 21685	8/24/95	19.70	130	6.8	5.4	0.22	23	6.3	5.0	95124
USDA 21685	8/31/95	18.95	112	3.8	4.6	0.18	26	3.5	4.2	95153
Bale	9/7/95	(13.10)		2.8	5.0	0.22	26	2.6	4.6	499
USDA 21686	8/18/95	18.40	71	2.6	5.5	0.19	20	2.4	5.1	95085
USDA 21686	8/24/95	18.30	113	3.7	4.5	0.22	24	3.4	4.1	95125
USDA 21686	8/31/95	22.82	98	3.0	7.4	0.18	24	2.8	6.8	95154
Bale	9/7/95	(10.60)		3.6	7.1	0.20	25	3.3	6.5	500
USDA 21687	8/21/95	20.70	84	3.8	3.2	0.20	22	3.5	2.9	95100
USDA 21687	8/28/95	22.86	114	4.8	3.8	0.22	25	4.4	3.5	95133
Bale	8/30/95	(10.80)		4.7	4.2	0.23	27	4.3	3.9	458
	8/30/95	(11.50)		4.5	4.1	0.24	26	4.1	3.8	317
USDA 21688 ✓	8/17/95	18.60	59	5.3	5.5	0.21	21	4.9	5.1	95080
USDA 21688	8/28/95	23.09	75	5.8	4.7	0.21	24	5.3	4.3	95134
Bale	8/30/95	(8.65)		7.5	6.4	0.22	24	6.9	5.9	167
USDA 21689 ✓	8/17/95	17.50	65	7.9	4.9	0.24	20	7.3	4.5	95081
USDA 21689	8/21/95	18.15	90	9.9	5.8	0.20	22	9.1	5.3	95097
USDA 21689	8/28/95	22.82	99	10.9	5.1	0.22	24	10.0	4.7	95135
Bale	8/30/95	(8.00)		7.0	5.8	0.23	26	6.4	5.3	166

Off-Station Experimental Varieties

See also: color slides ('95) with qual. data

Darrell Smith gave me the analytical results (by S.S. Steiner, Inc. Yakima) of the varieties planted in northern Idaho, Oregon and Washington.

Variety	Total Bales	Acres	Moisture Content	bales/Acre	% α-acids (dwb)	% β-acids (dwb)	HSI
Idaho 21684	12	3	7.2	3.64	5.8	5.5	0.254
Idaho 21685	8	3	7.0	2.67	3.2	5.6	0.243
Idaho 21686	13	3	8.7	3.64	2.7	6.8	0.225
Idaho 21687	4	3	6.4	1.21	4.2	4.2	0.251
Idaho 21688	15	3	4.8	5.00	4.3	5.2	0.243
Idaho 21373	4	1	7.5	4.00	10.1	6.6	0.233
Wa 21373	9		7.0		11.7	8.8	0.247
ID ~~Wa~~ 21683	9	3	8.0	6.33	3.6	4.1	0.258
Or 21664	26		7.5		6.6	5.3	0.251
Wa 21664	27		6.9		5.6	8.9	0.217
Or 21665	17		8.0		5.4	7.1	0.239
Wa 21665	11		9.8		3.9	5.0	0.232
Wa 21666	11		6.3		2.3	7.1	0.243

High α + β Material

1995 Nursery (USDA)	α %	β %	CoH %
Hall. Magnum	14-16	5-7	27
Eastern Gold	10-12	6	28
19058M	24	50	17
58111M	24	48	28
63015M	52	24	24
21429M	29	50	24
Patented varieties (commercial)			
Chelan (87203-1)	13-15	9-12	35
Tillicum (87207-2)	13-15	9-12	35
unnamed (87311-3)	16-18	6-7	50
Columbus	14-16	4-6	30-35
Tomahawk	not available		

High Alpha-acid or 'Kettle' Hops

Note: These rankings are based on chemical data collected from the USDA-ARS germ plasm collection at Corvallis, Oregon. Some characteristics are affected by climate, for example, alpha-acid content of Cluster grown in Oregon is usually lower than a Washington sample. How well a variety stores is affected by post-harvest handling. Probably the best efficiency for high alpha-acid conversion to BU's is obtained by high alpha-acids content with high % Cohumulone in the alpha-acids.

% Alpha-acids (Ranked Highest at top)

Traditional	New Varieties
	Ha Magnum
	Chinook
	Nugget
	Wye Target
	Olympic
	Eroica
	Centennial
	Galena
	Banner
Bullion	
Pride of Ringwood	Northern Brewer
Brewers Gold	Orion
	Wye Northdown
	Record
	Wye Challenger
Yakima Cluster	Talisman

Storage (Ranked Best at top)

Traditional	New Varieties
Yakima Cluster	
	Northern Brewer
	Galena
	Nugget
	Wye Challenger
	Wye Northdown
	Talisman
	Chinook
	Eroica
Pride of Ringwood	Orion
	Ha Magnum
	Record
	Olympic
	Wye Target
Bullion	Banner
Brewers Gold	Centennial

Alpha/Beta (Highest at top of list)

Traditional	New Varieties
	Chinook (~4:1)
	Record
	Nugget
	Centennial
	Eroica
	Wye Target
	Olympic
	Northern Brewer
	Ha Magnum
	Wye Challenger
Brewers Gold	Talisman
Bullion	Banner
	Orion
Yakima Cluster	Galena
Pride of Ringwood	

% Cohumulone (Highest at top of list)

Traditional	New Varieties
	Talisman (55)
	Galena
	Orion
Yakima Cluster	Eroica
Bullion	Wye Target
Brewers Gold	Chinook
	Banner
Pride of Ringwood	Olympic
	Centennial
	Record
	Ha Magnum
	Nugget
	Northern Brewer
	Wye Northdown
	Wye Challenger

Aroma Hops (world wide)

Note: These rankings are based on chemical data collected from the USDA-ARS germ plasm collection at Corvallis, Oregon. Some characteristics are affected by climate, for example, alpha-acid content of Cascade grown in Oregon is usually higher than a Washington sample. How well a variety stores is affected by post-harvest handling.

Traditional Aroma Varieties	Similar New Varieties
Hallertauer	Crystal Liberty Ultra Mt Hood
Strisselspalter Elsasser Backa	
	Hersbrucker Hüller Bitterer
Savinja Golding Yugoslavian Golding Fuggle Styrian	Willamette Columbia
	Cascade
Tettnanger Saazer Spalter	USDA 21664, USDA 21666 Selections (7) in off-station trials

Sensory Analysis and Hops

Sensory evaluation by a trained, descriptive panel provides a valuable tool for assessing the contribution of hops to the aroma and flavor of beer. In our sensory lab, we have spent over seven years evaluating the aroma contribution of hops and this past year we have begun looking at the bitterness contribution of hops to beer.

Research for 1994: Bitterness Quality in Beer

Method:

1) Brewing beers with different hops (Cluster, Willamette, Galena, Mt. Hood, Spalt Select, Hallertauer, Saazer, and a few Washington Selection varieties)

2) Sensory evaluation of the bitterness by rating the flavor intensities of the following descriptors: Maximum Bitterness, Harshness, Smoothness, Come-on-time and Lingering

Sensory Results:

There was a general trend for hops which were higher in cohumulone to be rated lower in Maximum Bitterness and Harshness, although there were a few exceptions.

PILOT BREWERY
Oregon State University

GOALS:

- To have a state of the art pilot brewery in the processing plant
- To use the brewery for research and education in the hop and brewing fields
- Have the brewery and personnel available to industry on a contract basis

Equipment Obtained:	Cost
- Glycol Unit	$4,000
- Heat Exchangers	$3,500
- Refrigerator	$1,400
- Scale	$ 900
- Roller Mill	$ 500
- Grain Storage	$ 500
- Water Treatment System	$ 150
- Pumps	$1,500

Some of these items were donated.

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery ♀ Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
19001	Brewers Gold	001:01-04	C	9/06/95	1200	208	10.3	4.8	68	0.27	38	67	0.87	40	0.00	0.00	0.0	0.0	0.0	0.0	0.00	357
19027	Fu x Fu-S	033:49-50	C	9/05/95	800	149	0.8	2.9	21	0.33	38	56	0.63	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	227
19028	EGr x EC-S	034:49-50	C	9/05/95	1200	133	2.9	6.9	30	0.27	38	62	0.71	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	233
19105	LGp-S(Fu Fu-S)	001:49-50	C	9/05/95	1200	109	1.5	7.7	16	0.28	31	55	1.02	33	0.00	0.00	0.0	0.0	0.0	0.0	0.00	253
19110	Belg 31-S OP	002:49-50	C	9/05/95	1400	198	5.0	5.3	49	0.27	56	76	0.34	85	0.00	0.00	0.0	0.0	0.0	0.0	0.00	240
19120	Sunshine-S	003:49-50	C	9/05/95	1200	211	8.1	3.2	72	0.30	31	56	0.46	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	250
19137	Sunshine-S	004:49-50	C	9/05/95	400	142	7.6	2.8	73	0.33	28	54	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	254
19151	Fu-RedV-OP	005:49-50	C	9/05/95	1200	135	1.9	5.0	28	0.28	56	24	0.86	41	0.00	0.00	0.0	0.0	0.0	0.0	0.00	236
19185	LGpFuRedV-OP	006:49-50	C	9/05/95	1000	145	5.7	3.3	63	0.29	38	61	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	239
21003	Fu T4	101:01-02	B	8/23/95	242	10.30	3.8	2.0	65	0.27	28	50	0.42	73	0.69	0.49	0.0	0.0	0.0	0.0	0.00	71
21007	6735-005	041:49-50	C	9/05/95	200	161	4.4	3.0	60	0.33	35	61	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	223
21011	L-16	005:01-04	C	9/06/95	2000	207	6.6	4.8	58	0.24	45	68	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	329
21014	Hallertau MF	221:01-05	B	8/29/95	461	9.25	5.2	4.9	51	0.26	22	40	0.73	57	1.92	0.64	47.8	7.9	0.1	25.7	3.25	476
21014	Hallertau MF	007:01-04	B	8/21/95	484	10.45	5.4	4.0	57	0.21	19	40	0.50	64	1.03	0.50	42.0	8.6	0.1	30.1	3.50	1
21015	Tettnanger	222:01-05	B	8/22/95	265	12.65	5.4	3.0	64	0.29	31	51	0.64	52	1.03	0.30	63.0	3.1	9.0	10.6	3.40	33
21015	Tettnanger	008:01-04	B	8/21/95	256	8.70	3.8	3.3	53	0.21	22	41	0.51	60	0.57	0.22	51.1	5.3	10.5	17.9	3.39	2
21016	Fu N, VF	223:01-05	B	8/22/95	887	12.70	3.7	3.6	51	0.29	30	49	0.50	70	0.88	0.63	58.6	5.7	4.2	16.7	2.92	34
21016	Fu N, VF	009:01-04	B	8/21/95	811	10.35	5.3	2.6	67	0.24	28	51	0.43	75	1.15	0.72	45.0	8.4	4.5	23.6	2.80	3
21030	6616-019	024:51-52	C	9/06/95	500	187	8.8	7.5	54	0.26	41	64	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	315
21039	Golden Star	015:01-04	C	9/06/95	2200	153	5.6	5.0	53	0.25	51	73	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	340
21039	Golden Star	224:01-05	C	9/08/95	2200	105	4.0	4.1	50	0.26	50	73	0.65	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	434
21040	Columbia	225:01-05	B	8/29/95	1056	10.10	5.1	3.9	57	0.23	40	62	0.48	58	0.65	0.29	40.7	7.9	6.1	20.5	2.61	470
21040	Columbia	023:05-08	C	8/29/95	800	117	6.6	5.0	57	0.27	38	60	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	124
21041	Willamette	024:05-08	B	8/29/95	725	15.65	5.7	3.6	62	0.23	32	56	0.51	62	1.51	0.46	43.4	8.4	6.1	23.7	2.82	518
21041	Willamette	224:16-20	B	9/11/95	1186	11.25	5.1	3.7	58	0.28	37	59	0.77	43	2.18	0.74	52.2	6.4	5.9	18.8	2.92	611
21042	6769-002	103:07-08	C	9/07/95	1800	193	4.3	3.6	54	0.27	38	65	0.56	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	424
21043	Wye Challenger	226:01-05	B	8/29/95	1502	8.10	7.3	4.9	60	0.26	26	49	0.38	81	1.39	0.00	49.5	4.6	1.0	15.4	3.37	475
21043	Wye Challenger	018:05-08	B	8/29/95	711	15.70	10.2	4.9	68	0.26	22	44	0.48	54	0.83	0.55	41.8	6.1	1.8	19.9	3.28	516
21044	Wye Northdown	221:16-20	C	9/08/95	400	170	8.6	5.7	60	0.28	28	55	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	590
21044	Wye Northdown	019:05-08	C	8/29/95	200	180	3.6	2.2	62	0.31	23	50	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	113
21044	Wye Northdown	232:06-10	C	9/08/95	1600	177	5.7	4.7	55	0.31	28	47	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	432
21049	Styrian, Yugo	020:05-08	B	8/21/95	576	7.45	5.0	2.0	71	0.24	29	54	0.39	81	0.82	0.54	47.8	4.6	1.8	13.1	2.82	4
21049	Styrian, Yugo	225:16-20	B	8/22/95	565	12.05	4.6	2.5	65	0.27	33	50	0.47	72	1.16	0.60	50.5	7.1	4.8	21.5	3.04	35
21050	Ahil,Yugo	001:09-12	B	8/29/95	597	10.60	8.6	3.6	70	0.25	28	53	0.70	46	1.85	0.48	55.2	4.6	12.8	9.0	1.94	522
21050	Ahil,Yugo	227:01-05	B	8/29/95	1476	9.55	11.4	5.2	68	0.25	24	48	0.62	52	2.12	0.67	55.5	3.4	10.7	7.6	2.22	468
21051	Apolon, Yugo	228:01-05	C	9/08/95	1500	226	7.8	4.5	63	0.25	24	43	0.79	45	0.00	0.00	0.0	0.0	0.0	0.0	0.00	439
21051	Apolon, Yugo	004:09-12	B	8/21/95	640	13.55	10.6	3.7	74	0.22	25	47	0.54	58	1.20	0.61	65.8	3.1	9.8	7.6	2.48	5
21052	Atlas,Yugo	002:09-12	B	8/29/95	981	10.00	9.1	4.0	70	0.25	40	66	0.81	39	1.79	0.46	60.9	3.4	11.8	7.2	2.09	528
21052	Atlas,Yugo	229:01-05	C	9/08/95	1600	105	7.2	2.9	71	0.31	40	65	0.72	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	448
21053	Aurora, Yugo	230:01-05	B	8/29/95	1376	8.10	9.5	4.3	69	0.26	24	52	0.34	85	1.26	0.69	45.4	3.9	5.3	13.5	3.42	474
21053	Aurora, Yugo	003:09-12	B	8/21/95	747	12.50	9.1	3.6	71	0.22	21	49	0.32	86	0.58	0.65	55.1	4.6	3.5	16.1	3.51	6
21055	6806-080	033:05-08	B	8/29/95	1003	24.65	12.9	3.7	78	0.29	50	72	0.00	0	2.43	0.00	52.6	4.5	5.9	6.5	1.44	473
21055	6806-080	044:47-48	C	9/01/95	600	386	16.6	3.9	81	0.31	49	73	0.38	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	173
21056	Bullion, 10A,VF	013:09-12	B	8/29/95	1195	8.65	6.2	3.2	66	0.24	38	65	0.49	61	1.02	0.37	60.5	5.3	0.1	8.5	1.61	461
21056	Bullion, 10A,VF	226:16-20	B	9/11/95	2022	11.35	10.5	5.9	64	0.23	39	64	0.89	38	3.32	0.96	68.6	5.5	0.1	9.3	1.70	609
21057	PrRingwood Sel	036:49-50	C	9/05/95	800	184	9.1	6.4	59	0.24	40	65	0.33	86	0.00	0.00	0.0	0.0	0.0	0.0	0.00	231
21062	6512-024	043:51-52	C	9/05/95	400	242	3.9	1.9	68	0.32	53	70	0.56	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	216
21077	Saazer, Czech	Coleman	B	8/16/95	300	8.35	4.3	4.0	52	0.27	24	41	0.76	37	0.60	0.27	32.5	6.5	16.1	23.1	3.57	106

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21077	Saazer, Czech	021:05-08	C	8/29/95	100	174	4.6	4.1	53	0.29	23	43	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	119
21078	Record, Belg	021:09-12	B	8/31/95	683	10.40	6.9	7.9	47	0.23	26	50	0.52	60	1.79	1.21	55.3	6.0	0.3	18.0	3.00	494
21079	Blue N.B.,Belg	008:51-52	C	9/06/95	50	166	4.2	1.9	69	0.40	24	48	0.54	63	0.00	0.00	0.0	0.0	0.0	0.0	0.00	274
21079	Blue N.B.,Belg	009:09-12	C	8/29/95	50	148	7.3	2.9	71	0.35	24	49	0.47	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	109
21080	Backa, Yugo	231:01-05	C	9/08/95	2000	135	2.3	5.5	29	0.26	27	45	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	437
21080	Backa, Yugo	008:09-12	C	9/06/95	800	248	3.0	7.1	30	0.24	24	40	0.72	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	355
21081	Dunav	232:01-05	C	9/08/95	1800	164	5.4	3.2	63	0.29	29	47	0.43	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	435
21081	Dunav	005:09-12	B	8/29/95	939	10.20	7.2	3.7	66	0.26	31	60	0.47	72	2.14	0.78	52.1	5.8	32.3	16.7	2.86	467
21082	Neoplanta,Yugo	006:09-12	B	8/29/95	725	9.15	9.8	4.1	71	0.25	35	64	0.41	76	1.42	0.80	39.1	10.6	4.8	22.0	2.07	527
21082	Neoplanta	233:01-05	C	9/08/95	600	128	6.3	3.1	67	0.28	38	64	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	450
21083	Vojvodina,Yugo	234:01-05	C	9/08/95	2000	111	7.1	3.0	70	0.30	34	63	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	441
21083	Vojvodina,Yugo	007:09-12	C	9/06/95	700	133	7.6	2.9	73	0.28	26	56	0.34	85	0.00	0.00	0.0	0.0	0.0	0.0	0.00	327
21085	Yugo VII/23	039:49-50	C	9/05/95	200	145	4.6	5.4	46	0.29	23	45	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	247
21086	Yugo VIII/27	040:49-50	C	9/05/95	100	140	5.2	5.7	48	0.28	19	41	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	232
21092	Cascade VF	235:01-05	C	9/08/95	2000	217	3.7	4.4	46	0.28	37	55	0.86	41	0.00	0.00	0.0	0.0	0.0	0.0	0.00	444
21092	Cascade VF	014:09-12	B	8/29/95	885	8.65	6.0	4.9	55	0.23	38	56	0.48	64	1.02	0.47	62.8	2.9	3.8	7.6	2.60	466
21093	N. Brewer VF	236:01-05	B	8/22/95	1422	11.00	10.5	5.3	67	0.27	27	51	0.44	76	2.08	1.45	67.2	4.4	0.1	11.7	2.65	36
21093	N. Brewer VF	012:09-12	B	8/21/95	427	8.05	10.1	3.7	73	0.23	24	50	0.36	81	1.58	0.84	60.5	6.0	0.1	16.6	2.76	7
21094	6903-112	009:49-50	C	9/05/95	1600	196	6.7	5.8	54	0.24	36	59	0.33	86	0.00	0.00	0.0	0.0	0.0	0.0	0.00	249
21095	6903-259	010:49-50	C	9/05/95	1400	178	6.0	6.3	49	0.27	37	59	0.33	87	0.00	0.00	0.0	0.0	0.0	0.0	0.00	241
21097	Huller Bitter	030:05-08	C	9/06/95	1400	174	5.6	4.1	58	0.27	33	53	0.69	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	343
21097	Huller Bitter	237:01-05	C	9/08/95	1900	132	5.2	3.6	59	0.27	31	52	0.65	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	446
21098	6913-068	112:03-04	B	8/23/95	2815	11.30	6.9	3.9	64	0.23	25	50	0.61	51	0.94	0.43	66.7	5.3	0.1	6.1	1.16	72
21112	Wye Target	016:09-12	B	8/29/95	1419	8.80	11.1	4.9	70	0.25	35	63	0.43	74	1.59	0.82	55.9	4.6	0.2	8.7	1.89	462
21112	Wye Target	238:01-05	B	8/29/95	1898	12.15	12.4	5.8	68	0.25	40	63	0.77	40	2.26	0.69	62.3	3.4	0.2	7.3	2.16	465
21113	Lubelska, Pol	018:09-12	B	8/21/95	224	6.85	4.0	3.5	54	0.21	23	43	0.60	53	0.58	0.23	50.4	4.8	12.0	16.2	3.36	8
21114	Nadwislanska	019:09-12	C	8/29/95	150	202	5.3	4.8	52	0.27	23	43	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	122
21115	Pocket Talisman	020:09-12	C	9/06/95	600	122	2.0	1.4	59	0.38	53	75	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	341
21116	Brewers Gold VF	015:09-12	C	9/06/95	1200	205	5.1	2.5	67	0.31	35	65	0.37	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	326
21116	Brewers Gold VF	239:01-05	B	9/13/95	3336	7.20	10.7	4.5	70	0.26	44	68	0.58	57	1.39	0.70	60.1	11.7	0.2	0.9	0.08	656
21120	7001-013	218:31-35	C	9/08/95	1600	71	1.0	7.9	11	0.28	64	51	0.95	36	0.00	0.00	0.0	0.0	0.0	0.0	0.00	591
21138	6701-054	016:49-50	C	9/05/95	1400	186	2.9	2.5	53	0.31	27	46	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	258
21139	6704-138	024:49-50	C	9/05/95	2000	190	4.0	7.5	35	0.25	47	69	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	257
21144	6185-001	051:51-52	C	9/05/95	800	293	5.2	7.4	41	0.26	37	61	0.98	35	0.00	0.00	0.0	0.0	0.0	0.0	0.00	234
21145	6305-004	052:51-52	C	9/05/95	1000	125	3.6	5.7	39	0.31	37	62	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	243
21150	6616-010	049:51-52	C	9/05/95	800	131	3.4	4.0	46	0.32	40	63	0.82	44	0.00	0.00	0.0	0.0	0.0	0.0	0.00	230
21151	6616-020	030:51-52	C	9/06/95	1600	169	4.4	5.3	45	0.31	39	64	1.03	32	0.00	0.00	0.0	0.0	0.0	0.0	0.00	290
21156	6806-094	009:51-52	C	9/06/95	1200	190	7.4	2.8	72	0.31	40	64	0.77	46	0.00	0.00	0.0	0.0	0.0	0.0	0.00	265
21158	6806-099	049:49-50	C	9/05/95	1000	350	11.3	3.5	76	0.26	35	57	0.81	44	0.00	0.00	0.0	0.0	0.0	0.0	0.00	225
21159	6818-043	010:51-52	C	9/06/95	600	124	3.4	7.9	30	0.26	21	39	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	294
21160	6901-140	051:49-50	C	9/05/95	800	203	6.2	7.3	46	0.24	26	50	0.31	90	0.00	0.00	0.0	0.0	0.0	0.0	0.00	221
21161	6903-226	039:51-52	C	9/06/95	300	101	4.2	6.8	38	0.27	25	47	0.40	78	0.00	0.00	0.0	0.0	0.0	0.0	0.00	314
21162	6903-263	040:51-52	C	9/06/95	1600	112	5.4	6.8	44	0.25	31	93	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	302
21163	6907-058	052:49-50	C	9/05/95	1000	184	7.2	9.0	44	0.23	29	49	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	255
21164	6907-077	055:49-50	C	9/05/95	1800	232	5.4	8.2	40	0.23	34	62	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	218
21167	Hybrid 2, India	240:01-05	C	9/08/95	1800	180	8.4	6.6	56	0.23	33	55	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	433
21167	Hybrid 2, India	014:01-04	C	9/06/95	500	153	10.2	6.0	63	0.25	32	54	0.39	79	0.00	0.00	0.0	0.0	0.0	0.0	0.00	356
21168	Prec d Bourg	023:01-04	C	8/29/95	100	187	5.3	4.7	53	0.26	22	42	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	129

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21169	Tardif d Bourg	222:16-20	C	9/08/95	1600	155	2.5	7.1	26	0.25	17	33	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	577
21169	Tardif d Bourg	024:01-04	C	8/29/95	800	128	4.7	5.1	48	0.25	16	34	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	130
21170	Elsasser	025:01-04	C	8/29/95	800	127	2.8	6.8	29	0.28	18	34	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	126
21172	Landhopfen	027:01-04	C	8/29/95	100	133	4.7	5.0	49	0.25	24	44	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	118
21173	Strisselspalter	031:01-04	C	8/29/95	200	153	7.0	3.9	64	0.28	28	77	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	117
21179	Hersbrucker Eng	006:01-04	C	9/06/95	800	136	3.6	6.5	36	0.26	21	38	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	337
21180	7003-143	034:51-52	C	9/06/95	2000	140	8.4	7.0	55	0.25	27	54	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	310
21181	7003-243	035:51-52	C	9/06/95	400	130	6.9	8.0	46	0.24	40	61	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	300
21182	Galena (43-16)	008:05-08	B	8/29/95	1621	16.30	10.0	6.3	62	0.22	43	68	0.00	0	1.52	0.00	52.2	3.1	0.2	6.6	2.11	519
21182	Galena (43-16)	227:16-20	B	9/11/95	1604	12.90	14.4	9.0	62	0.23	41	64	0.47	69	2.51	0.95	57.9	3.2	0.2	7.2	2.25	617
21183	Eroica (34-5)	013:05-08	C	9/06/95	1900	190	12.1	4.6	72	0.24	39	67	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	344
21185	Hersbrucker Ger	004:01-04	C	9/06/95	600	157	3.6	6.5	36	0.26	20	39	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	346
21186	Spalter	022:01-04	B	8/21/95	213	7.95	4.0	2.3	63	0.25	22	45	0.54	65	0.65	0.15	38.7	6.5	11.1	21.6	3.33	9
21187	Southern Brewer	233:06-10	C	9/08/95	1900	228	6.9	3.8	65	0.24	45	70	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	438
21187	Southern Brewer	028:01-04	C	9/06/95	1600	238	9.0	3.9	70	0.25	41	69	0.67	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	353
21188	S.Af. NP2/55	017:47-48	C	9/01/95	1200	117	6.1	4.8	56	0.27	30	55	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	214
21188	S.Af. NP2/55	018:49-50	C	9/05/95	100	124	3.5	2.7	56	0.34	29	55	0.61	57	0.00	0.00	0.0	0.0	0.0	0.0	0.00	261
21193	Nugget	228:16-20	B	9/11/95	2252	15.80	13.1	5.3	71	0.24	32	58	0.52	62	2.44	1.14	51.9	7.1	0.1	16.8	2.38	636
21193	Nugget	036:01-04	B	8/29/95	3039	17.95	12.5	4.7	73	0.24	29	54	0.00	0	0.90	0.00	53.7	7.1	0.1	16.2	2.30	529
21194	7006-311	032:51-52	C	9/06/95	700	272	12.1	6.9	64	0.24	26	52	0.48	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	297
21195	7006-408	036:51-52	C	9/06/95	600	125	14.7	4.7	76	0.28	26	52	0.35	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	312
21196	Bullion 6A	007:05-08	B	8/29/95	1173	13.15	8.1	4.1	67	0.24	39	66	0.57	56	1.51	0.42	62.9	5.2	0.1	7.4	1.45	459
21197	Tettnang? VF	032:05-08	B	8/21/95	569	8.45	4.4	2.3	66	0.32	28	53	0.41	83	1.28	0.38	44.6	8.6	4.4	23.8	2.75	10
21198	7003-038	010:47-48	C	9/01/95	1400	170	7.5	7.4	50	0.25	31	58	0.31	89	0.00	0.00	0.0	0.0	0.0	0.0	0.00	200
21199	7004-003	004:47-48	C	9/01/95	800	168	9.1	5.3	63	0.25	39	61	0.49	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	212
21201	7005-070	046:47-48	C	9/01/95	2000	258	11.8	6.2	66	0.25	35	61	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	170
21202	6903-107	014:47-48	C	9/01/95	2010	163	6.0	6.2	49	0.26	22	42	0.33	87	0.00	0.00	0.0	0.0	0.0	0.0	0.00	198
21209	Yugo 33P13	105:01-02	B	8/23/95	981	9.40	5.0	2.3	68	0.27	28	51	0.42	75	0.97	0.62	43.1	9.0	4.1	24.9	2.75	73
21213	Aromat, Yugo	025:05-08	C	8/29/95	50	151	2.6	2.5	51	0.33	22	42	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	116
21214	Sirem, Yugo	026:05-08	C	8/29/95	100	189	4.0	3.7	52	0.27	22	43	0.82	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	128
21215	Norgard 1478, Y	027:05-08	C	8/29/95	100	238	8.4	4.3	66	0.29	31	59	0.48	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	123
21216	Groene Bel	028:05-08	C	8/29/95	400	174	5.4	4.0	57	0.27	28	53	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	131
21217	Star, Belg	029:05-08	B	8/21/95	192	10.25	2.7	1.5	64	0.27	23	43	0.39	82	0.53	0.21	31.2	12.1	4.7	34.0	2.80	11
21218	7005-149	045:47-48	C	9/01/95	400	126	11.8	4.2	74	0.26	38	63	0.37	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	179
21219	65009 VF	008:49-50	C	9/05/95	2000	212	10.6	8.7	55	0.25	33	59	0.82	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	238
21220	Eroica VF	031:05-08	C	9/06/95	1600	197	9.7	3.8	72	0.24	42	68	1.12	28	0.00	0.00	0.0	0.0	0.0	0.0	0.00	325
21220	Eroica VF	241:01-05	C	9/08/95	2000	160	8.9	3.6	71	0.25	42	68	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	451
21222	Aquila, Id 33-6	039:05-08	B	8/29/95	1152	14.55	7.7	3.0	72	0.26	32	54	0.71	47	1.89	0.41	50.7	4.5	12.3	9.8	2.21	456
21222	Aquila, Id 33-6	229:16-20	B	9/11/95	2517	13.50	7.3	5.0	60	0.23	53	75	0.79	40	1.91	0.86	65.5	3.0	0.2	1.1	0.35	663
21225	Olympic	037:01-04	C	9/06/95	1600	157	5.1	2.6	66	0.28	36	64	1.06	31	0.00	0.00	0.0	0.0	0.0	0.0	0.00	335
21225	Olympic	242:01-05	B	8/29/95	1638	10.75	13.1	6.3	68	0.24	34	60	0.66	49	1.29	0.58	63.4	5.4	0.0	7.0	1.29	472
21226	Chinook	038:01-04	C	9/06/95	1700	199	11.5	3.6	76	0.26	35	61	0.36	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	349
21226	Chinook	230:16-20	C	9/08/95	1900	278	11.0	4.0	73	0.27	39	62	0.71	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	565
21227	Perle	032:01-04	B	8/29/95	626	15.45	11.1	4.7	70	0.22	26	54	0.41	68	0.98	0.42	37.2	9.7	0.1	31.3	3.25	520
21227	Perle	231:16-20	B	9/11/95	768	10.30	8.3	4.3	66	0.28	34	59	0.42	77	2.35	1.45	46.0	8.4	0.2	24.4	2.89	637
21232	Jap 69K-BH66	034:47-48	C	9/01/95	1800	248	10.6	4.6	70	0.28	38	68	0.54	63	0.00	0.00	0.0	0.0	0.0	0.0	0.00	199
21233	Jap 70K-SH6	035:47-48	C	9/01/95	800	199	9.1	5.8	61	0.25	44	71	0.67	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	211
21238	Blisk, Yugo	022:05-08	B	8/29/95	2048	12.00	9.8	3.7	72	0.25	37	62	0.84	36	2.31	0.41	54.6	3.7	16.4	9.6	2.59	526

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21238	Blisk, Yugo	232:16-20	B	9/11/95	1333	15.20	9.1	3.8	70	0.25	39	63	1.07	27	2.76	0.56	69.4	2.2	9.7	5.5	2.47	619
21239	Bobek, Yugo	221:06-10	B	8/29/95	683	10.35	7.9	6.8	54	0.22	25	48	0.46	64	1.33	0.61	66.6	3.1	3.9	10.0	3.25	523
21239	Bobek, Yugo	017:09-12	B	8/31/95	779	9.50	8.5	6.1	58	0.24	24	48	0.40	74	1.31	0.89	59.2	3.8	2.7	11.3	2.98	492
21240	Buket, Yugo	222:06-10	B	8/29/95	1160	13.35	11.0	5.4	67	0.24	25	57	0.85	31	2.60	0.86	58.3	4.5	4.6	14.1	3.11	521
21240	Buket, Yugo	022:09-12	B	8/31/95	853	9.85	10.6	5.3	67	0.25	23	54	0.55	55	1.32	0.95	47.3	6.4	16.4	17.6	2.77	485
21243	Pol Klon 30	038:47-48	C	9/01/95	1000	236	7.9	2.5	76	0.31	29	50	0.62	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	183
21246	7311-032	023:47-48	C	9/01/95	2200	246	9.9	3.8	72	0.30	66	78	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	188
21247	7311-068	024:47-48	C	9/01/95	1600	184	11.7	5.1	70	0.30	40	95	0.31	89	0.00	0.00	0.0	0.0	0.0	0.0	0.00	192
21248	7311-095	027:47-48	C	9/01/95	1800	187	13.1	4.3	75	0.29	44	64	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	185
21250	7311-152	029:47-48	C	9/01/95	1700	234	11.1	2.7	81	0.29	28	56	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	210
21251	7312-009	028:49-50	C	9/05/95	1000	244	14.3	4.8	75	0.32	38	62	0.39	79	0.00	0.00	0.0	0.0	0.0	0.0	0.00	242
21252	7312-036	040:47-48	C	9/01/95	1800	280	12.0	3.3	78	0.31	36	60	0.33	86	0.00	0.00	0.0	0.0	0.0	0.0	0.00	186
21253	7312-041	041:47-48	C	9/01/95	1400	262	15.7	5.4	74	0.27	35	62	0.32	88	0.00	0.00	0.0	0.0	0.0	0.0	0.00	181
21255	7312-134	042:47-48	C	9/01/95	1400	312	13.9	2.9	83	0.27	38	63	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	184
21256	7312-032	054:51-52	C	9/05/95	1500	163	12.6	4.7	73	0.29	43	70	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	222
21256	7312-032	009:47-48	C	9/01/95	600	144	10.4	5.1	67	0.30	40	65	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	202
21257	7313-083	021:47-48	C	9/01/95	800	362	15.8	5.5	74	0.32	34	60	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	194
21257	7313-083	053:51-52	C	9/05/95	600	223	12.3	4.3	74	0.31	42	68	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	219
21261	7003-075	055:51-52	C	9/05/95	1400	191	8.6	6.4	57	0.25	19	44	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	220
21276	Early Prolific	023:09-12	B	8/21/95	341	7.45	4.9	2.4	67	0.26	28	53	0.42	62	0.60	0.41	45.2	6.2	3.4	17.3	2.77	12
21276	Early Prolific	223:06-10	B	8/22/95	555	11.75	3.9	2.3	63	0.29	24	44	0.47	64	0.93	0.47	50.2	5.2	4.8	14.8	2.83	37
21277	Early Promise	024:09-12	C	8/29/95	100	200	7.0	2.3	75	0.28	28	53	0.36	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	112
21277	Early Promise	224:06-10	C	9/08/95	100	155	5.8	2.0	74	0.27	32	55	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	443
21278	Keyworths Early	225:06-10	B	8/29/95	922	12.20	8.2	3.4	71	0.27	34	56	0.43	72	1.64	0.93	44.9	7.2	0.3	22.0	3.05	464
21278	Keyworths Early	025:09-12	C	9/06/95	400	214	8.8	3.6	71	0.29	31	53	0.42	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	345
21279	Keyworths Mids	226:06-10	C	9/08/95	1600	153	7.4	3.1	71	0.26	47	69	0.56	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	447
21279	Keyworths Mids	026:09-12	B	8/31/95	910	9.55	7.7	3.7	68	0.24	44	69	0.50	61	0.63	0.37	45.8	12.9	0.7	23.4	1.82	487
21280	Pride of Kent	227:06-10	C	9/08/95	600	184	9.2	6.9	57	0.24	36	61	0.66	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	440
21280	Pride of Kent	027:09-12	B	8/21/95	1045	10.50	9.5	6.5	59	0.23	39	62	0.91	34	2.04	1.01	83.6	1.8	0.0	4.2	2.30	13
21281	Sunshine	220:16-20	C	9/08/95	100	171	6.6	2.5	73	0.30	29	53	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	582
21281	Sunshine	028:09-12	C	8/29/95	200	138	7.4	2.8	73	0.30	31	56	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	110
21282	Wye Saxon	029:09-12	C	8/29/95	150	192	8.0	4.1	66	0.26	19	42	0.44	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	120
21282	Wye Saxon	228:06-10	B	8/29/95	704	10.30	7.5	4.8	61	0.23	21	46	0.48	81	1.31	0.61	65.0	2.8	5.7	6.3	2.26	514
21283	Wye Viking	229:06-10	B	8/29/95	444	11.50	10.5	5.5	66	0.25	24	45	0.50	67	2.59	0.95	55.5	2.2	8.9	5.9	2.67	463
21283	Wye Viking	030:09-12	B	8/21/95	284	8.40	7.4	4.0	65	0.22	21	43	0.40	79	1.02	0.73	39.8	5.1	10.5	13.7	2.70	14
21284	Bramling	030:01-04	C	8/29/95	100	152	4.7	2.4	66	0.31	27	51	0.39	79	0.00	0.00	0.0	0.0	0.0	0.0	0.00	125
21285	Id sel BOR 704	002:51-52	C	9/06/95	800	133	1.6	2.9	36	0.30	12	27	0.63	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	271
21286	Kirin II	230:06-10	C	9/08/95	2200	142	4.5	4.7	49	0.26	50	73	0.62	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	449
21286	Kirin II	039:01-04	C	9/06/95	2200	172	6.5	5.9	52	0.23	50	72	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	331
21287	Banner	016:13-16	B	9/08/95	2314	9.00	9.4	5.2	65	0.25	37	63	0.63	56	2.32	0.93	61.6	4.4	0.1	11.1	2.52	620
21287	Banner	233:16-20	B	9/11/95	1941	15.35	10.7	6.8	61	0.23	36	60	0.81	39	3.01	0.68	65.7	4.3	0.0	11.9	2.78	641
21289	7312-053	012:49-50	C	9/05/95	1200	145	9.3	2.9	76	0.34	25	58	0.49	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	245
21290	7312-057	015:49-50	C	9/05/95	2000	196	10.7	2.7	80	0.30	36	61	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	256
21292	7312-081	020:49-50	C	9/05/95	800	150	8.4	2.4	78	0.36	31	61	0.46	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	252
21293	7312-084	021:49-50	C	9/05/95	800	194	13.2	3.7	78	0.30	24	53	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	246
21294	7312-106	022:49-50	C	9/05/95	1600	193	14.6	5.4	73	0.26	41	64	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	262
21295	7312-115	023:49-50	C	9/05/95	1000	280	12.0	3.0	80	0.31	29	56	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	237
21296	7312-128	032:49-50	C	9/05/95	1000	279	13.1	4.8	73	0.29	35	57	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	259

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21298	7315-035	038:49-50	C	9/05/95	400	199	12.6	3.7	77	0.26	26	52	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	226
21368	Yugo 88/150	031:47-48	C	9/01/95	1800	196	11.0	4.6	70	0.24	34	60	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	182
21368	Yugo 88/150	106:07-08	C	9/07/95	600	218	7.5	3.8	66	0.26	34	64	0.75	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	425
21369	Yugo 88/187	107:07-08	C	9/07/95	600	189	7.3	4.5	62	0.27	32	61	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	414
21369	Yugo 88/187	032:47-48	C	9/01/95	1700	148	8.1	4.7	63	0.28	32	61	0.57	61	0.00	0.00	0.0	0.0	0.0	0.0	0.00	187
21370	Yugo 88/201	108:07-08	B	8/23/95	960	11.20	8.5	3.6	70	0.23	33	59	0.46	57	1.01	0.50	60.5	3.5	11.7	10.1	2.86	66
21370	Yugo 88/201	033:47-48	C	9/01/95	1800	209	11.0	4.1	73	0.26	33	62	0.72	49	0.00	0.00	0.0	0.0	0.0	0.0	0.00	175
21371	7003-066	011:47-48	C	9/01/95	1800	121	6.0	6.4	49	0.26	35	54	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	195
21372	7006-061	020:47-48	C	9/01/95	1400	183	8.9	2.9	76	0.31	28	54	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	209
21373	7006-398	026:47-48	C	9/01/95	50	237	13.1	6.6	67	0.28	18	42	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	174
21373	7006-398	112:15-16	B	8/31/95	875	9.20	12.1	6.7	64	0.24	18	43	0.38	79	1.49	1.03	75.1	3.4	1.2	5.1	1.51	493
21373	7006-398	242:21-25	B	9/13/95	1169	10.65	13.1	7.9	63	0.24	22	47	0.57	58	3.33	0.93	72.8	3.8	2.0	6.2	1.63	668
21386	6929-042	102:03-04	B	8/23/95	704	9.20	4.9	4.0	55	0.23	34	55	0.64	54	1.22	0.38	66.1	2.8	1.6	3.8	1.35	67
21387	7013-003	104:03-04	B	8/23/95	1173	10.45	2.4	6.3	28	0.24	30	53	0.90	36	1.70	0.43	68.4	2.7	0.2	3.6	1.31	74
21389	56008x19058M	106:05-06	B	8/25/95	811	10.65	5.9	4.5	57	0.23	42	62	0.53	59	0.36	0.45	79.6	1.7	0.0	3.9	2.33	132
21394	6751-136	112:05-06	B	8/23/95	1152	11.55	4.7	4.2	53	0.25	42	64	0.94	32	1.76	0.45	76.6	1.5	0.1	3.8	2.47	75
21395	6750-210	111:05-06	B	8/23/95	1536	11.70	7.5	4.6	62	0.23	41	65	0.55	56	1.33	0.42	70.2	3.0	0.1	7.5	2.50	68
21396	Tolhurst	231:06-10	B	8/22/95	725	13.45	1.6	3.3	33	0.26	29	47	0.70	46	0.96	0.49	48.1	6.9	7.1	16.7	2.43	38
21397	Hallertau MF T4	110:01-02	C	9/07/95	200	146	6.3	5.1	55	0.25	42	65	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	419
21403	Sticklebract	234:16-20	C	9/08/95	1900	217	12.5	5.1	71	0.25	47	71	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	566
21403	Sticklebract	002:01-04	C	9/06/95	2000	159	10.2	5.4	65	0.25	43	69	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	330
21404	Green Bullet	003:01-04	C	9/06/95	1800	133	7.2	3.7	66	0.27	41	68	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	333
21405	Superalpha	033:01-04	C	9/06/95	1800	184	10.0	5.4	65	0.23	34	61	0.34	86	0.00	0.00	0.0	0.0	0.0	0.0	0.00	328
21405	Superalpha	236:16-20	C	9/08/95	2000	181	7.8	4.9	61	0.26	39	64	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	575
21405	Superalpha	235:16-20	C	9/08/95	1800	172	8.8	4.1	68	0.24	42	71	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	589
21406	AlphaAroma	026:01-04	C	9/06/95	2000	138	6.8	2.7	71	0.28	25	52	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	332
21406	AlphaAroma	237:16-20	C	9/08/95	2000	183	10.5	4.0	72	0.24	27	53	0.43	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	583
21407	Id 51-8A	022:47-48	C	9/01/95	600	149	12.9	5.7	69	0.25	43	67	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	205
21408	W402-49	028:47-48	C	9/01/95	200	230	10.3	7.0	60	0.25	49	73	0.82	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	191
21412	7013-051	106:03-04	B	8/25/95	832	11.55	3.1	4.1	43	0.25	27	43	0.61	51	1.44	0.44	49.7	4.8	2.9	8.6	1.82	164
21441	7710-034	048:49-50	C	9/05/95	800	270	4.8	5.6	46	0.26	35	55	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	224
21443	7727-044	017:51-52	C	9/06/95	1000	161	6.4	3.4	65	0.28	21	46	0.40	78	0.00	0.00	0.0	0.0	0.0	0.0	0.00	284
21450	7304-107	023:51-52	C	9/06/95	1800	207	8.0	2.9	73	0.27	30	55	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	307
21451	7306-193	025:51-52	C	9/06/95	1400	173	5.1	2.1	71	0.30	29	57	0.34	85	0.00	0.00	0.0	0.0	0.0	0.0	0.00	285
21452	7311-028	026:51-52	C	9/06/95	1600	268	14.8	4.0	79	0.29	38	61	0.37	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	303
21453	7314-033	027:51-52	C	9/06/95	800	171	10.0	5.1	66	0.29	32	60	0.54	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	291
21454	7007-339	033:51-52	C	9/06/95	1200	168	9.3	5.8	62	0.28	42	70	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	292
21455	Mt Hood	238:16-20	B	9/11/95	1587	12.20	4.6	6.8	40	0.22	27	49	1.29	18	2.65	0.90	58.5	7.2	0.1	18.4	2.54	652
21455	Mt Hood	010:09-12	C	9/06/95	700	238	6.6	7.7	46	0.22	23	46	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	320
21456	8303-046	111:03-04	C	9/07/95	400	163	3.7	5.0	43	0.26	24	43	0.67	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	418
21457	Liberty	239:16-20	B	9/11/95	825	12.20	4.3	4.0	52	0.24	28	48	0.85	40	2.08	0.73	50.0	7.0	0.4	24.5	3.47	665
21457	Liberty	011:05-08	C	8/29/95	900	146	3.6	3.4	52	0.28	21	41	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	115
21459	8308-066	110:07-08	C	9/07/95	800	214	4.0	3.0	57	0.27	21	41	0.47	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	423
21460	HP1/86 S. Afr.	041:51-52	C	9/06/95	1800	109	5.9	6.0	49	0.26	31	51	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	316
21469	8301-011	240:36-40	C	9/11/95	1200	129	1.7	4.2	29	0.31	22	45	0.94	37	0.00	0.00	0.0	0.0	0.0	0.0	0.00	606
21484	8305-017	238:21-25	B	9/13/95	862	8.70	4.1	4.6	47	0.23	27	45	0.46	73	1.63	0.76	33.3	10.6	0.6	37.1	3.51	649
21485	S Afr Rf5/54	007:49-50	C	9/05/95	100	118	10.6	5.5	66	0.25	18	39	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	260
21485	S Afr Rf5/54	019:47-48	C	9/01/95	1200	171	9.3	5.2	64	0.24	15	36	0.30	92	0.00	0.00	0.0	0.0	0.0	0.0	0.00	208

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21486	7507-109	012:47-48	C	9/01/95	2000	154	8.1	5.4	60	0.25	28	50	0.36	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	204
21486	7507-109	030:47-48	C	9/01/95	200	174	9.0	5.6	61	0.27	27	46	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	189
21490	Crystal	240:16-20	B	9/13/95	2082	9.15	3.5	6.7	34	0.22	22	37	0.89	34	1.97	0.63	59.7	5.0	0.2	17.3	3.46	648
21491	8405-026	111:07-08	B	8/23/95	811	11.50	4.7	3.5	58	0.24	22	41	0.66	48	0.93	0.37	48.9	10.0	0.6	26.8	2.67	76
21493	8408-096	113:01-02	B	8/28/95	704	13.85	6.2	5.0	55	0.23	22	43	0.67	50	1.48	0.57	63.6	4.3	1.1	15.2	3.54	358
21496	Tettnanger A	040:01-04	B	8/21/95	203	7.85	4.4	4.9	47	0.22	24	43	0.00	0	0.60	0.00	50.8	4.4	12.3	15.1	3.47	16
21497	Tettnanger B	041:01-04	B	8/21/95	501	7.50	4.2	4.9	46	0.23	22	42	0.62	51	0.89	0.31	49.2	4.6	14.1	15.6	3.39	15
21498	Yeoman	241:16-20	B	8/22/95	1525	11.15	14.8	4.7	76	0.27	27	50	0.35	81	1.63	1.47	60.2	4.0	0.1	12.3	3.03	39
21498	Yeoman	034:01-04	B	8/21/95	1195	11.25	12.9	4.3	75	0.27	25	50	0.34	82	2.09	0.92	49.2	5.8	0.2	16.1	2.77	17
21499	Zenith	035:01-04	B	8/29/95	640	10.45	10.8	3.6	75	0.25	24	50	0.40	74	1.89	0.95	46.5	5.5	0.1	19.0	3.43	517
21499	Zenith	242:16-20	B	9/06/95	981	10.20	11.1	3.5	76	0.27	28	53	0.53	65	3.24	1.30	52.7	4.1	0.1	14.5	3.54	625
21500	7504-026	036:47-48	C	9/01/95	700	147	11.9	4.6	72	0.24	21	45	0.37	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	172
21503	7504-137	037:47-48	C	9/01/95	400	178	5.9	6.9	46	0.26	32	54	0.49	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	190
21505	8036-099	039:47-48	C	9/01/95	200	170	5.9	2.5	70	0.29	31	55	0.63	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	201
21507	Centennial	221:21-25	C	9/08/95	800	188	11.3	4.2	73	0.27	31	55	0.88	40	0.00	0.00	0.0	0.0	0.0	0.0	0.00	571
21507	Centennial	031:09-12	B	8/31/95	1269	11.25	9.9	3.6	73	0.27	30	55	1.03	29	3.09	0.73	66.8	3.4	0.2	7.2	2.15	501
21511	7610-104	015:47-48	C	9/01/95	1800	211	12.6	3.6	78	0.28	30	54	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	207
21512	7611-025	018:47-48	C	9/01/95	1800	179	5.5	1.2	82	0.35	29	49	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	203
21513	7504-004	043:47-48	C	9/01/95	400	139	9.9	5.5	64	0.25	27	47	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	176
21514	Hersbrucker-6	222:21-25	C	9/08/95	1600	102	3.4	5.6	37	0.27	17	37	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	588
21515	Hersbrucker-8	035:05-08	C	9/06/95	2000	140	4.4	6.0	42	0.26	19	38	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	334
21515	Hersbrucker-8	223:21-25	C	9/08/95	1700	130	3.0	5.3	36	0.30	19	37	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	579
21516	Hersbrucker-9	036:05-08	C	9/06/95	1800	145	4.1	6.8	38	0.23	17	36	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	350
21516	Hersbrucker-9	224:21-25	C	9/08/95	1600	152	3.5	5.2	40	0.27	18	38	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	567
21517	Hersb red stem	037:05-08	C	9/06/95	1900	120	4.2	6.0	41	0.25	17	37	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	338
21517	Hersb red stem	225:21-25	C	9/08/95	1000	114	4.5	4.0	53	0.27	21	40	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	568
21518	Hersb alpha	226:21-25	C	9/08/95	800	145	3.2	5.0	39	0.25	19	37	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	570
21518	Hersb alpha	038:05-08	C	9/06/95	1900	154	4.8	4.9	50	0.23	19	39	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	347
21519	Ap71/74-2a Yugo	013:47-48	C	9/01/95	1600	102	6.9	3.2	68	0.30	27	49	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	213
21520	Ba 11/72/19a Yu	039:09-12	B	9/01/95	114	9.10	7.8	4.2	65	0.25	31	57	0.40	74	0.43	0.25	26.6	9.9	0.1	31.5	3.18	508
21520	Ba 11/72/19a Yu	016:47-48	C	9/01/95	1400	146	7.3	3.9	65	0.29	31	57	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	197
21521	Saazer-36	001:13-16	B	8/21/95	341	6.65	3.5	3.1	53	0.27	23	43	0.59	54	0.62	0.18	54.3	3.6	12.7	12.8	3.59	18
21521	Saazer-36	227:21-25	B	8/22/95	224	10.90	5.2	5.3	49	0.22	24	42	0.62	52	1.13	0.34	63.3	2.7	10.5	9.6	3.52	40
21523	21113 vf	229:21-25	B	8/22/95	299	9.50	5.6	5.3	52	0.24	25	42	0.54	60	0.96	0.44	65.4	2.5	9.1	8.3	3.33	41
21523	21113 vf	003:13-16	B	8/21/95	427	7.25	3.7	3.8	50	0.25	22	42	0.58	54	0.52	0.46	46.8	4.4	15.2	15.3	3.45	19
21524	21114 vf	004:13-16	B	8/21/95	235	6.35	2.7	2.7	51	0.23	22	41	0.57	59	0.29	0.16	35.6	5.4	14.4	19.1	3.54	20
21524	21114 vf	230:21-25	B	8/22/95	181	11.15	4.7	4.6	51	0.24	25	42	0.52	62	0.93	0.42	58.8	3.3	11.6	11.3	3.45	42
21526	Osvald #126	005:13-16	B	8/22/95	1166	11.70	5.1	2.2	69	0.26	28	52	0.45	71	1.11	0.62	47.3	8.5	4.1	23.9	2.80	43
21527	Blato (CSR)	006:13-16	B	8/22/95	192	9.90	3.6	3.1	54	0.23	24	43	0.56	65	0.74	0.23	49.6	4.8	11.2	16.1	3.33	44
21529	Osvald #31	008:13-16	B	8/22/95	203	9.40	3.8	3.1	55	0.22	22	43	0.57	47	0.41	0.27	33.6	5.7	12.7	20.9	3.63	45
21532	Osvald #72 (CSR	011:13-16	B	8/22/95	149	8.90	3.5	3.0	54	0.22	23	42	0.00	0	0.31	0.00	45.3	4.6	10.4	16.3	3.53	46
21535	21525 vf	231:21-25	B	8/22/95	213	10.00	5.0	4.1	55	0.22	24	42	0.00	0	0.76	0.00	50.4	4.4	13.1	15.4	3.48	47
21535	21525 vf	013:13-16	B	8/22/95	299	11.05	3.2	3.0	52	0.23	23	44	0.59	53	0.46	0.25	57.9	3.3	10.6	11.3	3.46	452
21536	7003-154	050:47-48	C	9/01/95	600	115	6.4	6.0	52	0.27	37	64	0.38	81	0.00	0.00	0.0	0.0	0.0	0.0	0.00	168
21537	7006-370	025:47-48	C	9/01/95	800	157	7.9	9.5	45	0.25	17	38	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	193
21563	Iowa 3	027:41-44	C	9/06/95	600	105	0.7	2.4	23	0.42	65	82	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	272
21566	Iowa 6	028:41-44	C	9/06/95	700	137	3.9	4.2	48	0.31	64	80	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	313
21567	Iowa 7	029:41-44	C	9/06/95	1700	103	1.4	3.1	31	0.44	77	88	0.66	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	283

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21576	Montana 4	033:41-44	C	8/25/95	100	310	5.9	5.0	54	0.26	62	82	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	96
21578	Montana 6	021:39-40	C	9/06/95	300	321	5.8	3.6	61	0.27	68	83	0.77	46	0.00	0.00	0.0	0.0	0.0	0.0	0.00	270
21579	Montana 7	034:41-44	C	9/06/95	300	285	3.4	3.1	53	0.34	63	83	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	268
21580	Montana 8	022:39-40	B	8/28/95	811	8.35	6.3	3.2	66	0.25	61	80	0.66	53	0.54	0.45	90.3	0.6	0.1	0.2	0.37	379
21581	Montana 9	035:41-44	C	9/06/95	300	231	3.3	3.4	49	0.28	81	92	0.83	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	311
21583	Montana 10	024:39-40	B	8/28/95	363	7.30	5.9	2.6	69	0.28	70	83	0.77	46	1.69	0.58	76.1	3.0	0.1	0.5	0.18	389
21584	Iowa 8	036:41-44	C	8/25/95	200	383	4.3	3.9	52	0.31	60	82	0.73	49	0.00	0.00	0.0	0.0	0.0	0.0	0.00	95
21585	Montana 11	037:41-44	C	9/06/95	600	252	5.5	2.2	72	0.29	71	86	0.54	63	0.00	0.00	0.0	0.0	0.0	0.0	0.00	264
21586	Montana 12	025:39-40	B	8/28/95	469	9.75	5.5	6.0	48	0.23	63	80	0.70	45	1.81	0.65	69.7	1.7	1.5	0.4	0.21	390
21590	Montana 16	041:41-44	C	9/06/95	500	332	4.7	2.2	68	0.28	70	85	0.63	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	308
21591	Montana 17	042:41-44	C	9/06/95	400	194	1.9	5.0	28	0.30	57	83	1.08	30	0.00	0.00	0.0	0.0	0.0	0.0	0.00	267
21592	Montana 18	043:41-44	C	9/06/95	600	204	3.9	3.6	52	0.31	62	80	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	281
21593	Montana 19	026:39-40	B	8/28/95	427	10.90	5.4	4.2	56	0.25	67	81	0.63	57	0.63	0.53	84.9	1.3	0.1	1.0	0.75	364
21594	Montana 20	027:39-40	B	8/28/95	896	9.30	4.9	3.7	57	0.25	65	82	0.59	53	1.00	0.44	78.0	3.5	0.1	0.6	0.18	380
21599	Utah 12	003:39-40	C	9/06/95	600	227	3.3	3.4	50	0.27	81	91	0.44	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	296
21600	Utah 13	004:39-40	C	9/06/95	600	207	1.9	1.6	54	0.33	83	92	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	276
21602	Montana 24	030:39-40	B	8/28/95	512	14.25	5.3	6.0	47	0.23	62	78	1.11	26	1.48	0.63	76.6	1.6	0.1	0.4	0.25	369
21605	W Am Minn	031:39-40	B	8/28/95	427	16.10	2.1	4.6	31	0.23	52	76	0.84	40	0.61	0.27	74.0	3.9	0.2	1.1	0.28	388
21606	Eng 27/57/264	005:47-48	C	9/01/95	800	145	6.6	6.5	50	0.25	50	67	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	206
21607	Wye Dwarf gene	007:47-48	C	9/01/95	200	124	6.0	3.7	62	0.30	66	78	0.39	79	0.00	0.00	0.0	0.0	0.0	0.0	0.00	196
21607	English Int 30	220:21-25	C	9/08/95	50	112	5.8	3.5	62	0.30	66	78	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	569
21608	N Dakota 9	032:39-40	B	8/28/95	427	10.45	3.8	3.7	51	0.24	70	85	0.00	0	1.13	0.00	70.0	1.8	0.4	2.8	1.51	387
21609	Pacific Gem	017:13-16	B	9/08/95	739	8.10	13.7	7.2	65	0.23	39	66	0.35	83	1.78	0.88	61.1	4.1	0.1	12.4	3.07	615
21609	Pacific Gem	232:21-25	B	9/13/95	3029	7.85	10.0	5.2	66	0.24	46	69	0.37	76	1.80	0.99	54.6	6.4	0.1	20.0	3.10	669
21610	NZ Hallertauer	018:13-16	B	9/08/95	2218	9.35	7.0	6.3	53	0.22	36	62	0.39	72	1.53	0.81	56.6	5.0	3.8	9.3	1.87	628
21610	NZ Hallertauer	233:21-26	B	9/13/95	887	8.10	4.5	5.0	48	0.25	41	64	0.47	64	1.54	0.00	57.4	5.0	4.2	10.2	2.03	667
21611	Celeia	234:21-25	B	9/06/95	1322	10.50	4.5	3.4	57	0.28	30	61	0.73	51	2.36	0.00	58.4	5.8	3.6	13.1	2.27	643
21611	Celeia	020:13-16	B	8/22/95	1824	13.65	5.5	4.0	58	0.24	24	54	0.38	78	0.52	0.36	44.9	7.5	4.2	19.9	2.66	49
21612	Cerera	235:21-25	B	9/06/95	1271	10.45	4.9	3.4	59	0.24	29	60	0.70	47	1.77	0.75	59.8	5.1	2.7	12.1	2.37	629
21612	Cerera	021:13-16	C	9/01/95	1800	181	6.8	3.6	65	0.27	25	56	0.64	55	0.00	0.00	0.0	0.0	0.0	0.0	0.00	171
21613	Cekin	019:13-16	B	9/08/95	1024	9.50	7.6	2.8	73	0.26	25	50	0.36	82	1.19	0.82	43.2	6.3	7.4	20.2	3.19	616
21613	Cekin	236:21-25	B	9/06/95	794	10.20	6.9	2.6	73	0.27	27	52	0.39	74	1.55	0.94	47.2	5.8	1.1	7.1	1.22	626
21614	Cicero	022:13-16	C	9/01/95	1600	185	7.1	2.8	72	0.30	26	48	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	180
21614	Cicero	235:06-10	B	8/31/95	1351	9.85	7.6	2.8	73	0.29	30	51	0.37	82	1.58	1.07	55.6	5.5	3.1	15.8	2.89	631
21614	Cicero	237:21-25	B	8/22/95	1152	12.55	6.1	2.2	74	0.28	29	50	0.35	83	0.69	0.43	38.2	8.8	4.1	27.6	3.13	50
21650	Fuggle vf (4820	021:01-04	B	8/21/95	757	7.90	4.7	2.1	69	0.29	26	53	0.42	77	0.88	0.37	51.0	7.3	3.5	19.1	2.61	21
21650	Fuggle vf (4820	236:06-10	B	8/22/95	1399	12.70	5.2	3.1	63	0.27	30	51	0.48	69	1.27	0.73	58.6	5.4	4.5	17.1	3.14	52
21660	8802-019	217:36-40	C	9/11/95	100	227	3.9	5.3	43	0.24	23	44	0.62	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	598
21660	8802-019	114:01-02	B	8/28/95	811	12.90	4.7	6.3	43	0.21	23	45	0.91	32	1.41	0.45	58.1	4.5	8.7	15.9	3.50	370
21661	8802-024	115:01-02	B	8/28/95	981	10.90	7.9	6.5	55	0.22	19	36	0.77	42	2.20	0.77	46.7	5.3	10.5	18.9	3.58	365
21662	8802-045	116:01-02	B	8/28/95	469	10.80	5.9	6.7	47	0.21	23	40	0.00	0	0.90	0.00	39.8	4.8	10.4	17.9	3.70	384
21662	8802-045	218:36-40	C	9/11/95	50	173	4.5	5.6	44	0.26	24	37	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	608
21663	8802-048	219:36-40	C	9/11/95	100	252	7.8	7.3	52	0.23	23	37	0.62	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	602
21663	8802-048	117:01-02	B	8/28/95	1066	12.00	5.7	6.5	47	0.22	26	41	0.83	36	1.96	0.63	57.4	3.2	7.2	11.3	3.57	391
21664	8802-068	Coleman	B	8/25/95	0	14.25	4.8	6.7	42	0.28	0	0	0.00	0	1.28	0.00	17.9	8.5	13.6	30.4	3.58	683
21664	8802-068	110:25-26	B	8/25/95	192	9.10	5.3	6.8	44	0.21	22	39	0.00	0	1.21	0.00	45.4	5.0	10.0	17.8	3.58	162
21664	8802-068	118:01-02	B	8/28/95	1194	9.05	5.7	7.1	45	0.19	23	40	0.67	49	0.99	0.47	34.4	6.6	12.7	23.3	3.54	359
21664	8802-068	Coleman	B	8/25/95	1731	6.60	5.3	6.9	44	0.24	23	42	0.89	29	1.53	0.51	21.6	8.2	16.1	28.7	3.50	107

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coβ	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21664	8802-068	237:36-40	C	9/08/95	1500	181	5.2	7.2	42	0.25	24	43	1.35	20	0.00	0.00	0.0	0.0	0.0	0.0	0.00	541
21664	8802-068	237:36-40	B	9/13/95	1425	9.30	4.8	6.8	41	0.22	26	43	1.07	25	2.39	0.89	56.7	3.9	9.3	13.2	3.36	647
21665	8805-040	Alluvial	B	8/31/95	1182	5.85	6.0	5.2	54	0.26	22	38	0.72	43	1.41	0.43	45.0	5.3	10.7	19.0	3.56	318
21665	8805-040	119:01-02	B	8/28/95	853	12.55	6.9	5.7	55	0.20	22	40	0.62	49	1.06	0.53	54.1	4.6	8.5	16.5	3.56	378
21665	8805-040	238:36-40	C	9/08/95	1674	240	5.9	3.7	62	0.21	24	41	1.17	26	0.00	0.00	0.0	0.0	0.0	0.0	0.00	540
21665	8805-040	238:36-40	B	9/13/95	1500	7.75	5.6	4.2	57	0.22	25	41	0.93	33	2.03	0.57	63.4	3.2	8.2	11.2	3.48	659
21665	8805-040	Alluvial	B	8/31/95	0	14.90	5.6	4.7	54	0.31	0	0	0.00	0	1.13	0.00	34.9	6.2	11.3	22.7	3.69	684
21665	8805-040	111:25-26	B	8/25/95	683	8.75	5.0	4.8	51	0.19	21	38	0.50	64	1.04	0.46	48.1	5.0	10.6	17.6	3.49	133
21666	8806-017	120:01-02	B	8/28/95	640	12.55	3.1	7.4	29	0.20	20	38	0.48	66	0.77	0.43	59.1	3.5	9.1	12.3	3.46	366
21666	8806-017	239:36-40	C	9/11/95	800	188	1.2	3.6	26	0.25	19	38	1.03	32	0.00	0.00	0.0	0.0	0.0	0.0	0.00	605
21667	Omega	237:06-10	B	8/31/95	1226	10.50	8.7	3.9	69	0.30	32	50	0.52	68	2.07	1.04	52.3	4.8	0.1	16.9	3.53	632
21667	Omega	011:09-12	B	8/21/95	1038	9.45	10.7	2.5	81	0.25	25	47	0.31	92	1.07	0.87	48.8	5.8	0.3	20.5	3.54	22
21668	Whitbread's Gol	042:01-04	B	8/21/95	277	8.10	7.0	2.4	75	0.27	33	55	0.41	81	0.99	0.93	42.2	9.5	1.1	29.2	3.06	23
21668	Whitbread's Gol	238:06-10	B	8/31/95	1152	10.70	6.1	3.2	66	0.29	35	57	0.54	68	1.77	1.20	65.4	6.7	0.1	9.9	1.47	635
21669	Eastwell Goldin	239:06-10	B	8/31/95	538	10.05	6.0	3.0	67	0.28	29	52	0.48	72	1.38	0.86	52.4	6.9	0.1	21.7	3.15	622
21669	Eastwell Goldin	043:01-04	C	8/29/95	50	84	3.2	1.7	65	0.41	26	49	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	114
21670	Hallertauer Mag	023:13-16	B	8/22/95	1120	9.75	14.3	5.1	74	0.24	27	47	0.31	91	1.05	0.81	61.8	4.5	0.2	16.5	3.63	48
21670	Hallertauer Mag	240:06-10	B	8/31/95	3225	10.90	17.1	7.1	71	0.26	27	48	0.45	70	3.75	0.70	62.6	3.7	0.1	14.0	3.73	634
21671	Hallertauer Gol	Coleman	B	8/24/95	0	12.60	8.3	6.5	56	0.24	0	0	0.00	0	1.23	0.00	56.2	5.2	0.1	19.1	3.66	674
21671	Hallertauer Gol	Coleman	B	8/24/95	0	10.95	8.3	6.9	55	0.24	0	0	0.00	0	1.47	0.00	58.2	5.3	0.1	19.0	3.58	691
21671	Hallertauer Gol	241:06-10	B	9/11/95	1544	10.20	9.5	6.4	60	0.25	23	46	0.67	50	2.69	0.84	64.4	2.8	0.1	9.9	3.54	670
21671	Hallertauer Gol	Coleman	B	8/24/95	990	12.10	8.7	6.3	58	0.24	19	41	0.57	53	1.26	0.48	62.6	4.7	0.0	17.5	3.77	103
21671	Hallertauer Gol	024:13-16	C	9/01/95	1400	354	7.1	3.8	65	0.27	19	46	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	169
21672	Hallertauer Tra	Coleman	B	8/24/95	0	12.95	6.3	4.8	56	0.28	0	0	0.00	0	1.10	0.00	56.0	5.4	0.1	19.3	3.59	693
21672	Hallertauer Tra	242:06-10	B	9/11/95	1647	10.65	8.2	5.1	62	0.24	28	50	0.87	36	1.92	0.60	61.5	4.2	0.1	14.8	3.57	613
21672	Hallertauer Tra	Coleman	B	8/24/95	738	11.35	7.2	4.8	60	0.22	25	49	0.52	56	0.96	0.37	63.0	4.9	0.1	18.1	3.67	104
21672	Ha Tradition	Coleman	B	8/24/95	0	11.75	6.0	4.5	58	0.28	0	0	0.00	0	0.90	0.00	50.8	6.7	0.2	24.0	3.59	675
21672	Hallertauer Tra	025:13-16	C	9/01/95	1400	232	6.1	2.7	69	0.29	24	51	0.55	63	0.00	0.00	0.0	0.0	0.0	0.0	0.00	177
21673	Hersbrucker Pur	221:11-15	B	9/11/95	939	9.80	6.4	3.4	65	0.26	24	48	0.48	69	1.19	0.66	59.0	3.9	0.2	9.4	2.44	650
21673	Hersbrucker Pur	026:13-16	C	9/01/95	1200	199	3.8	4.9	44	0.28	20	46	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	178
21674	Spalter Select	027:13-16	B	8/22/95	597	9.40	6.1	4.2	60	0.25	22	43	0.38	80	0.85	0.46	49.4	4.1	9.5	10.2	2.48	51
21674	Spalter Select	Coleman	B	8/24/95	0	10.20	6.0	5.3	53	0.24	0	0	0.00	0	1.02	0.00	53.3	1.3	13.2	6.4	4.97	676
21674	Spalter Select	Coleman	B	8/24/95	906	12.15	6.9	5.0	58	0.23	22	44	0.63	45	0.85	0.36	61.8	2.3	10.7	5.6	2.49	105
21674	Spalter Select	222:11-15	B	9/11/95	1465	11.10	6.1	5.9	51	0.23	25	46	0.57	59	1.85	0.77	59.7	2.3	10.4	5.6	2.47	666
21674	Spalter Select	Coleman	B	8/24/95	0	11.85	5.4	5.6	49	0.24	0	0	0.00	0	0.91	0.00	59.9	2.6	10.1	6.5	2.51	692
21675	Orion	028:13-16	B	8/22/95	533	11.55	9.5	4.9	66	0.22	23	50	0.34	81	0.71	0.39	45.8	9.7	0.2	24.9	2.56	54
21675	Orion	223:11-15	B	9/08/95	907	9.40	9.4	5.7	62	0.24	27	52	0.55	59	2.33	1.12	56.3	6.6	0.1	16.7	2.55	662
21676	Toyomidori	034:09-12	C	9/06/95	1000	149	12.3	4.7	72	0.27	46	67	0.44	73	0.00	0.00	0.0	0.0	0.0	0.0	0.00	342
21676	Hersbrucker G	034:09-12	B	9/01/95	1000	11.15	4.5	4.6	49	0.24	19	39	0.53	59	1.08	0.64	48.2	5.1	0.4	11.5	2.24	507
21676	Toyomidori	224:11-15	B	8/31/95	2125	8.35	13.6	6.5	68	0.24	46	64	0.47	67	1.52	0.96	61.9	3.7	0.1	8.8	2.34	645
21677	Kitamidori	035:09-12	B	9/01/95	1067	8.70	7.6	4.2	64	0.24	22	41	0.50	61	0.97	0.59	30.1	10.3	6.1	35.1	3.42	511
21677	Kitamidori	225:11-15	B	9/11/95	981	8.70	11.6	5.7	67	0.25	23	44	0.43	72	1.64	1.15	39.9	7.3	6.6	27.2	3.75	610
21678	Eastern Gold	226:11-15	B	9/13/95	2995	6.45	11.7	5.7	67	0.24	30	49	0.37	81	2.07	1.04	36.7	8.4	4.1	21.2	2.51	651
21678	Eastern Gold	036:09-12	B	9/01/95	1290	10.35	10.3	5.6	65	0.23	26	45	0.34	84	0.84	0.70	29.7	9.5	3.1	24.8	2.60	510
21679	Canadian RedVin	229:11-15	C	9/08/95	2600	106	3.6	4.8	43	0.26	48	70	0.68	52	0.00	0.00	0.0	0.0	0.0	0.0	0.00	587
21680	East Kent Goldi	038:09-12	B	9/01/95	313	11.15	4.2	2.3	64	0.25	26	52	0.45	67	0.66	0.36	44.2	7.6	1.0	22.5	2.97	513
21680	East Kent Goldi	228:11-15	B	9/11/95	1003	10.65	6.3	2.8	69	0.26	29	54	0.37	82	1.10	0.79	53.4	5.9	0.4	19.2	3.28	638
21681	Canterbury Gold	037:09-12	B	9/01/95	583	10.85	5.1	2.2	70	0.23	25	50	0.37	82	0.83	0.54	46.2	7.9	0.4	23.0	2.89	504

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21681	Canterbury Gold	227:11-15	B	9/11/95	704	10.60	6.1	3.0	67	0.24	27	51	0.36	85	1.17	0.79	48.9	6.8	0.8	22.3	3.27	639
21682	Wurttemberger	230:11-15	B	8/22/95	853	11.15	3.9	4.5	46	0.26	25	42	0.47	70	1.18	0.72	55.2	6.4	4.6	19.7	3.11	57
21683	9036-045	Coleman	B	9/07/95	1642	11.50	4.4	5.6	44	0.21	21	50	0.80	42	1.42	0.47	58.6	4.1	8.3	15.3	3.72	497
21683	9036-045	109:21-22	C	9/07/95	200	200	3.3	5.0	40	0.26	18	46	0.67	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	400
21683	9036-045	105:09-10	B	8/31/95	1770	9.85	3.5	4.6	43	0.22	18	48	0.44	69	0.88	0.48	43.0	7.1	9.4	25.8	3.64	491
21683	9036-045	224:26-30	B	9/06/95	2065	11.35	3.2	4.3	42	0.23	22	53	0.74	46	1.12	0.29	54.2	4.9	9.4	18.0	3.69	455
21683	9036-045	Coleman	B	9/07/95	0	12.50	4.3	5.5	43	0.25	0	0	0.00	0	1.42	0.00	49.7	5.4	11.0	19.6	3.62	681
21683	9036-045	Coleman	B	9/07/95	0	12.45	4.1	5.6	43	0.25	0	0	0.00	0	1.05	0.00	55.6	4.7	7.5	16.8	3.59	686
21684	9040-038	232:26-30	B	9/06/95	1920	11.30	6.7	5.2	56	0.23	27	47	0.61	56	2.13	0.61	73.1	2.0	7.1	7.1	3.53	454
21684	9040-038	110:21-22	B	8/23/95	703	9.15	5.5	4.6	54	0.22	22	44	0.44	68	0.95	0.40	65.0	3.2	8.8	10.3	3.23	87
21684	9040-038	102:11-12	B	8/31/95	1024	9.65	6.4	4.4	60	0.23	22	47	0.39	79	0.95	0.42	57.8	3.5	8.7	12.6	3.57	671
21684	9040-038	Coleman	B	9/07/95	1403	9.40	5.8	5.4	52	0.23	26	47	0.63	55	0.91	0.53	71.4	2.1	7.6	7.4	3.47	498
21685	9040-065	111:15-16	B	8/31/95	299	10.20	3.3	4.0	45	0.25	24	44	0.00	0	0.48	0.00	50.0	5.1	8.4	15.3	2.99	512
21685	9040-065	111:21-22	B	8/25/95	597	9.45	2.4	4.4	35	0.21	25	42	0.64	55	0.70	0.19	51.3	4.6	9.8	17.6	3.82	134
21685	9040-065	220:36-40	C	9/11/95	100	179	3.2	5.6	36	0.27	27	45	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	597
21685	9040-065	Coleman	B	9/07/95	0	14.00	2.5	4.1	38	0.28	0	0	0.00	0	0.73	0.00	60.7	3.4	8.7	12.2	3.63	682
21685	9040-065	Coleman	B	9/07/95	887	13.10	2.6	4.6	36	0.22	26	46	0.68	54	0.95	0.15	62.9	3.2	7.9	11.4	3.57	499
21685	9040-065	241:36-40	C	9/11/95	200	163	2.8	5.7	33	0.28	26	45	0.65	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	607
21685	9040-065	Coleman	B	9/07/95	0	12.85	6.0	5.5	52	0.25	0	0	0.00	0	0.00	1.50	70.0	2.4	6.5	8.5	3.56	694
21686	9041-065	Coleman	B	9/07/95	1382	10.60	3.3	6.5	34	0.20	25	40	0.82	40	1.23	0.42	49.7	3.6	18.2	12.7	3.51	500
21686	9041-065	Coleman	B	9/07/95	0	11.75	2.5	6.7	27	0.25	0	0	0.00	0	1.20	0.00	45.5	4.1	19.9	15.5	3.74	677
21686	9041-065	112:21-22	B	8/25/95	448	8.70	2.2	5.3	30	0.20	21	36	0.42	66	0.62	0.28	37.0	5.9	19.5	21.4	3.66	135
21686	9041-065	107:11-12	B	8/23/95	1408	8.90	2.9	6.4	31	0.20	21	39	0.51	60	1.07	0.40	33.1	6.7	21.6	23.6	3.53	88
21686	9041-065	Coleman	B	9/07/95	0	10.70	3.6	6.1	37	0.25	0	0	0.00	0	1.15	0.00	45.9	4.1	16.5	14.4	3.53	687
21686	9041-065	237:26-30	B	9/06/95	1519	9.50	2.9	7.7	27	0.20	27	43	0.71	45	1.60	0.50	51.6	3.7	16.9	12.8	3.43	469
21687	9042-003	102:23-24	B	8/25/95	448	9.20	3.7	3.7	50	0.22	23	42	0.42	77	0.90	0.49	41.6	5.6	18.8	20.4	3.65	165
21687	9042-003	241:26-30	B	9/06/95	751	10.25	5.9	4.6	56	0.22	24	43	0.36	79	1.10	0.47	39.0	5.1	21.5	19.1	3.76	471
21687	9042-003	Coleman	B	8/30/95	0	11.15	4.0	3.8	51	0.29	0	0	0.00	0	0.60	0.00	37.9	4.6	20.7	17.5	3.77	678
21687	9042-003	111:11-12	B	8/31/95	469	10.60	4.3	3.0	59	0.24	21	44	0.40	68	0.42	0.21	36.1	5.1	22.2	18.0	3.49	505
21687	9042-003	Coleman	B	8/30/95	717	10.80	4.3	3.9	53	0.23	27	46	0.40	71	0.57	0.35	52.6	3.5	14.0	13.5	3.83	458
21687	9042-003	Coleman	B	8/30/95	717	11.50	4.1	3.8	52	0.24	26	46	0.43	75	0.63	0.29	50.0	3.7	15.7	12.7	3.42	317
21688	9042-012	103:23-24	B	9/06/95	896	15.70	4.2	4.4	49	0.23	21	42	0.00	0	0.79	0.00	55.8	2.3	8.4	8.3	3.54	673
21688	9042-012	Coleman	B	8/30/95	1171	8.65	6.9	5.9	54	0.22	24	47	0.51	47	0.68	0.31	59.8	2.6	9.8	9.4	3.64	167
21688	9042-012	Coleman	B	8/30/95	0	10.15	4.5	5.3	46	0.26	0	0	0.00	0	0.72	0.00	56.9	2.7	10.2	9.8	3.62	680
21688	9042-012	221:31-35	B	9/06/95	1195	10.70	4.6	5.1	48	0.24	27	46	0.45	71	0.84	0.40	51.1	2.3	9.2	8.4	3.64	672
21688	9042-012	Coleman	B	8/30/95	0	10.55	4.0	5.3	43	0.26	0	0	0.00	0	0.68	0.00	56.9	2.9	9.4	10.5	3.62	689
21689	9043-052	Coleman	B	8/30/95	0	9.15	7.6	5.5	58	0.25	0	0	0.00	0	1.58	0.00	49.0	4.9	18.2	17.3	3.50	679
21689	9043-052	Coleman	B	8/30/95	0	9.85	7.3	5.4	58	0.26	0	0	0.00	0	1.22	0.00	45.7	5.2	15.2	19.0	3.65	685
21689	9043-052	112:13-14	B	8/23/95	2048	8.80	6.4	5.3	55	0.23	22	46	0.36	76	0.85	0.53	42.5	6.5	16.3	22.6	3.51	89
21689	9043-052	104:23-24	B	8/25/95	1450	8.05	6.7	5.5	55	0.22	22	45	0.38	78	1.21	0.64	50.1	5.2	14.8	18.5	3.55	136
21689	9043-052	Coleman	B	8/30/95	1894	8.00	7.8	5.9	57	0.23	26	45	0.40	67	1.45	0.66	51.6	4.4	16.6	15.7	3.55	166
21689	9043-052	231:31-35	B	9/06/95	2329	11.85	6.8	5.5	55	0.24	27	51	0.75	46	2.77	0.85	65.7	3.0	11.6	10.7	3.55	495
21697	Sunbeam 9046-20	242:36-40	C	9/11/95	200	145	5.0	2.5	67	0.34	37	60	0.69	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	604
21698	Bianca 9046-41	110:15-16	B	8/23/95	1344	7.95	10.9	4.3	72	0.22	29	55	0.47	64	1.10	0.50	29.4	8.2	17.5	25.1	3.08	90
21698	Bianca 9046-41	232:36-40	B	9/13/95	853	8.65	8.9	3.1	74	0.26	28	51	0.46	71	2.64	1.60	33.9	8.8	0.2	25.3	2.89	657
21698	Bianca 9046-41	106:23-24	B	8/25/95	768	10.05	7.5	4.3	64	0.23	26	50	0.50	62	0.63	0.47	20.6	9.0	17.3	30.2	3.35	137
21700	Kirin C-827	042:09-12	C	8/29/95	100	170	4.9	2.2	69	0.28	22	46	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	111
21700	Kirin C-827	220:11-15	C	9/08/95	100	195	5.4	2.1	72	0.25	28	53	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	436

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coβ	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21701	Furano Ace	220:01-05	C	9/08/95	50	100	4.9	5.4	48	0.27	28	53	0.68	52	0.00	0.00	0.0	0.0	0.0	0.0	0.00	442
21701	Furano Ace	040:09-12	C	8/29/95	50	125	3.4	4.2	45	0.30	23	48	0.60	58	0.00	0.00	0.0	0.0	0.0	0.0	0.00	121
21702	Sorachi Ace	041:09-12	C	8/29/95	50	110	7.0	5.1	58	0.27	26	54	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	108
21702	Sorachi Ace	220:06-10	C	9/08/95	50	84	9.2	5.2	64	0.27	32	59	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	445
21704	9036-003	101:03-04	C	9/07/95	100	220	4.4	3.3	57	0.26	24	47	0.65	55	0.00	0.00	0.0	0.0	0.0	0.0	0.00	430
21705	9037-011	104:07-08	C	9/07/95	200	322	6.6	2.9	70	0.26	27	51	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	426
48209	Fuggle H	010:01-04	B	8/21/95	853	10.05	4.6	2.4	66	0.27	27	50	0.41	79	1.51	0.28	50.6	6.7	3.3	18.1	2.72	24
48209	Fuggle H	231:11-15	B	8/22/95	725	14.25	5.4	2.9	65	0.29	29	49	0.51	68	1.06	0.68	50.7	6.8	5.3	20.9	3.06	58
50024	BB 301-2	011:49-50	C	9/05/95	1000	117	6.2	3.1	67	0.30	42	66	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	251
50040	BB 301-1	046:49-50	C	9/05/95	900	123	3.1	5.7	36	0.30	37	53	0.39	79	0.00	0.00	0.0	0.0	0.0	0.0	0.00	244
54003	BB 504-2	031:51-52	C	9/06/95	400	213	4.9	3.3	60	0.28	58	73	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	306
56001	Hallertauer	011:01-04	B	8/21/95	341	12.85	4.3	4.5	49	0.23	19	39	0.40	71	1.18	0.47	38.3	9.7	0.2	34.4	3.55	25
56002	Backa	012:01-04	C	9/06/95	600	150	3.2	4.0	44	0.27	21	41	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	336
56008	OB 826	013:49-50	C	9/05/95	1600	153	8.2	5.9	58	0.26	41	65	0.64	55	0.00	0.00	0.0	0.0	0.0	0.0	0.00	235
56012	73-S	014:49-50	C	9/05/95	1400	168	6.3	3.6	63	0.28	26	55	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	229
56013	Cascade	013:01-04	B	8/29/95	704	9.30	6.5	5.1	56	0.22	35	55	0.62	51	1.04	0.33	66.5	3.4	4.1	8.7	2.56	525
58016	Utah 526-5	001:41-44	C	9/06/95	600	209	3.5	2.0	63	0.30	23	48	0.41	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	280
60016	NM 1-3	016:41-44	C	9/06/95	600	388	2.4	2.4	50	0.29	74	87	1.07	31	0.00	0.00	0.0	0.0	0.0	0.0	0.00	269
60020	NM 2-4	003:41-44	C	9/06/95	100	215	3.0	4.6	40	0.24	50	69	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	266
60020	NM 2-4	003:41-44	C	8/23/95	100	179	1.8	4.1	30	0.29	48	67	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	92
60021	NM 3-1	004:41-44	C	9/06/95	100	210	3.8	1.8	68	0.32	68	76	0.49	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	286
60024	Colo 1-2	006:41-44	C	9/06/95	100	337	4.7	3.3	59	0.30	61	80	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	289
60024	Colo 1-2	006:41-45	C	8/25/95	100	260	3.2	2.4	56	0.29	60	79	0.57	61	0.00	0.00	0.0	0.0	0.0	0.0	0.00	98
60025	Colo 1-3	017:41-44	C	9/06/95	1200	180	6.1	2.6	70	0.29	58	76	0.41	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	298
60027	Colo 2-2	008:41-44	C	9/06/95	400	148	1.6	3.3	33	0.33	61	76	0.62	57	0.00	0.00	0.0	0.0	0.0	0.0	0.00	282
60029	Colo 3-1	010:41-44	C	9/06/95	1200	261	6.9	5.5	55	0.25	68	81	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	263
60032	Colo 5-1	011:41-44	C	9/06/95	200	217	2.6	2.0	56	0.30	45	68	0.38	80	0.00	0.00	0.0	0.0	0.0	0.0	0.00	304
60033	Colo 6-1	019:41-44	C	9/06/95	300	133	1.8	3.6	34	0.28	71	86	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	288
60035	Colo 7-2	020:41-44	C	8/25/95	100	179	1.7	2.7	39	0.39	46	72	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	91
60037	Wyo 2-1	012:41-44	C	9/06/95	1600	192	5.1	4.2	55	0.26	42	67	0.33	87	0.00	0.00	0.0	0.0	0.0	0.0	0.00	287
60038	Wyo 3-1	013:41-44	C	9/06/95	400	311	1.3	3.0	31	0.44	62	79	0.70	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	273
60042	Shinshuwase	016:01-04	C	9/06/95	1800	157	5.0	4.8	51	0.26	52	73	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	323
60042	Shinshuwase	232:11-15	C	9/08/95	2200	127	5.4	5.3	50	0.25	50	72	0.66	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	581
61019	Yugo Golding	017:01-04	B	8/21/95	597	11.20	4.3	2.3	65	0.28	29	53	0.42	73	1.08	0.58	50.9	7.5	4.3	20.2	2.70	26
61019	Yugo Golding	233:11-15	B	8/22/95	845	12.05	5.0	3.0	63	0.28	30	50	0.52	67	1.26	0.61	55.4	6.4	4.9	19.4	3.04	59
61020	Savj Golding	234:11-15	B	8/22/95	597	12.60	4.8	2.5	65	0.30	33	52	0.47	74	1.09	0.64	48.0	7.6	5.9	22.9	3.02	53
61020	Savj Golding	018:01-04	B	8/21/95	235	11.25	4.7	2.1	69	0.27	28	52	0.35	82	0.75	0.56	49.3	7.6	3.8	21.8	2.88	27
61021	Tettnanger	019:01-04	C	8/29/95	100	202	4.8	5.1	49	0.25	21	41	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	127
62013	Comet	020:01-04	C	9/06/95	1800	291	11.9	4.6	72	0.25	44	67	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	348
62013	Comet	235:11-15	C	9/08/95	1700	284	9.6	5.2	65	0.28	45	67	1.23	24	0.00	0.00	0.0	0.0	0.0	0.0	0.00	578
62052	Density	001:05-08	C	9/06/95	800	138	3.7	2.3	62	0.29	41	69	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	322
62053	Defender	002:05-08	B	8/21/95	192	8.50	3.0	1.3	70	0.28	27	50	0.50	67	0.81	0.28	36.7	11.9	3.5	26.8	2.25	28
63008	N 48-8	011:51-52	C	9/06/95	1500	169	5.6	6.7	46	0.26	38	67	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	295
63018	N 47-35	012:51-52	C	9/06/95	400	189	4.6	5.1	48	0.28	25	43	0.80	44	0.00	0.00	0.0	0.0	0.0	0.0	0.00	309
63019	N 47-40	013:51-52	C	9/06/95	1400	240	8.2	5.4	60	0.26	34	56	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	293
63020	N 47-42	014:51-52	C	9/06/95	1000	166	7.8	6.5	55	0.27	31	54	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	279
63021	N48-1	015:51-52	C	9/06/95	1200	156	7.7	8.7	47	0.25	51	72	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	275
63027	BG x 19040M	016:51-52	C	9/06/95	1600	107	7.4	7.5	50	0.24	40	59	0.72	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	301

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
63032	BG x 58015M	035:49-50	C	9/05/95	1200	340	6.8	4.8	59	0.30	64	82	0.71	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	248
64003	19105 x 19173M	018:51-52	C	9/06/95	700	107	1.0	4.4	18	0.31	31	55	0.94	37	0.00	0.00	0.0	0.0	0.0	0.0	0.00	305
64007	19105 x 19058M	211:31-35	C	9/11/95	1600	180	1.5	5.8	21	0.30	32	59	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	596
64007	19105 x 19058M	017:49-50	C	9/05/95	1300	115	2.6	8.1	24	0.25	28	55	0.52	65	0.00	0.00	0.0	0.0	0.0	0.0	0.00	228
64008	Zattler 2L1180P	019:51-52	C	9/06/95	200	150	5.3	3.4	61	0.30	21	47	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	278
64010	Zattler 7K4910P	021:51-52	C	9/06/95	300	153	4.4	4.8	48	0.28	20	40	0.37	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	277
64020	Backa x 19062M	044:51-52	C	9/05/95	400	135	5.0	3.0	62	0.28	30	54	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	217
64026	BG x 19182M	045:51-52	C	9/05/95	600	130	5.5	6.8	44	0.26	25	49	0.43	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	215
64100	Bullion	003:05-08	B	8/29/95	1589	14.80	9.6	5.0	66	0.22	41	67	0.87	32	2.30	0.62	65.6	5.8	0.0	9.5	1.64	515
64107	Northern Brewer	004:05-08	B	8/21/95	412	11.35	8.6	3.4	72	0.25	25	49	0.39	80	1.76	1.18	57.8	6.6	0.2	18.2	2.76	29
65009	BG x 19058M	028:51-52	C	9/06/95	800	278	11.1	8.0	58	0.25	35	62	0.90	39	0.00	0.00	0.0	0.0	0.0	0.0	0.00	299
65009	BG x 19058M	239:21-25	B	9/13/95	1941	10.70	9.9	8.0	55	0.22	40	64	0.91	31	3.70	1.04	65.4	6.7	0.1	9.9	1.47	653
65101	Talisman	005:05-08	C	9/06/95	1600	173	4.7	2.6	64	0.28	56	77	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	324
65101	Talisman	236:11-15	C	9/08/95	2000	119	12.8	8.3	61	0.28	51	74	0.47	70	0.00	0.00	0.0	0.0	0.0	0.0	0.00	574
65102	Cluster (L1)	006:05-08	B	8/21/95	853	7.90	5.8	3.9	60	0.23	41	66	0.30	90	0.44	0.30	66.5	3.4	0.2	8.1	2.38	31
65102	Cluster (L1)	041:05-08	B	8/21/95	1052	7.45	7.5	4.8	61	0.23	44	69	0.29	87	0.45	0.40	59.0	5.0	0.4	11.9	2.39	30
65104	Cluster (L8)	033:09-12	C	9/06/95	1600	186	2.8	2.1	57	0.28	45	69	0.34	85	0.00	0.00	0.0	0.0	0.0	0.0	0.00	319
66050	Alliance	237:11-15	B	9/11/95	1411	11.30	5.2	2.1	72	0.26	35	58	0.48	65	1.27	0.81	39.1	10.3	2.2	31.0	3.01	664
66050	Alliance	012:05-08	B	8/29/95	619	15.70	6.0	2.0	75	0.24	32	58	0.00	0	0.91	0.00	35.8	8.4	1.7	27.4	3.26	524
66051	Progress	009:05-08	B	8/21/95	341	16.70	6.5	2.4	73	0.25	29	54	0.00	0	0.77	0.00	39.2	9.0	0.3	32.4	3.62	32
66052	Pride of Ringwo	010:05-08	C	9/06/95	1400	183	11.5	7.5	60	0.24	32	54	0.36	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	351
66052	Pride of Ringwo	238:11-15	C	9/08/95	1900	122	9.2	6.9	57	0.25	32	52	0.41	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	573
66054	Calicross	014:05-08	C	9/06/95	1700	199	5.4	4.3	56	0.26	40	64	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	352
66054	Calicross	239:11-15	C	9/08/95	2200	182	9.4	7.2	56	0.24	43	65	0.34	86	0.00	0.00	0.0	0.0	0.0	0.0	0.00	584
66055	First Choice	240:11-15	C	9/08/95	2000	146	5.6	6.5	47	0.28	45	68	0.49	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	586
66055	First Choice	015:05-08	C	9/06/95	1500	188	5.0	4.9	51	0.30	41	65	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	339
66056	Smoothcone	016:05-08	C	9/06/95	1600	178	7.2	3.9	65	0.27	23	46	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	321
66056	Smoothcone	241:11-15	C	9/08/95	1800	124	7.4	3.8	66	0.27	32	60	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	585
68052	Petham Golding	017:05-08	C	9/06/95	600	184	8.6	2.5	78	0.26	29	54	0.44	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	354
68052	Petham Golding	242:11-15	C	9/08/95	1000	254	6.8	2.1	76	0.27	33	58	0.73	49	0.00	0.00	0.0	0.0	0.0	0.0	0.00	580
8154-274		103:31-32	B	8/25/95	1663	9.40	7.9	4.5	64	0.24	24	47	0.36	82	1.35	0.79	49.6	9.8	0.1	22.0	2.25	138
8252-115		104:31-32	B	8/25/95	1024	9.85	7.0	5.0	59	0.22	27	47	0.50	58	1.06	0.50	36.3	5.1	0.4	16.5	3.26	139
8254-165		108:31-32	C	9/07/95	200	131	2.8	7.7	27	0.26	15	31	0.62	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	402
8254-167		215:36-40	B	9/11/95	742	9.30	6.5	6.6	50	0.23	17	36	0.49	65	1.93	1.04	36.9	8.6	0.2	30.7	3.56	654
8254-244		216:36-40	B	9/11/95	896	10.60	4.7	6.3	43	0.23	24	43	0.70	48	1.36	0.66	37.6	8.9	3.9	30.7	3.44	618
8254-253		109:31-32	C	9/07/95	200	158	3.3	6.1	35	0.27	15	33	0.65	54	0.00	0.00	0.0	0.0	0.0	0.0	0.00	406
8254-267		110:31-32	C	9/07/95	400	209	6.0	5.3	53	0.32	18	40	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	401
8411-015		111:31-32	B	8/25/95	1450	8.70	6.6	4.3	61	0.25	23	47	0.34	79	0.58	0.63	28.0	11.3	0.3	36.3	3.23	140
8411-025		112:31-32	B	8/25/95	1067	9.30	6.8	3.3	68	0.25	28	51	0.33	85	1.07	0.83	39.1	9.5	0.3	28.1	2.97	141
8411-027		101:33-34	B	8/25/95	1109	8.00	8.0	3.1	72	0.25	25	47	0.33	86	1.36	0.83	37.1	10.3	0.2	30.2	2.93	142
8411-029		102:33-34	B	8/25/95	1962	8.70	6.9	3.2	68	0.27	26	49	0.34	83	0.99	0.73	37.5	9.3	0.3	29.1	3.12	143
8411-040		103:33-34	B	8/25/95	960	9.00	5.9	3.9	60	0.24	27	49	0.35	76	0.96	0.54	50.7	7.8	0.2	23.3	2.98	144
8411-042		104:33-34	B	8/25/95	1749	9.20	7.6	3.6	68	0.25	28	51	0.34	87	1.08	0.76	48.0	7.9	0.2	22.3	2.84	145
8411-049		105:33-34	C	9/07/95	400	144	4.6	3.1	60	0.31	23	49	0.49	68	0.00	0.00	0.0	0.0	0.0	0.0	0.00	399
8411-064		106:33-34	B	8/25/95	2069	8.35	6.7	3.7	64	0.26	32	55	0.36	83	1.28	0.77	42.4	7.6	0.2	25.4	3.33	146
8411-135		108:33-34	B	8/25/95	1386	8.90	6.6	4.2	61	0.26	27	53	0.44	74	1.53	0.96	61.4	6.7	0.2	17.2	2.56	147
8411-150		109:33-34	B	9/08/95	1173	9.00	6.1	4.4	58	0.24	27	49	0.42	74	1.52	0.80	50.6	7.5	0.5	20.5	2.75	623
8411-157		110:33-34	B	8/25/95	1024	9.15	4.0	3.1	56	0.27	27	52	0.40	79	0.72	0.61	37.5	12.1	0.1	26.7	2.22	149

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
8411-170		111:33-34	B	8/25/95	832	8.60	5.5	3.7	60	0.25	22	45	0.34	81	0.90	0.38	49.4	7.1	0.2	20.5	2.87	150
8411-204		101:35-36	B	8/25/95	1024	8.45	8.3	4.0	67	0.25	22	45	0.32	81	1.18	0.92	37.8	9.2	0.1	26.6	2.88	163
8411-229		102:35-36	B	8/25/95	1067	8.55	7.7	4.0	66	0.24	31	57	0.30	86	0.78	0.60	34.4	9.1	0.3	24.8	2.72	148
8411-262		103:35-36	B	9/11/95	1941	8.75	7.6	4.6	62	0.23	29	52	0.35	84	1.43	0.89	42.3	7.7	0.3	24.1	3.13	640
8412-002		104:35-36	B	9/08/95	1450	7.75	8.6	6.1	58	0.23	37	62	0.35	83	1.48	0.74	51.4	5.3	4.3	16.6	3.11	644
8412-010		105:35-36	B	9/08/95	1429	9.20	6.6	6.3	51	0.23	39	63	0.48	66	1.56	0.57	60.8	4.7	1.1	15.2	3.25	614
8412-016		107:35-36	B	8/25/95	1834	8.35	9.3	4.0	70	0.23	29	57	0.32	84	1.13	0.77	56.5	3.8	3.8	10.1	2.64	159
8412-019		108:35-36	B	9/08/95	1578	8.95	9.0	4.4	67	0.23	23	49	0.37	83	1.57	0.92	51.0	4.6	1.7	15.0	3.27	627
8412-022		109:35-36	B	9/08/95	1578	8.50	8.5	4.1	67	0.25	29	53	0.34	84	1.45	0.99	45.0	7.4	1.0	25.5	3.47	660
8412-034		111:35-36	B	9/08/95	1344	9.20	7.6	4.2	65	0.22	29	56	0.45	73	0.84	0.00	57.4	3.7	3.5	7.7	2.07	630
8412-058		102:37-38	B	9/08/95	2346	8.40	9.1	6.0	60	0.22	23	46	0.44	66	1.79	0.93	42.5	7.1	2.3	18.8	2.63	661
8412-075		103:37-38	B	8/25/95	1834	7.70	8.6	3.9	69	0.25	24	48	0.35	81	1.08	0.62	54.7	5.5	4.1	19.0	3.44	151
8412-079		105:37-38	B	9/08/95	1600	8.70	6.1	5.6	52	0.22	31	60	0.40	78	1.19	0.48	64.6	3.1	2.8	7.3	2.34	612
8412-088		106:37-38	B	8/25/95	1386	9.60	8.2	4.2	66	0.23	24	48	0.33	82	1.08	0.47	51.3	5.8	4.0	19.0	3.26	152
8412-101		107:37-38	B	8/25/95	1578	8.40	6.9	5.5	56	0.23	20	43	0.30	87	0.57	0.52	33.0	8.5	2.1	25.1	2.95	153
8412-125		109:37-38	B	9/08/95	2645	8.55	7.1	5.2	58	0.23	26	49	0.32	90	1.12	0.72	39.6	9.9	1.3	26.8	2.70	655
8412-138		111:37-38	B	9/10/95	2090	8.80	9.2	5.2	64	0.24	24	50	0.34	84	1.54	0.87	44.6	6.6	4.3	20.7	3.12	642
8412-183		103:39-40	B	9/08/95	960	8.60	9.0	4.9	65	0.23	27	52	0.41	73	1.77	0.69	50.8	5.8	3.5	17.1	2.95	621
8412-188		104:39-40	B	8/25/95	2048	7.85	7.1	6.3	53	0.22	24	51	0.32	80	0.57	0.34	33.5	9.5	1.8	31.5	3.33	154
8412-196		105:39-40	B	8/28/95	1621	11.15	9.6	5.8	63	0.22	35	60	0.35	76	0.89	0.56	64.8	2.6	2.9	7.5	2.85	363
8412-199		106:39-40	B	9/08/95	2218	8.45	9.0	5.1	64	0.24	24	49	0.32	86	1.17	0.93	47.7	5.8	5.5	17.9	3.10	646
8412-207		107:39-40	B	9/08/95	725	9.15	7.3	3.0	71	0.25	21	45	0.29	89	0.75	0.49	58.6	3.9	3.9	12.9	3.34	633
8412-214		108:39-40	B	9/06/95	917	10.50	7.9	4.4	64	0.24	25	49	0.38	79	1.00	0.80	52.2	5.2	5.2	14.3	2.72	480
8603-481		236:36-40	C	9/08/95	1200	119	4.3	6.0	42	0.28	24	42	1.14	27	0.00	0.00	0.0	0.0	0.0	0.0	0.00	535
8802-002		102:25-26	B	8/25/95	683	9.65	5.2	7.4	41	0.21	23	41	0.54	54	1.39	0.72	52.2	6.8	0.1	23.5	3.45	155
8802-018		103:25-26	C	9/07/95	200	259	5.5	6.5	46	0.24	23	43	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	398
8802-027		104:25-26	B	8/25/95	533	9.25	5.1	6.3	45	0.22	23	41	0.60	50	1.39	0.58	53.5	4.7	10.1	16.1	3.44	156
8802-059		105:25-26	C	9/07/95	100	195	7.5	6.0	56	0.26	21	39	0.77	46	0.00	0.00	0.0	0.0	0.0	0.0	0.00	408
8805-006		106:25-26	B	8/25/95	512	9.85	3.9	5.9	40	0.22	21	37	0.64	47	1.36	0.63	42.5	6.4	13.7	22.3	3.45	157
8805-011		107:25-26	B	8/25/95	277	9.45	6.3	5.5	53	0.22	25	43	0.00	0	1.17	0.00	35.4	9.8	0.7	34.4	3.52	158
8805-013		108:25-26	B	8/25/95	363	8.35	6.4	5.6	53	0.23	23	54	0.59	50	1.51	0.69	41.2	5.4	12.4	18.7	3.48	160
8806-012		109:25-26	B	8/25/95	277	9.20	4.6	8.5	35	0.19	20	35	0.00	0	0.61	0.00	55.4	3.9	12.6	13.3	3.43	161
8808-034		213:31-35	C	9/08/95	1400	99	0.4	3.4	11	0.34	44	52	0.87	40	0.00	0.00	0.0	0.0	0.0	0.0	0.00	592
8808-055		215:31-35	C	9/11/95	1500	115	1.0	7.1	12	0.28	33	54	1.07	30	0.00	0.00	0.0	0.0	0.0	0.0	0.00	600
8808-065		216:31-35	C	9/08/95	1400	81	0.4	5.4	7	0.32	39	59	1.21	25	0.00	0.00	0.0	0.0	0.0	0.0	0.00	593
8808-074		217:31-35	C	9/11/95	1400	106	0.4	8.3	5	0.26	73	55	1.34	20	0.00	0.00	0.0	0.0	0.0	0.0	0.00	603
8808-142		219:31-35	C	9/08/95	1200	117	0.1	10.8	1	0.27	27	47	1.09	30	0.00	0.00	0.0	0.0	0.0	0.0	0.00	594
8809-071		212:36-40	C	9/11/95	800	172	1.0	4.7	18	0.27	90	51	0.99	34	0.00	0.00	0.0	0.0	0.0	0.0	0.00	601
8809-105		213:36-40	C	9/11/95	1000	112	0.9	5.0	15	0.32	72	46	1.31	21	0.00	0.00	0.0	0.0	0.0	0.0	0.00	599
8809-132		214:36-40	C	9/08/95	800	188	0.6	9.6	6	0.22	50	52	1.20	25	0.00	0.00	0.0	0.0	0.0	0.0	0.00	595
8901-001		113:03-04	C	8/25/95	100	295	3.7	2.7	58	0.35	63	82	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	94
8901-016		114:03-04	C	8/25/95	150	265	3.8	2.3	62	0.34	61	80	0.83	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	97
8901-022		115:03-04	C	8/25/95	50	557	4.3	3.1	58	0.30	59	77	0.73	49	0.00	0.00	0.0	0.0	0.0	0.0	0.00	93
8901-025		116:03-04	B	8/28/95	491	12.80	4.9	2.8	63	0.28	62	77	1.28	17	0.74	0.32	68.5	2.2	0.3	2.5	1.14	361
8901-048		117:03-04	C	8/25/95	150	292	4.7	2.5	66	0.32	62	32	0.94	37	0.00	0.00	0.0	0.0	0.0	0.0	0.00	99
8913-001		118:03-04	B	8/28/95	341	9.65	2.4	2.4	50	0.27	62	80	0.54	61	0.45	0.04	72.5	2.4	0.3	2.8	1.17	376
8918-012		119:03-04	B	8/28/95	683	8.60	3.5	2.8	56	0.26	61	80	0.69	53	0.54	0.12	72.9	3.5	0.1	2.1	0.61	383
8918-041		120:03-04	B	8/28/95	939	10.55	3.4	3.1	52	0.26	53	72	0.75	49	0.79	0.34	80.5	1.6	0.1	1.4	0.88	368

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coβ	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
8921-003		113:05-06	C	8/25/95	200	346	2.8	1.5	64	0.41	62	81	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	102
8923-002		114:05-06	C	8/25/95	100	381	4.8	2.5	66	0.32	72	88	0.42	75	0.00	0.00	0.0	0.0	0.0	0.0	0.00	101
8923-009		115:05-06	B	8/28/95	811	8.75	5.4	2.7	67	0.26	64	83	0.41	70	0.50	0.24	70.9	1.8	0.1	2.0	1.08	373
8924-003		116:05-06	C	8/25/95	200	342	5.1	2.4	68	0.34	57	77	0.80	44	0.00	0.00	0.0	0.0	0.0	0.0	0.00	100
8936-022		119:05-06	B	8/28/95	853	8.50	6.9	4.3	61	0.23	83	92	0.33	79	0.63	0.39	72.4	2.4	0.1	0.9	0.39	375
8936-028		120:05-06	B	8/28/95	341	8.60	4.5	6.5	41	0.22	75	89	0.43	73	1.04	0.48	72.1	2.2	0.0	0.2	0.10	386
8940-001		113:07-08	B	8/28/95	320	9.15	2.3	2.5	48	0.27	58	78	0.60	55	0.28	0.10	78.0	2.5	0.1	2.3	0.93	371
8940-010		114:07-08	B	8/28/95	533	8.60	3.7	3.3	53	0.26	52	71	1.20	22	0.72	0.18	74.8	1.1	0.1	1.4	1.32	360
8943-010		115:07-08	B	8/28/95	683	9.20	3.2	2.8	53	0.26	58	74	0.32	89	0.59	0.53	34.8	4.5	0.2	2.6	0.57	393
8951-002		116:07-08	B	8/28/95	427	11.85	3.9	2.8	58	0.25	71	86	0.90	31	0.94	0.24	69.7	3.4	0.1	2.9	0.85	377
9004-072		114:11-12	B	8/28/95	1130	10.10	2.5	1.7	60	0.30	63	79	0.91	36	0.36	0.17	69.8	3.9	0.3	0.9	0.24	385
9008-010		115:11-12	B	8/28/95	576	9.05	8.0	3.7	69	0.25	61	81	0.55	57	1.13	0.53	80.4	1.0	0.1	1.4	1.38	367
9008-042		116:11-12	B	8/28/95	896	9.15	4.2	5.1	45	0.24	68	82	0.55	58	0.60	0.27	80.4	1.7	0.2	0.9	0.52	362
9010-043		117:11-12	B	8/28/95	853	7.55	3.8	3.5	52	0.25	79	90	0.81	40	0.75	0.22	76.1	1.7	0.1	0.8	0.47	381
9011-064		118:11-12	B	8/28/95	981	12.80	4.1	2.1	66	0.25	77	88	1.02	30	0.91	0.26	74.8	4.0	0.2	0.6	0.15	372
9015-025		119:11-12	B	8/28/95	640	7.80	6.2	2.9	68	0.25	67	84	0.47	73	0.99	0.49	80.4	2.8	0.1	0.7	0.24	382
9019-025		120:11-12	C	9/07/95	400	431	1.9	2.1	48	0.42	74	88	0.95	36	0.00	0.00	0.0	0.0	0.0	0.0	0.00	403
9019-027		006:39-40	B	8/28/95	192	8.65	4.1	4.0	51	0.25	76	88	0.85	40	0.85	0.00	75.0	3.4	0.2	2.5	0.75	392
9030-037		012:39-40	B	8/28/95	683	9.10	4.1	3.6	53	0.22	73	88	0.63	50	1.43	0.25	80.2	1.9	0.1	1.5	0.78	394
9030-055		013:39-40	B	8/28/95	533	12.80	6.1	4.9	56	0.25	75	90	0.78	41	1.36	0.30	77.0	1.2	0.1	0.9	0.74	374
9036-006		102:17-18	B	8/23/95	960	10.65	2.8	3.9	42	0.24	23	41	0.51	63	0.55	0.22	49.7	6.2	8.4	19.7	3.17	77
9036-016		102:09-10	C	9/07/95	600	130	3.7	4.0	48	0.28	22	45	0.59	59	0.00	0.00	0.0	0.0	0.0	0.0	0.00	416
9036-016		221:26-30	C	9/08/95	1400	124	2.0	5.6	26	0.29	25	45	1.02	33	0.00	0.00	0.0	0.0	0.0	0.0	0.00	576
9036-017		103:17-18	B	8/31/95	619	9.95	2.3	4.0	36	0.24	21	38	0.65	49	0.37	0.16	24.7	9.3	11.1	32.3	3.48	509
9036-031		104:09-10	B	8/23/95	1600	10.90	3.5	3.6	49	0.24	17	45	0.41	72	0.54	0.33	36.6	7.9	11.6	27.4	3.47	78
9036-036		223:26-30	C	9/08/95	1600	156	2.7	3.8	42	0.32	20	51	0.83	43	0.00	0.00	0.0	0.0	0.0	0.0	0.00	559
9036-038		104:17-18	B	8/23/95	725	10.95	3.0	3.8	44	0.23	21	49	0.48	64	0.45	0.30	40.4	9.1	0.8	30.8	3.40	60
9036-056		105:17-18	C	9/07/95	600	159	1.2	4.4	22	0.28	21	36	0.73	49	0.00	0.00	0.0	0.0	0.0	0.0	0.00	429
9036-058		106:17-18	C	9/07/95	700	165	3.6	3.8	48	0.27	21	52	0.69	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	427
9037-003		225:26-30	B	8/22/95	862	10.85	7.8	4.1	65	0.25	23	44	0.43	73	1.17	0.41	55.3	2.9	15.3	10.1	3.52	55
9037-003		106:09-10	B	8/23/95	1024	9.10	7.6	3.2	70	0.23	23	44	0.35	81	0.67	0.41	44.2	3.9	18.0	13.5	3.49	61
9037-007		226:26-30	B	9/06/95	1323	10.15	6.7	4.0	62	0.27	25	48	0.60	59	2.34	0.79	67.8	1.8	8.1	6.3	3.48	658
9037-007		107:09-10	B	8/23/95	1002	10.20	7.7	3.7	68	0.24	21	45	0.40	68	1.03	0.49	48.7	4.2	11.6	14.9	3.52	79
9039-017		107:17-18	C	9/07/95	300	142	2.1	5.3	28	0.29	23	42	0.84	42	0.00	0.00	0.0	0.0	0.0	0.0	0.00	415
9039-021		108:09-10	C	9/07/95	600	218	5.6	3.6	61	0.27	24	46	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	417
9039-024		234:36-40	C	9/08/95	1300	150	5.3	4.2	56	0.27	27	49	0.66	53	0.00	0.00	0.0	0.0	0.0	0.0	0.00	544
9039-034		235:36-40	B	8/22/95	1101	11.65	5.1	3.8	57	0.25	25	44	0.55	63	1.06	0.46	54.3	3.2	15.2	11.0	3.48	56
9039-040		109:09-10	C	9/07/95	800	170	3.3	4.5	42	0.26	20	40	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	422
9039-041		108:17-18	B	9/06/95	896	10.75	2.5	5.2	33	0.22	24	44	0.61	55	1.17	0.49	53.0	6.4	1.3	22.5	3.51	477
9039-045		110:09-10	B	8/31/95	747	12.00	4.2	4.2	50	0.20	16	41	0.33	79	0.10	0.17	29.9	6.7	10.8	25.0	3.74	503
9040-016		109:17-28	C	9/07/95	200	191	5.5	5.3	51	0.26	23	42	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	409
9040-029		230:26-30	C	9/08/95	1700	138	2.3	4.9	32	0.27	23	42	0.89	40	0.00	0.00	0.0	0.0	0.0	0.0	0.00	563
9040-029		111:09-10	B	8/31/95	1514	10.15	4.3	5.0	46	0.23	20	39	0.41	72	0.31	0.21	20.4	8.1	18.5	28.9	3.58	489
9040-043		233:26-30	C	9/08/95	1400	157	2.6	5.4	32	0.27	25	44	1.13	28	0.00	0.00	0.0	0.0	0.0	0.0	0.00	572
9040-043		103:11-12	B	8/31/95	1109	10.65	3.7	6.5	37	0.21	21	41	0.52	60	0.85	0.41	42.2	6.5	8.9	23.3	3.59	488
9040-047		110:17-18	C	9/07/95	200	190	1.4	5.5	20	0.31	25	37	1.05	31	0.00	0.00	0.0	0.0	0.0	0.0	0.00	395
9040-063		111:17-18	C	9/07/95	150	183	3.6	5.8	38	0.24	24	42	0.63	56	0.00	0.00	0.0	0.0	0.0	0.0	0.00	428
9041-001		112:17-18	C	9/07/95	300	123	1.3	3.0	30	0.33	29	40	0.78	46	0.00	0.00	0.0	0.0	0.0	0.0	0.00	410

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
9041-027		234:26-30	C	9/08/95	1600	94	5.7	4.4	56	0.27	23	88	0.53	64	0.00	0.00	0.0	0.0	0.0	0.0	0.00	560
9041-027		104:11-12	B	8/31/95	789	9.60	6.2	3.6	63	0.23	18	41	0.31	86	0.48	0.27	33.4	6.2	14.9	22.2	3.56	483
9041-034		105:11-12	B	8/23/95	1280	9.55	5.9	4.3	57	0.24	18	40	0.34	85	0.66	0.19	37.7	6.5	17.2	23.3	3.58	70
9041-034		235:26-30	B	9/06/95	1126	9.10	5.9	6.3	48	0.23	23	42	0.38	78	0.45	0.30	42.2	6.8	15.4	13.5	2.00	624
9041-036		102:19-20	B	8/23/95	640	9.10	3.3	5.5	37	0.21	19	36	0.38	74	0.16	0.36	15.0	12.2	0.8	43.3	3.55	80
9041-036		240:31-35	C	9/08/95	1800	149	4.1	6.0	41	0.27	23	43	0.56	61	0.00	0.00	0.0	0.0	0.0	0.0	0.00	562
9041-042		103:19-20	B	9/06/95	768	8.20	2.8	4.8	36	0.23	24	44	0.59	45	0.93	0.34	54.8	6.4	1.8	21.9	3.42	478
9041-042		241:31-35	C	9/08/95	2000	177	6.0	4.4	58	0.25	25	46	0.35	84	0.00	0.00	0.0	0.0	0.0	0.0	0.00	564
9041-051		104:19-20	C	9/07/95	1600	216	5.6	3.1	64	0.27	20	45	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	407
9041-052		106:11-12	B	8/31/95	960	10.95	4.8	5.2	48	0.24	19	39	0.39	71	0.38	0.18	38.8	4.7	18.5	16.3	3.51	460
9041-075		242:31-35	C	9/08/95	2000	132	4.7	4.0	54	0.26	25	44	0.46	71	0.00	0.00	0.0	0.0	0.0	0.0	0.00	558
9041-075		105:19-20	C	9/07/95	800	182	6.0	4.1	60	0.24	21	45	0.50	67	0.00	0.00	0.0	0.0	0.0	0.0	0.00	405
9041-086		238:26-30	C	9/08/95	1400	103	6.3	6.5	49	0.25	20	40	0.54	63	0.00	0.00	0.0	0.0	0.0	0.0	0.00	557
9041-086		108:11-12	C	9/07/95	600	144	2.8	2.5	53	0.30	17	39	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	431
9041-106		110:11-12	B	8/23/95	533	10.05	4.3	5.4	44	0.21	17	34	0.34	78	0.41	0.21	33.3	5.5	17.6	18.7	3.43	62
9041-106		240:26-30	C	9/08/95	1200	120	3.3	5.5	38	0.29	22	39	0.62	57	0.00	0.00	0.0	0.0	0.0	0.0	0.00	556
9041-110		106:19-20	B	8/23/95	853	9.75	5.1	3.7	58	0.24	21	43	0.37	79	0.74	0.43	40.0	9.7	0.5	33.8	3.49	63
9042-010		242:26-30	C	9/08/95	1600	136	1.9	6.6	22	0.27	22	40	0.44	74	0.00	0.00	0.0	0.0	0.0	0.0	0.00	554
9042-010		112:11-12	B	8/31/95	1450	9.30	1.9	6.3	23	0.20	19	34	0.44	65	0.66	0.28	44.0	5.1	16.5	17.7	3.47	486
9042-013		107:19-20	C	9/07/95	600	167	1.9	2.9	40	0.29	22	41	0.68	52	0.00	0.00	0.0	0.0	0.0	0.0	0.00	396
9042-013		221:36-40	C	9/08/95	1500	94	1.6	4.5	27	0.29	27	40	0.71	50	0.00	0.00	0.0	0.0	0.0	0.0	0.00	530
9042-017		103:13-14	B	8/31/95	747	9.65	4.1	4.4	48	0.22	18	39	0.37	78	0.37	0.23	36.2	6.1	14.9	21.0	3.47	502
9042-019		104:13-14	B	8/31/95	768	9.80	8.3	3.3	71	0.23	20	45	0.31	87	0.87	0.65	31.9	6.1	18.3	22.3	3.67	496
9042-019		223:31-35	C	9/08/95	1700	120	4.9	3.4	59	0.32	24	46	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	539
9042-024		225:31-35	C	9/08/95	1600	148	3.2	6.4	33	0.26	21	37	0.45	72	0.00	0.00	0.0	0.0	0.0	0.0	0.00	548
9042-034		107:13-14	B	8/31/95	597	12.85	6.8	3.8	64	0.24	20	43	0.37	73	0.74	0.51	43.0	5.2	13.1	18.6	3.60	457
9042-034		226:31-35	C	9/08/95	1800	120	4.6	3.7	55	0.29	22	43	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	547
9043-001		108:13-14	B	8/23/95	500	9.05	7.6	4.2	64	0.24	20	40	0.32	82	0.77	0.46	46.0	4.8	14.2	16.5	3.44	81
9043-001		227:31-35	C	9/08/95	1800	148	7.2	5.2	58	0.25	26	45	0.57	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	549
9043-014		108:19-20	B	9/06/95	1109	9.30	6.5	4.3	60	0.25	21	45	0.52	63	1.40	0.57	65.2	2.9	3.2	10.0	3.47	453
9043-023		109:13-14	C	9/07/95	500	184	3.9	1.9	67	0.31	17	44	0.36	82	0.00	0.00	0.0	0.0	0.0	0.0	0.00	421
9043-023		228:31-35	C	9/08/95	1800	121	5.2	2.8	65	0.31	20	44	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	536
9043-026		223:36-40	C	9/08/95	1900	159	6.8	2.9	70	0.27	26	51	0.40	77	0.00	0.00	0.0	0.0	0.0	0.0	0.00	550
9043-026		109:19-20	B	9/06/95	725	10.05	4.1	3.3	55	0.25	20	42	0.47	68	0.88	0.37	44.0	5.9	3.2	20.7	3.50	482
9043-030		110:13-14	B	8/23/95	2048	9.50	9.2	4.8	66	0.22	23	45	0.43	67	1.27	0.50	53.9	3.4	12.2	11.9	3.52	82
9043-030		229:31-35	C	9/08/95	1600	219	6.3	4.8	56	0.26	25	48	0.68	52	0.00	0.00	0.0	0.0	0.0	0.0	0.00	551
9043-032		110:19-20	B	9/06/95	683	10.65	2.2	4.3	33	0.25	22	41	0.67	53	2.27	0.75	66.5	1.2	11.4	4.3	3.56	479
9043-037		111:19-20	C	9/07/95	800	128	3.0	3.2	49	0.34	20	43	0.74	48	0.00	0.00	0.0	0.0	0.0	0.0	0.00	413
9043-039		111:13-14	C	9/07/95	800	151	7.3	5.2	59	0.27	22	49	0.51	66	0.00	0.00	0.0	0.0	0.0	0.0	0.00	411
9043-039		230:31-35	C	9/08/95	1400	176	5.8	4.9	54	0.30	27	50	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	533
9043-054		112:19-20	C	9/07/95	600	227	6.0	4.8	55	0.28	23	48	0.80	44	0.00	0.00	0.0	0.0	0.0	0.0	0.00	412
9044-004		102:21-22	B	8/23/95	853	10.30	4.5	4.2	52	0.22	20	42	0.32	79	0.35	0.31	52.2	6.9	5.0	19.5	2.83	83
9044-039		232:31-35	C	9/08/95	2000	103	5.3	5.1	51	0.27	25	49	0.41	76	0.00	0.00	0.0	0.0	0.0	0.0	0.00	532
9044-039		102:15-16	C	9/07/95	1600	162	4.8	3.7	57	0.28	21	48	0.36	83	0.00	0.00	0.0	0.0	0.0	0.0	0.00	420
9045-013		103:21-22	C	9/07/95	800	162	5.3	2.2	71	0.30	24	50	0.69	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	397
9045-030		103:15-16	B	8/31/95	1450	9.15	2.3	7.4	24	0.21	18	37	0.43	66	0.85	0.41	42.9	7.5	13.7	21.1	2.80	490
9045-030		233:31-35	C	9/08/95	1600	91	1.4	5.2	21	0.28	26	41	0.58	60	0.00	0.00	0.0	0.0	0.0	0.0	0.00	545
9045-035		104:21-22	B	8/23/95	683	9.05	5.2	2.7	66	0.26	24	48	0.39	89	0.82	0.60	52.9	5.5	12.2	13.9	2.54	64

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 692

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
9045-041		105:21-22	C	9/07/95	300	235	2.5	4.2	37	0.32	44	69	1.18	26	0.00	0.00	0.0	0.0	0.0	0.0	0.00	404
9045-079		106:21-22	B	8/23/95	640	11.25	3.9	5.3	42	0.20	22	40	0.47	59	0.64	0.32	39.2	12.1	14.9	13.8	1.14	84
9046-017		109:15-16	B	8/23/95	640	9.95	8.7	3.2	73	0.25	23	48	0.38	78	1.18	0.98	22.2	12.2	0.3	34.8	2.85	69
9046-017		231:36-40	C	9/08/95	1200	165	8.1	2.7	75	0.29	29	53	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	552
9046-036		225:36-40	C	9/08/95	1800	190	5.1	7.7	40	0.26	24	43	0.86	41	0.00	0.00	0.0	0.0	0.0	0.0	0.00	534
9046-037		234:31-35	C	9/08/95	1400	160	3.0	2.4	56	0.40	29	51	1.33	20	0.00	0.00	0.0	0.0	0.0	0.0	0.00	561
9046-037		104:15-16	B	8/31/95	597	9.80	4.2	3.1	58	0.23	26	48	0.73	44	0.85	0.41	43.2	4.5	11.6	15.6	3.50	484
9046-065		106:15-16	B	8/31/95	2901	10.25	6.3	6.5	49	0.23	24	43	0.59	54	1.27	0.73	33.5	5.9	12.3	20.9	3.57	506
9046-065		236:31-35	C	9/08/95	2000	229	5.6	6.6	46	0.26	26	45	1.18	26	0.00	0.00	0.0	0.0	0.0	0.0	0.00	555
9046-085		226:36-40	C	9/08/95	1800	199	6.3	8.8	42	0.23	24	39	0.55	62	0.00	0.00	0.0	0.0	0.0	0.0	0.00	542
9046-085		107:21-22	B	9/06/95	703	12.65	6.0	7.5	44	0.21	23	39	0.69	42	1.56	0.84	51.4	6.2	0.4	22.0	3.54	481
9046-092		107:15-16	B	8/23/95	2069	10.55	6.1	8.4	42	0.21	22	39	0.70	43	1.77	0.66	44.0	4.6	17.4	15.8	3.42	85
9046-092		237:31-35	C	9/08/95	1500	170	4.4	7.8	36	0.24	27	42	1.23	24	0.00	0.00	0.0	0.0	0.0	0.0	0.00	546
9046-096		227:36-40	C	9/08/95	1800	165	4.8	3.3	59	0.28	24	43	0.48	69	0.00	0.00	0.0	0.0	0.0	0.0	0.00	531
9046-102		238:31-35	C	9/08/95	1800	172	5.6	6.5	46	0.27	22	39	1.14	28	0.00	0.00	0.0	0.0	0.0	0.0	0.00	553
9046-102		108:15-16	B	8/23/95	1280	9.80	6.0	7.0	46	0.22	20	36	0.50	58	1.34	0.56	52.5	5.6	10.1	19.2	3.45	86
9046-103		228:36-40	C	9/08/95	1600	195	4.1	4.3	49	0.28	23	42	1.09	30	0.00	0.00	0.0	0.0	0.0	0.0	0.00	537
9046-104		229:36-40	C	9/08/95	1700	124	5.3	4.9	52	0.28	27	42	0.87	40	0.00	0.00	0.0	0.0	0.0	0.0	0.00	543
9046-107		108:21-22	B	8/23/95	703	10.15	4.6	3.8	55	0.25	23	44	0.40	81	0.71	0.57	37.7	12.7	0.3	34.1	2.68	65
9048-046		230:36-40	C	9/08/95	1800	180	5.0	3.9	56	0.30	28	50	0.70	51	0.00	0.00	0.0	0.0	0.0	0.0	0.00	538

High Alpha Lines

1995 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 36

Accession or Nursery Number	♀ Identification	Location	TYP	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21043	Wye Challenger	018:05-08	B	8/29/95	711	15.70	10.2	4.9	68	0.26	22	44	0.48	54	0.83	0.55	41.8	6.1	1.8	19.9	3.28	516
21050	Ahil,Yugo	227:01-05	B	8/29/95	1476	9.55	11.4	5.2	68	0.25	24	48	0.62	52	2.12	0.67	55.5	3.4	10.7	7.6	2.22	468
21051	Apolon, Yugo	004:09-12	B	8/21/95	640	13.55	10.6	3.7	74	0.22	25	47	0.54	58	1.20	0.61	65.8	3.1	9.8	7.6	2.48	5
21055	6806-080	033:05-08	B	8/29/95	1003	24.65	12.9	3.7	78	0.29	50	72	0.00	0	2.43	0.00	52.6	4.5	5.9	6.5	1.44	473
21056	Bullion, 10A,VF	226:16-20	B	9/11/95	2022	11.35	10.5	5.9	64	0.23	39	64	0.89	38	3.32	0.96	68.6	5.5	0.1	9.3	1.70	609
21093	N. Brewer VF	012:09-12	B	8/21/95	427	8.05	10.1	3.7	73	0.23	24	50	0.36	81	1.58	0.84	60.5	6.0	0.1	16.6	2.76	7
21093	N. Brewer VF	236:01-05	B	8/22/95	1422	11.00	10.5	5.3	67	0.27	27	51	0.44	76	2.08	1.45	67.2	4.4	0.1	11.7	2.65	36
21112	Wye Target	016:09-12	B	8/29/95	1419	8.80	11.1	4.9	70	0.25	35	63	0.43	74	1.59	0.82	55.9	4.6	0.2	8.7	1.89	462
21112	Wye Target	238:01-05	B	8/29/95	1898	12.15	12.4	5.8	68	0.25	40	63	0.77	40	2.26	0.69	62.3	3.4	0.2	7.3	2.16	465
21116	Brewers Gold VF	239:01-05	B	9/13/95	3336	7.20	10.7	4.5	70	0.26	44	68	0.58	57	1.39	0.70	60.1	11.7	0.2	0.9	0.08	656
21182	Galena (43-16)	227:16-20	B	9/11/95	1604	12.90	14.4	9.0	62	0.23	41	64	0.47	69	2.51	0.95	57.9	3.2	0.2	7.2	2.25	617
21182	Galena (43-16)	008:05-08	B	8/29/95	1621	16.30	10.0	6.3	62	0.22	43	68	0.00	0	1.52	0.00	52.2	3.1	0.2	6.6	2.11	519
21193	Nugget	036:01-04	B	8/29/95	3039	17.95	12.5	4.7	73	0.24	29	54	0.00	0	0.90	0.00	53.7	7.1	0.1	16.2	2.30	529
21193	Nugget	228:16-20	B	9/11/95	2252	15.80	13.1	5.3	71	0.24	32	58	0.52	62	2.44	1.14	51.9	7.1	0.1	16.8	2.38	636
21225	Olympic	242:01-05	B	8/29/95	1638	10.75	13.1	6.3	68	0.24	34	60	0.66	49	1.29	0.58	63.4	5.4	0.0	7.0	1.29	472
21227	Perle	032:01-04	B	8/29/95	626	15.45	11.1	4.7	70	0.22	26	54	0.41	68	0.98	0.42	37.2	9.7	0.1	31.3	3.25	520
21240	Buket, Yugo	022:09-12	B	8/31/95	853	9.85	10.6	5.3	67	0.25	23	54	0.55	55	1.32	0.95	47.3	6.4	16.4	17.6	2.77	485
21240	Buket, Yugo	222:06-10	B	8/29/95	1160	13.35	11.0	5.4	67	0.24	25	57	0.85	31	2.60	0.86	58.3	4.5	4.6	14.1	3.11	521
21283	Wye Viking	229:06-10	B	8/29/95	444	11.50	10.5	5.5	66	0.25	24	45	0.50	67	2.59	0.95	55.5	2.2	8.9	5.9	2.67	463
21287	Banner	233:16-20	B	9/11/95	1941	15.35	10.7	6.8	61	0.23	36	60	0.81	39	3.01	0.68	65.7	4.3	0.0	11.9	2.78	641
21373	7006-398	242:21-25	B	9/13/95	1169	10.65	13.1	7.9	63	0.24	22	47	0.57	58	3.33	0.93	72.8	3.8	2.0	6.2	1.63	668
21373	7006-398	112:15-16	B	8/31/95	875	9.20	12.1	6.7	64	0.24	18	43	0.38	79	1.49	1.03	75.1	3.4	1.2	5.1	1.51	493
21498	Yeoman	241:16-20	B	8/22/95	1525	11.15	14.8	4.7	76	0.27	27	50	0.35	81	1.63	1.47	60.2	4.0	0.1	12.3	3.03	39
21498	Yeoman	034:01-04	B	8/21/95	1195	11.25	12.9	4.3	75	0.27	25	50	0.34	82	2.09	0.92	49.2	5.8	0.2	16.1	2.77	17
21499	Zenith	242:16-20	B	9/06/95	981	10.20	11.1	3.5	76	0.27	28	53	0.53	65	3.24	1.30	52.7	4.1	0.1	14.5	3.54	625
21499	Zenith	035:01-04	B	8/29/95	640	10.45	10.8	3.6	75	0.25	24	50	0.40	74	1.89	0.95	46.5	5.5	0.1	19.0	3.43	517
21609	Pacific Gem	232:21-25	B	9/13/95	3029	7.85	10.0	5.2	66	0.24	46	69	0.37	76	1.80	0.99	54.6	6.4	0.1	20.0	3.10	669
21609	Pacific Gem	017:13-16	B	9/08/95	739	8.10	13.7	7.2	65	0.23	39	66	0.35	83	1.78	0.88	61.1	4.1	0.1	12.4	3.07	615
21667	Omega	011:09-12	B	8/21/95	1038	9.45	10.7	2.5	81	0.25	25	47	0.31	92	1.07	0.87	48.8	5.8	0.3	20.5	3.54	22
21670	Hallertauer Mag	023:13-16	B	8/22/95	1120	9.75	14.3	5.1	74	0.24	27	47	0.31	91	1.05	0.81	61.8	4.5	0.2	16.5	3.63	48
21670	Hallertauer Mag	240:06-10	B	8/31/95	3225	10.90	17.1	7.1	71	0.26	27	48	0.45	70	3.75	0.70	62.6	3.7	0.1	14.0	3.73	634
21676	Toyomidori	224:11-15	B	8/31/95	2125	8.35	13.6	6.5	68	0.24	46	64	0.47	67	1.52	0.96	61.9	3.7	0.1	8.8	2.34	645
21677	Kitamidori	225:11-15	B	9/11/95	981	8.70	11.6	5.7	67	0.25	23	44	0.43	72	1.64	1.15	39.9	7.3	6.6	27.2	3.75	610
21678	Eastern Gold	036:09-12	B	9/01/95	1290	10.35	10.3	5.6	65	0.23	26	45	0.34	84	0.84	0.70	29.7	9.5	3.1	24.8	2.60	510
21678	Eastern Gold	226:11-15	B	9/13/95	2995	6.45	11.7	5.7	67	0.24	30	49	0.37	81	2.07	1.04	36.7	8.4	4.1	21.2	2.51	651
21698	Bianca 9046-41	110:15-16	B	8/23/95	1344	7.95	10.9	4.3	72	0.22	29	55	0.47	64	1.10	0.50	29.4	8.2	17.5	25.1	3.08	90

1996 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 60

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% ß	Alpha Ratio	HSI	Coα	Coß	6 Mo HSI	% Left	mL oil/100g Fresh	Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
21056	Bullion, 10A,VF	022:16-20	B	9/03/96	0	13.35	12.5	6.0	68	0.23	37	64	0.00	0	1.36	0.00	66.7	5.4	0.1	9.7	1.81	87
21182	Galena (43-16)	227:16-20	B	9/13/96	0	10.80	15.3	8.4	65	0.23	39	62	0.00	0	2.15	0.00	59.1	3.7	0.2	7.6	2.08	357
21183	Eroica (34-5)	013:05-08	B	9/09/96	0	17.30	12.4	4.5	73	0.22	37	65	0.00	0	1.31	0.00	67.1	10.1	0.3	0.8	0.08	279
21193	Nugget	228:16-20	B	9/13/96	0	16.80	17.2	4.8	78	0.24	26	52	0.00	0	1.58	0.00	72.0	3.8	0.1	8.7	2.28	361
21220	Eroica VF	241:01-05	B	9/13/96	0	11.60	14.0	4.6	75	0.25	44	69	0.00	0	1.35	0.00	62.8	11.4	0.2	0.9	0.08	379
21670	Hallertauer Mag	240:16-20	B	9/13/96	0	10.85	18.7	6.8	73	0.25	23	42	0.00	0	2.72	0.00	63.1	4.7	0.1	16.9	3.57	359
21677	Kitamidori	225:11-15	B	9/17/96	0	9.20	12.6	4.8	73	0.24	22	43	0.00	0	0.00	0.00	32.3	9.1	8.6	31.7	3.46	339
21678	Eastern Gold	226:11-15	B	9/17/96	0	8.80	14.2	5.2	73	0.22	28	47	0.00	0	1.86	0.00	43.4	7.6	3.6	19.5	2.59	338
9402-011		001:95	B	8/30/96	0	6.70	14.0	4.9	74	0.21	32	57	0.00	0	1.48	0.00	49.5	3.1	0.1	10.0	3.22	150
9402-036		029:70	B	9/03/96	0	7.25	13.4	5.5	71	0.23	24	52	0.00	0	1.87	0.00	0.0	0.0	0.0	0.0	0.00	127
9402-037		002:89	B	9/03/96	0	7.40	13.4	5.9	70	0.24	23	49	0.00	0	1.95	0.00	0.0	0.0	0.0	0.0	0.00	130
9402-042		002:94	B	9/03/96	0	14.20	14.9	6.9	68	0.22	24	45	0.00	0	1.74	0.00	59.3	2.5	0.2	8.3	3.36	160
9402-080		004:68	B	8/22/96	0	8.50	12.8	5.7	69	0.21	22	46	0.00	0	1.34	0.00	0.0	0.0	0.0	0.0	0.00	52
9403-046		006:71	B	9/10/96	0	9.80	12.1	4.8	72	0.23	35	57	0.00	0	2.21	0.00	45.9	8.4	0.1	20.5	2.45	223
9403-071		007:64	B	9/10/96	0	10.75	12.5	5.8	68	0.23	33	55	0.00	0	1.55	0.00	60.3	4.1	0.1	14.0	3.46	226
9403-103		008:64	B	9/10/96	0	10.00	12.5	6.4	66	0.24	28	54	0.00	0	3.24	0.00	59.9	4.2	0.1	14.5	3.49	216
9404-001		009:94	B	9/11/96	0	9.50	13.2	5.1	72	0.22	33	54	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	299
9404-015		010:76	B	9/11/96	0	10.25	12.5	4.1	75	0.23	28	54	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	321
9404-027		010:88	B	9/13/96	0	10.10	14.8	5.1	74	0.23	40	62	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	384
9404-048		011:77	B	9/11/96	0	8.70	13.8	5.4	72	0.21	31	52	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	317
9404-052		011:81	B	9/11/96	0	9.50	12.7	5.4	70	0.23	23	49	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	300
9404-054		011:83	B	9/11/96	0	10.70	12.1	4.3	74	0.23	24	44	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	319
9404-067		012:64	B	9/10/96	0	10.00	12.1	5.0	71	0.22	30	54	0.00	0	2.57	0.00	60.0	6.2	0.1	14.6	2.38	240
9404-070		012:67	B	9/11/96	0	10.60	15.4	3.2	83	0.23	26	52	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	288
9404-078		012:75	B	9/11/96	0	8.80	13.1	4.9	73	0.22	22	47	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	292
9404-092		012:89	B	9/11/96	0	8.90	15.2	6.4	70	0.21	34	56	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	293
9405-006		013:66	B	9/13/96	0	9.90	16.2	5.7	74	0.23	38	61	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	329
9405-007		013:67	B	9/13/96	0	11.00	14.7	6.2	70	0.23	23	44	0.00	0	2.44	0.00	0.0	0.0	0.0	0.0	0.00	327
9405-011		013:71	B	9/13/96	0	11.00	12.0	4.7	72	0.26	23	50	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	353
9405-034		013:94	B	8/23/96	0	9.90	13.6	4.7	74	0.23	24	50	0.00	0	1.98	0.00	0.0	0.0	0.0	0.0	0.00	112
9405-050		014:78	B	9/13/96	0	12.30	13.8	4.7	75	0.24	37	57	0.00	0	2.36	0.00	0.0	0.0	0.0	0.0	0.00	331
9405-072		015:68	B	9/13/96	0	8.65	13.1	6.8	66	0.23	34	58	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	383
9405-073		015:69	B	9/13/96	0	11.40	12.2	4.1	75	0.25	23	45	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	322
9405-103		016:67	B	9/13/96	0	10.30	12.4	3.1	80	0.27	24	46	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	324
9406-002		016:88	B	8/26/96	0	10.10	12.3	4.0	75	0.20	34	58	0.00	0	0.67	0.00	35.8	7.4	0.6	25.4	3.42	77
9406-003		016:89	B	9/13/96	0	10.15	14.3	3.4	81	0.24	36	59	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	289
9406-004		016:90	B	8/26/96	0	9.75	13.6	4.0	77	0.22	27	58	0.00	0	0.69	0.00	0.0	0.0	0.0	0.0	0.00	71
9406-010		017:64	B	9/10/96	0	10.70	16.9	5.7	75	0.23	34	59	0.00	0	2.00	0.00	53.3	5.3	0.1	13.6	2.56	246
9406-012		017:66	B	8/26/96	0	10.60	12.9	3.9	77	0.24	43	68	0.00	0	2.23	0.00	0.0	0.0	0.0	0.0	0.00	68
9406-023		017:77	B	8/26/96	0	10.10	13.1	4.5	75	0.23	23	47	0.00	0	1.57	0.00	0.0	0.0	0.0	0.0	0.00	64
9406-026		017:80	B	8/26/96	0	10.30	15.7	5.0	76	0.25	30	53	0.00	0	3.52	0.00	0.0	0.0	0.0	0.0	0.00	70
9406-096		019:83	B	9/13/96	0	10.75	12.8	4.5	74	0.23	26	47	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	325
9406-124		020:82	B	8/26/96	0	9.10	13.5	4.1	77	0.23	29	54	0.00	0	2.09	0.00	0.0	0.0	0.0	0.0	0.00	45
9406-131		020:89	B	9/13/96	0	11.35	12.0	5.3	69	0.24	30	48	0.00	0	3.00	0.00	0.0	0.0	0.0	0.0	0.00	330
9406-142		021:68	B	8/26/96	0	9.85	12.8	3.8	77	0.23	30	56	0.00	0	2.19	0.00	0.0	0.0	0.0	0.0	0.00	47
9408-066		027:69	B	9/16/96	0	8.95	12.3	5.7	68	0.21	22	42	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	367
9409-020		029:74	B	9/13/96	0	8.70	13.5	3.9	78	0.22	35	57	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	334
9410-033		032:77	B	9/16/96	0	8.95	13.4	3.4	80	0.25	30	56	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	372

High Alpha

1996 Bale (at 8% mc) and 5-Cone (as is basis) Analyses

Sorted by Accno (February 6, 1997) n = 60

Accession or Nursery Number	Identification	Location	T Y P	Harvest Date	Yield Lb/Ac	MC or ConeWt	% α	% β	Alpha Ratio	HSI	Coα	Coβ	6 Mo HSI	% Left	mL oil/100g Fresh	mL oil/100g Stor.	Area % Oil Composition Myr	Cary	Farn	Hum	H/C	LabNo
9410-042		032:86	B	9/16/96	0	9.70	17.1	4.3	80	0.22	23	46	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	350
9411-013		033:85	B	9/03/96	0	8.75	12.8	4.0	76	0.24	25	51	0.00	0	1.24	0.00	53.2	3.3	0.2	11.0	3.33	122
9411-073		035:81	B	9/06/96	0	8.10	12.9	5.6	70	0.23	32	53	0.00	0	1.01	0.00	29.3	3.7	0.1	6.3	1.68	178
9411-078		035:86	B	9/06/96	0	7.20	12.6	5.2	71	0.23	41	64	0.00	0	0.78	0.00	39.2	6.9	1.0	14.0	2.03	182
9411-089		035:67	B	9/06/96	0	8.15	13.7	5.3	72	0.22	23	40	0.00	0	1.08	0.00	33.2	9.6	0.2	32.1	3.36	185
9411-095		036:71	B	9/06/96	0	8.00	14.4	6.3	70	0.22	23	45	0.00	0	1.16	0.00	0.0	0.0	0.0	0.0	0.00	176
9414-001		044:64	B	9/09/96	0	9.10	12.3	3.4	78	0.25	24	45	0.00	0	2.44	0.00	42.6	10.1	0.2	16.0	1.58	233
9414-003		044:66	B	9/09/96	0	10.55	13.3	5.1	72	0.23	41	61	0.00	0	2.02	0.00	0.0	0.0	0.0	0.0	0.00	277
9414-022		044:85	B	9/09/96	0	11.30	12.9	2.6	83	0.25	23	47	0.00	0	2.05	0.00	50.4	8.9	0.2	14.4	1.62	232
9414-027		044:90	B	9/09/96	0	15.05	12.1	3.4	78	0.23	32	53	0.00	0	1.60	0.00	59.8	6.1	0.2	11.5	1.89	265
9414-030		044:93	B	9/09/96	0	9.95	12.5	3.2	80	0.24	42	66	0.00	0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	281
9415-001		047:80	B	9/10/96	0	10.00	12.5	6.4	66	0.23	56	72	0.00	0	2.20	0.00	59.1	5.0	5.3	9.0	1.78	252

1995 Lupulin Analyses

Sorted by Accno (February 6, 1997)

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Accession or Nursery Number	Identification	Location	Harvest Date	% α-acids	% β-acids	Alpha Ratio	Sum α+β	HSI	Coα	Coβ	Crush (3 hr)	SPO (hrs)	Permea-bility	Calc. % Remain	Hum/ Cary	Myrcene	Laboratory Serial No.
19009M	Fu x Fu-S	005:53-54	7/12/95	23.1	52.5	31	75.7	0.218	24	45	0.448	0.5	0.08	79	0.75	0	5023
19036M	LC x Fu-S	007:53-54	7/19/95	13.1	62.3	17	75.5	0.194	24	43	1.449	1.2	0.21	67	2.76	0	5069
19037M	Fu-S x RedV-S	008:53-54	7/12/95	14.8	56.6	21	71.3	0.200	27	48	1.890	0.6	0.08	79	3.24	0	5018
19046M	LC-S x Fu-S	014:53-54	7/19/95	6.1	63.3	9	69.4	0.188	33	48	1.635	0.5	0.01	87	1.67	0	5066
19048M	Fu-S x RedV-S	016:53-54	7/19/95	44.2	34.8	56	79.0	0.230	33	56	0.359	3.1	0.47	50	2.40	0	5064
19060M	EKG x Bav S	019:53-54	7/19/95	30.8	47.4	39	78.2	0.212	46	60	0.992	1.9	0.39	55	1.23	0	5057
19172M	CatsTailx19009M	024:53-54	7/11/95	27.5	40.4	40	67.8	0.240	19	32	1.273	1.6	0.59	44	2.67	0	5004
19173M	Striessx73-28	025:53-54	7/11/95	25.2	50.4	33	75.6	0.205	21	45	1.936	1.2	0.37	56	1.01	0	5005
21017M	6220-009M	029:53-54	7/19/95	46.7	29.5	61	76.2	0.247	41	61	0.353	3.7	0.46	51	1.92	0	5072
21110M	7007-018M	010:55-56	7/12/95	44.8	31.6	59	76.4	0.241	20	39	0.364	3.0	0.66	41	2.78	0	5015
21130M	6903-021M	030:57-58	7/13/95	15.1	60.3	20	75.5	0.193	17	32	1.861	1.1	0.06	81	1.48	0	5041
21135M	7006-430M	039:57-58	7/13/95	37.4	36.5	51	73.9	0.245	17	38	0.416	2.1	0.40	54	1.74	0	5036
21136M	7006-323M	041:57-58	7/13/95	39.3	35.7	52	75.0	0.242	17	33	0.353	2.3	0.33	59	2.65	0	5037
21137M	7006-340M	043:57-58	7/19/95	33.2	43.0	44	76.2	0.225	21	39	0.475	1.8	0.33	59	1.60	0	5054
21184M	Male Comet?	016:55-56	7/19/95	49.4	25.4	66	74.9	0.252	42	63	0.386	7.3	0.35	57	0.01	0	5059
21263M	7302-105M	039:53-54	7/11/95	27.5	40.4	40	67.8	0.240	29	46	0.487	2.3	0.46	51	0.25	0	5003
21300M	7006-084M	001:61-62	7/13/95	41.1	34.5	54	75.6	0.227	17	33	0.394	2.2	0.42	53	1.59	0	5026
21302M	7006-187M	002:61-62	7/13/95	41.4	31.8	57	73.2	0.253	19	37	0.744	2.0	0.41	54	1.53	0	5025
21303M	7007-021M	003:61-62	7/21/95	43.4	33.6	56	77.0	0.236	18	40	1.313	2.0	0.40	54	1.44	0	5076
21304M	7007-252M	004:61-62	7/21/95	45.9	27.1	63	73.0	0.233	26	48	0.408	2.2	0.51	48	0.88	0	5079
21307M	7613-042M	007:61-62	7/21/95	56.8	14.8	79	71.6	0.276	26	47	0.426	5.1	0.63	42	0.60	0	5077
21310M	7613-128M	010:61-62	7/21/95	58.7	20.7	74	79.3	0.258	34	60	0.382	8.1	0.01	87	1.12	0	5082
21313M	7302-036M	034:53-54	7/11/95	58.5	18.2	76	76.7	0.252	27	46	0.523	3.0	0.38	55	1.62	0	5002
21315M	7302-125M	040:53-54	7/12/95	47.4	22.8	68	70.2	0.265	29	50	0.606	1.9	0.01	87	2.13	0	5008
21316M	7302-127M	041:53-54	7/11/95	46.0	24.1	66	70.1	0.272	22	41	0.377	4.9	0.28	62	0.04	0	5001
21317M	7302-153M	043:53-54	7/19/95	59.9	19.7	75	79.6	0.245	29	53	0.390	3.8	0.36	57	0.46	0	5053
21318M	7302-155M	044:53-54	7/12/95	59.7	19.2	76	79.0	0.250	29	52	0.354	3.3	0.31	60	0.16	0	5010
21319M	7302-166m	045:53-54	7/12/95	65.0	17.8	78	82.8	0.246	28	51	0.316	3.2	0.33	59	0.13	0	5012
21322M	7302-183M	048:53-54	7/12/95	46.1	21.3	68	67.4	0.288	22	40	1.026	1.9	0.48	50	0.21	0	5014
21323M	7302-184M	049:53-54	7/12/95	48.4	23.7	67	72.2	0.257	19	36	0.415	2.5	0.43	52	0.01	0	5009
21327M	7303-169M	036:55-56	7/12/95	56.7	16.9	77	73.6	0.262	31	51	0.377	3.0	0.26	64	2.12	0	5017
21328M	7303-165M	037:55-56	7/12/95	50.1	25.1	67	75.2	0.252	35	54	0.367	2.4	0.30	61	1.50	0	5019
21329M	7304-085M	038:55-56	7/12/95	54.7	20.0	73	74.7	0.263	20	39	1.438	1.4	0.02	86	1.68	0	5022
21330M	7304-105M	040:55-56	7/12/95	54.6	22.4	71	77.0	0.243	29	50	0.332	2.3	0.15	73	1.38	0	5021
21331M	7304-123M	041:55-56	7/12/95	57.2	19.1	75	76.3	0.250	23	44	0.401	2.4	0.32	59	1.55	0	5020
21333M	7304-197M	046:55-56	7/12/95	52.6	20.2	72	72.8	0.249	32	52	0.435	2.0	0.24	65	2.35	0	5013
21337M	7309-034M	004:59-60	7/13/95	45.6	28.3	62	74.0	0.242	19	34	0.336	1.9	0.01	87	2.41	0	5035
21339M	7311-012M	008:59-60	7/13/95	43.7	25.1	63	68.8	0.279	29	48	0.370	5.4	0.33	59	1.57	0	5027
21344M	7311-142M	016:59-60	7/14/95	50.2	22.9	69	73.2	0.269	30	49	0.345	3.5	0.14	73	0.12	0	5050
21346M	7312-028M	018:59-60	7/14/95	56.1	21.2	73	77.3	0.259	29	50	0.345	3.5	0.39	55	0.13	0	5046
21347M	7312-033M	020:59-60	7/13/95	47.7	21.4	69	69.1	0.280	24	42	0.381	7.3	0.01	87	2.71	0	5029
21349M	7312-079M	022:59-60	7/19/95	56.0	20.9	73	76.9	0.264	33	54	0.395	6.8	0.40	54	1.26	0	5061
21354M	7314-023M	032:59-60	7/13/95	46.8	28.2	62	75.0	0.252	34	51	0.464	2.1	0.13	74	2.59	0	5040
21356M	7314-086M	034:59-60	7/13/95	51.8	24.6	68	76.4	0.255	37	56	0.347	2.5	0.19	69	1.59	0	5034
21362M	7506-235M	051:59-60	7/13/95	41.6	33.9	55	75.5	0.228	25	41	0.375	1.7	0.01	87	2.83	0	5033
21363M	7507-107M	052:59-60	7/19/95	42.6	28.8	60	71.5	0.241	30	51	0.482	6.6	0.37	56	2.73	0	5055
21364M	7507-117M	053:59-60	7/19/95	34.7	46.9	43	81.6	0.207	23	42	1.546	3.0	0.32	59	2.77	0	5063
21376M	7504-104M	052:57-58	7/19/95	21.9	55.2	28	77.1	0.209	23	45	0.325	1.8	0.26	64	0.27	0	5067

1995 Lupulin Analyses

Sorted by Accno (February 6, 1997)

Accession or Nursery Number	Identification	Location	Harvest Date	% α-acids	% β-acids	Alpha Ratio	Sum α+β	HSI	Coα	Coβ	Crush (3 hr)	SPO (hrs)	Permeability	Calc. % Remain	Hum/ Cary	Myrcene	Laboratory Serial No.
21379M	7506-057M	041:59-60	7/19/95	43.9	35.9	55	79.8	0.226	28	48	0.356	4.7	0.47	50	2.32	0	5060
21381M	7506-182M	049:59-60	7/13/95	22.2	56.7	28	78.9	0.201	15	26	2.084	0.9	0.26	64	2.91	0	5045
21416M	7007-275M	013:61-62	7/21/95	34.6	36.5	49	71.1	0.228	19	39	0.628	2.5	0.21	67	0.99	0	5085
21417M	7610-112M	014:61-62	7/21/95	56.9	18.9	75	75.8	0.250	36	59	0.422	6.6	0.26	64	1.23	0	5075
21419M	7613-004M	015:61-62	7/21/95	52.9	21.8	71	74.7	0.244	28	45	0.342	4.0	0.40	54	2.76	0	5074
21422M	7614-052M	018:61-62	7/21/95	54.7	21.1	72	75.9	0.254	30	49	0.384	7.7	0.08	79	2.36	0	5083
21424M	7701-032M	019:61-62	7/21/95	31.3	38.5	45	69.8	0.242	34	55	0.948	2.2	0.24	65	1.34	0	5078
21426M	7703-031M	021:61-62	7/21/95	40.8	34.7	54	75.6	0.227	20	43	0.338	3.1	0.51	48	1.00	0	5089
21427M	7704-012M	022:61-62	7/13/95	32.2	30.6	51	62.8	0.246	22	39	0.796	1.0	0.03	85	2.15	0	5030
21428M	7706-040M	023:61-62	7/21/95	40.3	34.9	54	75.1	0.234	32	55	0.339	4.2	0.35	57	1.55	0	5081
21429M	7710-033M	024:61-62	7/21/95	33.7	47.3	42	81.0	0.200	19	42	0.405	2.5	0.23	66	1.59	0	5084
21432M	7715-015M	025:61-62	7/14/95	32.3	48.2	40	80.5	0.203	24	39	0.488	1.4	0.55	46	2.21	0	5048
21433M	7717-019M	026:61-62	7/13/95	42.5	36.5	54	79.0	0.227	27	49	0.314	3.5	0.52	47	2.24	0	5031
21434m	7717-022M	027:61-62	7/13/95	41.9	34.7	55	76.5	0.232	18	33	0.322	2.6	0.11	76	2.40	0	5024
21435M	7721-049M	028:61-62	7/13/95	57.7	24.9	70	82.6	0.230	43	65	0.820	1.6	0.06	81	2.05	0	5028
21436M	7722-019M	029:61-62	7/13/95	56.7	20.4	74	77.2	0.246	35	56	0.313	2.7	0.27	63	2.19	0	5032
21437M	7727-004M	030:61-62	7/14/95	40.0	39.7	50	79.7	0.247	32	54	0.358	3.7	0.09	78	1.47	0	5052
21444M	7302-016m	033:53-54	7/11/95	46.4	26.0	64	72.4	0.248	30	53	0.455	2.2	0.25	64	0.63	0	5006
21446M	7310-007M	007:59-60	7/19/95	48.0	27.6	64	75.5	0.241	31	51	0.322	5.4	0.01	87	2.36	0	5070
21448M	7506-081M	043:59-60	7/14/95	48.3	31.9	60	80.2	0.223	23	45	0.300	2.2	0.13	74	2.82	0	5047
21462M	7703-005M	033:61-62	7/14/95	45.0	20.3	69	65.2	0.254	24	44	0.344	2.9	0.37	56	2.77	0	5051
21466M	7302-052M	035:53-54	7/11/95	53.2	23.7	69	76.9	0.243	24	47	0.371	3.1	0.56	45	0.03	0	5007
21487M	7711-032M	036:61-62	7/21/95	41.9	31.7	57	73.6	0.227	26	48	0.483	2.9	0.55	46	2.23	0	5080
21603M	7702-023M	037:61-62	7/21/95	41.1	34.0	55	75.1	0.239	31	56	0.442	4.6	0.48	50	1.60	0	5086
21615M	7303-052M	055:53-54	7/19/95	57.6	22.1	72	79.6	0.248	34	56	0.400	5.6	0.09	78	2.23	0	5058
21641M	8411-099M	041:61-62	7/21/95	35.5	35.1	50	70.6	0.247	23	47	0.422	3.2	0.28	62	1.51	0	5088
21643M	8411-217M	043:61-62	7/14/95	46.3	30.9	60	77.1	0.231	32	54	0.316	2.6	0.02	86	1.79	0	5049
21646M	8411-263M	046:61-62	7/21/95	42.5	32.6	57	75.2	0.227	19	37	0.345	3.4	0.50	48	1.51	0	5087
51114M	221-1	005:55-56	7/13/95	16.4	52.4	24	68.7	0.226	27	45	1.779	1.0	0.16	72	2.85	0	5042
52042M	19022 x 19045M	007:55-56	7/13/95	6.4	27.3	19	33.7	0.280	23	38	1.923	0.2	0.00	88	0.00	0	5039
52047M	19127 X 19173M	011:55-56	7/19/95	30.1	44.7	40	74.7	0.229	33	56	0.454	4.7	0.22	67	2.53	0	5062
63011M	19012 x 19041M	022:55-56	7/19/95	20.3	54.4	27	74.7	0.206	23	40	0.329	1.9	0.32	59	2.06	0	5068
63012M	BG x 58015M	023:55-56	7/12/95	47.1	27.7	63	74.8	0.270	44	63	0.574	1.5	0.05	82	0.90	0	5011
63013M	BG x 58015M	024:55-56	7/12/95	44.2	30.0	60	74.2	0.253	41	61	0.360	3.9	0.46	51	0.04	0	5016
63014M	BG x 58015M	025:55-56	7/19/95	41.4	30.8	57	72.2	0.251	46	65	0.335	3.4	0.45	51	0.21	0	5071
63015M	BG(BG x 19062M)	026:55-56	7/19/95	51.4	24.2	68	75.6	0.253	28	50	0.351	6.6	0.24	65	2.28	0	5073
64027M	BG(BG x 19062M)	033:57-58	7/13/95	49.9	28.3	64	78.2	0.243	29	58	0.379	3.4	0.40	54	1.39	0	5044
64028M	BG x(BGx19062M)	034:57-58	7/19/95	40.4	31.6	56	72.0	0.250	24	45	1.290	2.1	0.01	87	1.83	0	5056
64031M	BG(BG x 19062M)	037:57-58	7/19/95	33.8	38.8	47	72.6	0.248	33	53	0.327	4.6	0.61	43	2.11	0	5065
64102M	Wye #321	006:57-58	7/13/95	35.1	38.0	48	73.1	0.234	40	64	0.485	2.4	0.30	61	2.03	0	5038
64103M	Wye OB 79	007:57-58	7/13/95	34.7	43.8	44	78.5	0.208	43	64	0.467	1.3	0.10	77	2.36	0	5043

SABHF

The South African Breweries Hop Farms (Pty) Ltd.

Co. Reg. No. 05/0/912/07
Telephone (0441 707005/6
Telefax (0441) 707550

"Rob Roy" Farm, Blanco
District George, C.P.
P.O. Box 1498
6530 George

2 March 1995

Dr. Al Haunold
U.S. Dept. of Agriculture
Dept. Crop Science
Oregon State University
Caravallis. OR 97331

do not attack roots or on alfalfa-shoots also a fungus feeder, are only a feeder

Jerry Santo WSU nematologist
H: 1-509-786-3682
wk: 1-509-786-9256

Dear Al,
How are you keeping? I hope you are well!

We are presently in the middle of harvest with another good crop on hand - perhaps not as good as previous years, but not much to complain about.

Thank you for the varieties I received from you some time ago. They all arrived in good shape and are presently going through the various quarantine procedures.

soil was washed off

Russ Ralph Ingham 7-5255 OSU nematologist

Two of the varieties, Tettnanger and Hersbrucher Spät, are infected with the nematodes Aphelenchoides subtemius and Dictylenchus dipsaci respectively. These two species do not occur in South Africa and the plants are supposed to be destroyed. I have persuaded the quarantine authorities to hold on to these plants until we know more about these nematodes and the origin of the plant material.

dx of bulb

These two nematode species apparently survive in the top growth of the hops, especially the growing points! This will complicate the elimination of them through tissue culture, while hot water treatment might destroy the plants. Only these two varieties have been tested so far.

— no — would not be in the tissue — check bud

My problems and questions are the following:

1. What is the original source of this material and is the origin of all the other varieties in this consignment the same as these two?
2. Are these two varieties grown in the same source, block or plot and are they grown near each other in your hop field? My concern is that all the varieties or plants in this consignment could be infected if they are grown near to each other. It is possible that all the other varieties, or some of them, previously imported from your source, could also be infected. The quarantine authorities say that as they use as small a portion of the plant as possible for testing, so as not to damage the hop cutting too much, it is possible to miss a positive infection.
3. Are you aware of the presence of the nematodes in these plants and do you know more about their habits, spread, infestation and elimination in hop plants?
4. Do you have any suggestions or advice regarding this matter?

We would appreciate any help you can give us in this matter. As it is late in the season already I look forward to hearing from you as soon as possible!

Warm regards

OSU - Entomology: 7-4733
Ralph Berry (nematologist) 7-5536

Mr. Gerrie Brits
Research and Development Co-ordinator.

Tett 21015 8:1-4 | Dipsaci alf, red clover, onions - stem + bulb nematode - above ground
21496 40:1-4 | infect through roots; migrate up inside the tissue
21497 4:1-4
21185: 4:1-4 Gene Newcomb - plant clinic | 7-3472 75590

OREGON STATE UNIVERSITY
Cordley Hall 1089 · Corvallis, Oregon 97331-2903
Telephone 503-737-3472
Fax 503-737-2412

March 22, 1995

Or state univ Plant Clinic

Al Haunold
USDA-ARS hops program
Oregon State University
CORVALLIS OR 97331

Nematode levels in OSU hop field plots from which hop rhizomes were sent to South Africa.

The sample for nematode testing was received in the Plant Clinic on March 6, 1995 from the hops cultivars planting of USDA hop yards.

Rhizome and accompanying bud-shoot samples are reported in terms of relative abundance.

PCN#	Field or plot designation	Stem and Bulb Nematodes *Ditylenchus*	Foliar Nematodes *Aphelenchoides*
41	Hersbrucker Spaet plot #222:21-25	very few	none
42	Tettnanger plot #222:1-5	very few	rare

Some comments on aspects of this examination:

Number: In neither variety were there the quantities of nematodes I would expect if they were pathogenic upon hops. I removed individual buds from the plants, examined them separately and was unable to detect nematodes in them. I would be very comfortable taking softwood cuttings

Taxonomy: Although, of course, I cannot say that I saw exactly the same nematodes as the inspectors in South Africa, my examinations did not entirely confirm their diagnoses. The foliar nematode is close to *Aphelenchoides subtenuis,* but it does not fit entirely comfortably within that species. Prof. Harold Jensen had not found Oregon collections that he could identify as definitely that species. Our *Aphelenchoides* has never been found on *Narcissus* - the most commonly cited host for *A. subtenuis* - even though it is a crop of some importance in the state. *Ditylenchus dipsaci* is on the other hand found in association with several crops in the state, but has never been associated with hops. My measurements of the nematodes in my samples were shorter and stouter than I would expect for *D. dipsaci.*

In conclusion, I would certainly concur with all efforts to propagate material that is nematode free, but still feel there is little risk from the nematodes which probably were associated with the rough cork on the surface of the rhizomes and feeding upon fungi as is characteristic of many species within both genera.

Sincerely,

Gene Newcomb, PhD
Nematologist

GN/gn

United States Department of Agriculture
Agricultural Research Service
Pacific West Area
Forage Seed & Hop Research Unit
Dept. Crop and Soil Science
Crop Science Building 451B
Oregon State University
Corvallis, Oregon 97331-3002
Telephone: (503) 737-5841
FAX: (503) 737-1589

March 8, 1995

Gerrie Brits
Research and development coordinator
The South African Brew. Hop Farms Ltd.
Rob Roy Farm, Blanco
Dist. George
PO Box 1498
6530 George, South Africa FAX Nr. 9011-27-441-707550

Dear Gerrie,

I was quite surprised about your fax message of March 2, regarding the presence of the two nematode species Aphenlenchoides subtemius and Dictylenchus dipsaci in the hop shipment I mailed in late Dec. 1994.

I checked with nematologists both here and at Prosser WA and nobody has ever heard of either of these two species being associated with hops. I then went to the same plots from which the rhizomes of Tettnanger and Hersbrucker Spaet were dug and we got additional rhizomes plus soil samples and they are being investigated at the present time in our Plant Clinic. As soon as I hear anything definitive, I'll let you know.

Now to you specific questions:
1. These two varieties came from a different location, a new piece of ground we obtained about 3 years ago . I have not noticed any damage to the plants during the growing season nor am I aware of any nematode problem.

2. I know nothing about these nematodes, your information was the first time we were told there might be a problem. All rhizomes looked clean, no damage, we washed the soil off as much as possible, but did not do a microscopic examination at the time

3. I suggest you grow the plants in quarantine, force them into quick growth, make soft-wood cuttings by rooting them with IBA/boron (1000 ppm) and then destroy the original mother plants grown from the imported rootstock and steam sterilize the pots where these plants were grown. You should be able to get clean plants that way.

As soon as I get the information from our Plant Clinic, I let you know of the results.

Sincerely,

Al Haunold
Res. Geneticist

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March 31, 1995

Al Haunold
Dept of Crop and Soil Sciences
OSU
CAMPUS

The sample for nematode testing was received in the Plant Clinic on March 17, 1995 from the planting of USDA hop yards.

I first did "root" extractions for all samples. I varied the procedure by separating the growing shoots and young buds from the older rhizomes with their attached roots (very few present). There were so few nematodes present in either tissue type that I am just combining the results below. The root samples are simply reported as number of nematodes found. Any mathematical calculations would place their numbers as small fractions of nematodes per gram of tissue (the usual way of expressing such data). After I had some idea of what was in the "roots", I examined a limited number of soil samples, selecting those which had at least a few nematodes in the roots. Those results are in the standard nematodes per quart of soil and are the second figure under each PCN# when present.

PCN#	Field or plot designation	Stem and bulb Nematodes *Ditylenchus*	Foliar Nematodes *Aphelenchoides*	Cyst Nematodes *Heterodera*	
52	12:7 East Main		2	1	0
		0	270	0	
53	4:9 East Main	0	1	5	
		0	0	130	
54	40:8 East Main	0	3	6	
		0	0	2930	
55	48:18 East Main	3	0	3	
		0	0	1000	
56	109:9 West Main		0	0	0
57	10:56	0	2	0	
58	24:9 East Main	0	0	0	
59	106:37 West Main	0	1	0	
60	46.55 East Main	0	0	0	
61	26.55 East Main	0	0	0	
62	34:11 East Main	3	0	0	
	soil results	0	0	0	

Sincerely,

Gene Newcomb
Nematologist

March 16, 1995: Neil Christensen's (OSU Soils)--presentation to Or. Hop Comm.

1994 Oregon fertilizer trials on various farms and OSU yards.

Table 1. Hop cone yield, alpha and beta acid percentage, and nitrogen uptake as influenced by nitrogen fertilizer rates at four Willamette Valley locations in 1994.

Site[†]	Fert. N in June	Total Fert. N	Cone yield	alpha	beta	N in Cones	Tot. N uptake
	lb/a	lb/a	lb/a	%	%	lb/a	lb/a
Annen	0	40	1984	4.95	3.65	49	131
	50	90	2062	4.70	3.40	51	131
	100	140	1961	4.40	3.33	50	144
		LSD 0.05	N.S.	N.S.	N.S	N.S.	N.S.
Leavy	0	75	2547	15.8	5.23	51	115
	50	125	2717	16.0	5.18	52	125
	100	175	2499	16.0	5.03	51	124
		LSD 0.05	N.S.	N.S.	N.S	N.S.	N.S.
Stauffer	0	60	2104	16.3 a[§]	5.00 b[§]	44	103
	50	110	2057	14.9 b	4.75 c	42	102
	100	160	2151	15.2 b	5.03 a	45	108
		LSD 0.05	N.S.	0.9	0.12	N.S.	N.S.
USDA[‡]	0	0	1254 a[§]	16.1 a	4.65	nd[¶]	nd
	50	100	2410 b	14.8ab	4.40	nd	nd
	100	200	2558 b	14.5 b	4.31	nd	nd
		LSD 0.05	466				

[†] Hop cultivar was 'Willamette' at Annen site and 'Nugget' at all other sites.

[‡] Treatments applied in both 1993 and 1994 (ie., 0 N treatment received no nitrogen for two years).

[§] Means followed by the same letter not significantly different at P = 0.05.

[¶] Nitrogen uptake not determined at USDA site.

Fertilizer recommendations for 1995:

1) Base: by mid-April right after pruning (ring each hill)
   triple 15, 16 etc: 300 lbs/acre of 6 oz per hill, ringed

2) Booster: N only--by late May or early June, Am.Nitrate (33% N)
   250 lbs/acre or 5 oz per hill, ringed.

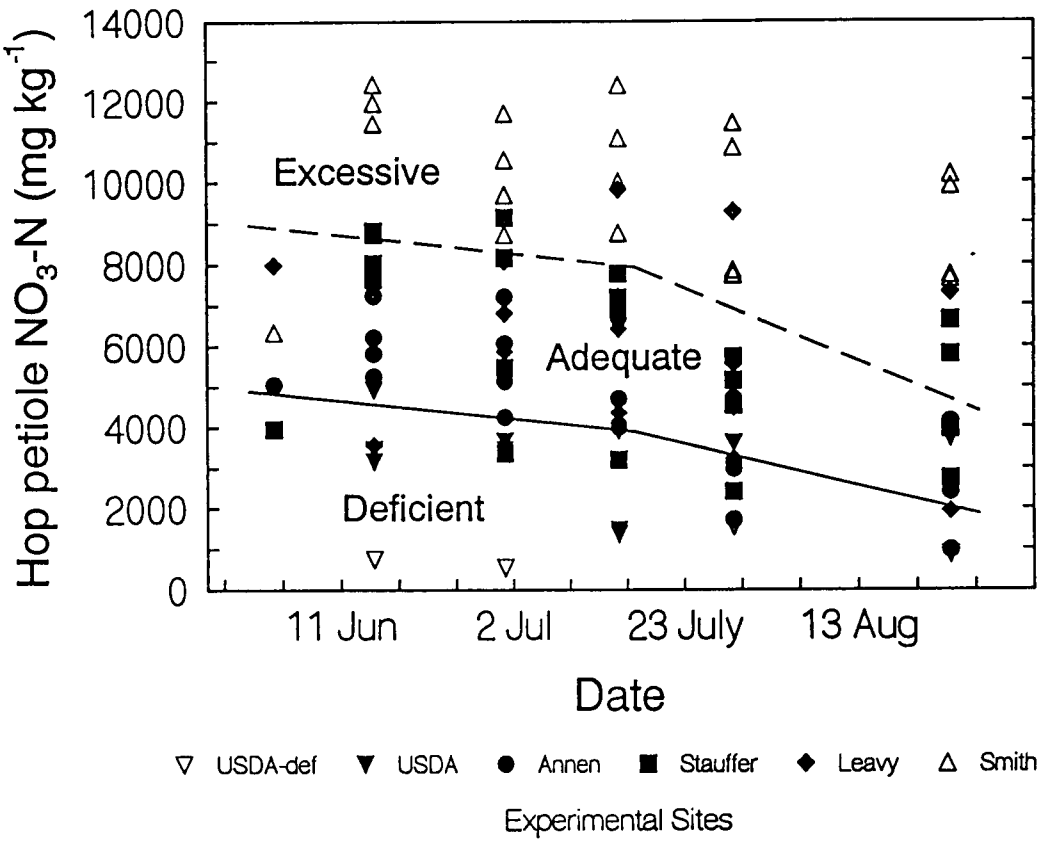

Figure 1. Nitrate-nitrogen concentrations in hop petioles at five sites from early June through August . Only points labeled USDA-def (∇) were shown to be nitrogen deficient.

Hop powdery mildew life cycle.

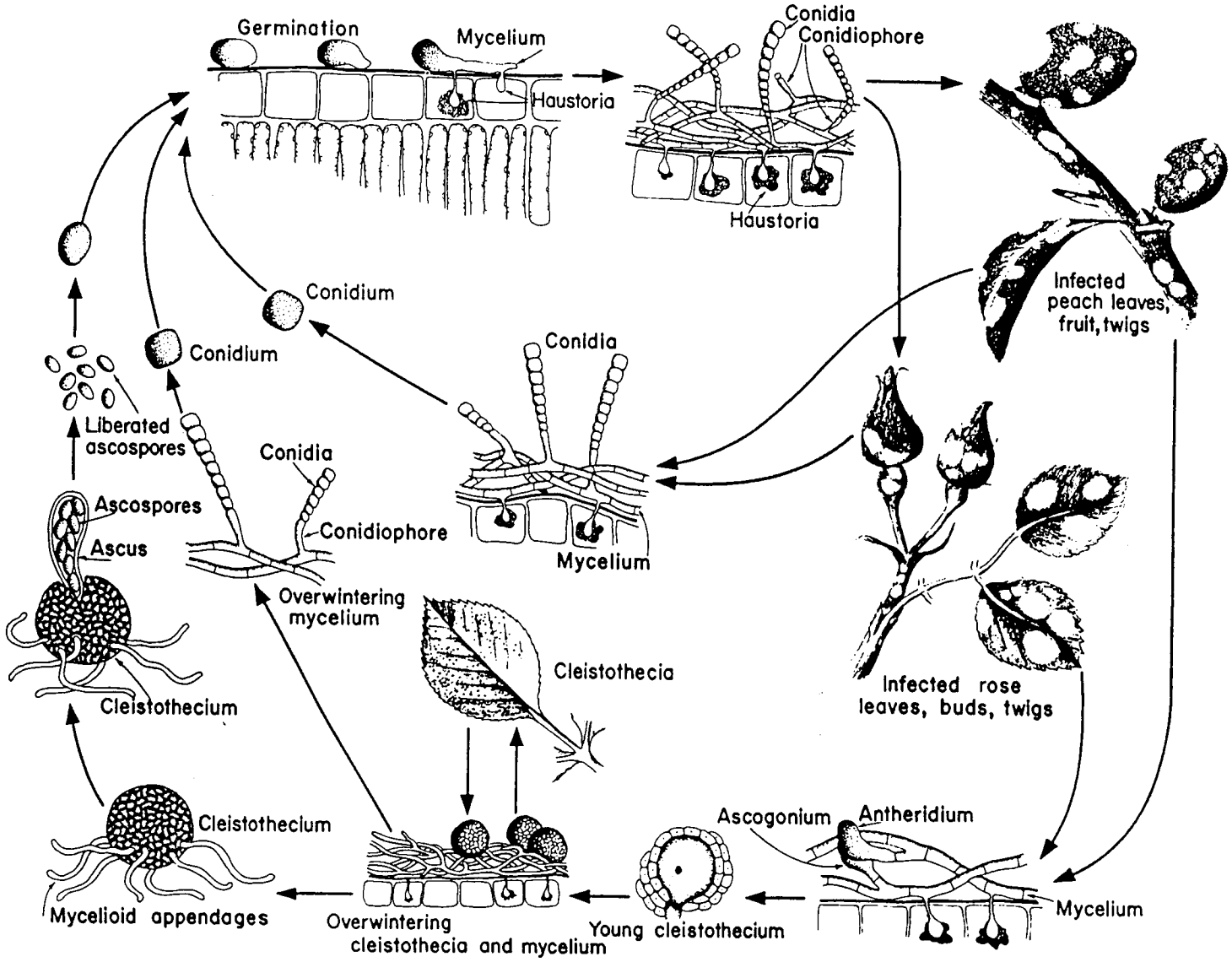

Fig. 33. Disease cycle of powdery mildew of rose and peach caused by *Sphaerotheca pannosa*.

AGRIOS, G.N (1969) Plant Pathology, Acad. Press

Recent Foreign Hop Importation into Oregon

(note: company was J.I. Haas Inc.)

5/31/91	Company renews PPQ form 597, permit to import post-entry hop material.
12/8/93	ODA hop quarantine goes into effect, prohibits entry of most hops.
7/94	ODA notifies NPB/USDA APHIS of new hop quarantine. A summary of the quarantine is placed in the *Federal/State Quarantine Summary.*
2/06/95	Company imports 150 plants from Suffolk, Great Britain. Plant material is inspected at Seattle and is found apparently free from pests. Material meets all USDA requirements for entry.
Spring/95	Company representative calls ODA to notify that the shipment has arrived.
8/7/95	Company representative calls ODA to request a post-entry inspection. As of this date, ODA has not received any reports from USDA (inspection alerts). This has allowed the material to be present in the production area for nearly an entire season without a post-entry inspection.
8/10/95	ODA alerts OHC of the shipment, seeks industry input on the situation of imported hops and the hop quarantine.
8/22/95	ODA formally notifies USDA of the quarantine situation and the problems with notification and asks for more to cooperation on future shipments.
10/23/95	USDA agrees to provide more cooperation.
11/9/95	ODA meets with OHC to review importation issue.

Washington State University
Irrigated Agriculture Research and Extension Center

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937-0

May 30,1995

Susan Hiller
Oregon Hop Commission
Salem, OR

Dear Susan:

RE: suitability of Ridomil for control of hop downy mildew in Oregon

I cannot recommend the use of Ridomil for control of hop downy mildew in the Willamette Valley of Oregon. Before I comment further, let me clarify the historical record. In 1992, I tested downy mildew samples from Oregon. In the samples tested, there was a high incidence of resistance to Ridomil (>75%) and every yard tested had samples which were Ridomil resistant. Tests in 1995 show some amelioration of the situation. Overall incidence of Ridomil resistance has declined and some hop yards, based on a sample size of only 10, had no resistant samples. Ultimately though, we have to estimate what effect Ridomil would have on the the downy mildew epidemic Oregon hop growers are currently experiencing. At this time, disease increase is limited only by the weather, not by the amount of inoculum (spores) actually present. How much of a decrease of inoculum would there have to be to make the epidemic inoculum-limited? That is a very difficult question to answer but probably about a 90% decrease in downy mildew would buy a grower a <u>few</u> days of control with the weather we currently have. Is the incidence of Ridomil resistance less than 10% (to allow for a 90% decrease)? Very, very unlikely even under the most optimistic assumptions.

When can Ridomil be used? Under good conditions and with another year of testing, maybe in 1996, if the incidence of resistance decreases below about 20%. Under those circumstances, an early season application could delay the need for an application of Aliette for a significant time. If a grower wishes to use Ridomil today, Ridomil resistant downy mildew will be re-selected and an efficacious use of Ridomil will be delayed for years. In addition, the grower will receive no benefit from his spray and will have to apply Aliette anyway. I wish I could sound more optimistic but that would be a lie.

Sorry,

Harnold

Post-it® Fax Note 7671	Date 5-30-95	# of pages ▶ 1
To Oregon Hop Growers	From Susan Hiller	
Co. FYI	Co. OHC	
Phone #	Phone #	

U.S. Hop Industry
Plant Protection Committee

A subcommittee of:
Washington Hop Commission
Oregon Hop Commission
Idaho Hop Commission
Hop Growers of America

504 North Naches Avenue, #11
Yakima, Washington 98901
Telephone (509) 453-4749
Fax (509) 457-8561
Ann E. George, Administrator

Chemical Residue Analyses for Pesticide Registration on Hops

Hop Research Council - 1996 Funding Request

Submitted: August 10, 1995
By: Washington Hop Commission on behalf of the U.S. Hop Industry Plant Protection Committee

INTRODUCTION AND JUSTIFICATION

Reluctance by chemical manufacturers to incur the expense of residue testing and other data development, in addition to increased liability exposure, has substantially reduced their active pursuit of small-acreage minor crops which provide limited profit potential.

The pesticide residue analysis project for hops was established in 1988-89. A coordinated 3-state effort is in place, for efficacy evaluation, residue sampling, and laboratory analysis of compounds, for the purpose of developing data to support the registration of new plant protection products for U.S. hops.

This program has allowed the hop industry to obtain the use of new products to control hop aphid and two-spotted spider mite. We are also pursuing products for resistance management programs, to control secondary pests (black vine weevil, symphylan, cutworm, etc.) and weeds, and identifying products that will work in concert with natural predators in Integrated Pest Management programs. Issues such as economics, preharvest and reentry intervals, worker safety, groundwater protection, and international harmonization are taken into account.

The U.S. Hop Industry Plant Protection Committee was formed in 1989 to give guidance to the effort, with representation from the Oregon, Idaho and Washington Hop Commissions, and Hop Growers of America. Industry support has been vital to the success of this program.

1996 FUNDING REQUEST

Washington State University Food and Environmental Quality Lab - Dr. Carol Weisskopf:
"Investigation of Pesticide Residues in Hop Matrices (see attached project description).

TOTAL 1996 REQUEST	$ 12,000

REVIEW OF 1994-95 RESIDUE PROJECTS

Dimethoate (Cygon) - The method was revised per IR-4 guidance and the storage stability studies and treated samples were reanalyzed. Data has been submitted to IR-4.
1995 Budget: $10,500 ***1995 Actual: $10,689***

Imidacloprid (Admire) - Completed storage stability study on the metabolites. Provado
1995 Budget: $3,500 ***1995 Actual: $0*** 6 ppm tolerance.

Hexakis (Vendex) - Repeat project, with analytical costs, up to $10,000, to be funded by IR-4. We had completed the project, but the manufacturer requested that it be redone with 2 applications per season instead of 3, and with a longer pre-harvest interval, in order to lower the residue levels. Analyses are currently underway.
No budget impact unless total analytical costs exceed $10,000.

Oryzalin (Surflan) - IR-4 Leader Lab at Davis, CA has been attempting to do method validation, with no success. Method problems will be addressed under the 1995-96 proposed project with WSU-FEQL.
1995 Budget: $14,000 ***1995 Actual: $0 to date***
($14,000 held in reserve to complete project when method is available).

Ethoprop (Mocap) - Method validation done by OSU did not provide acceptable recoveries. The WSDA Lab attempted to modify the method with little success (recoveries of parent compound are acceptable, but metabolite is not). Method problems will be addressed under the 1995-96 proposed project with WSU-FEQL. OR Symphylan control
1995 Budget: $11,200 ***1995 Actual: $13,825 to date (method development only - additional $15,000 being held in reserve for treated sample analyses).***

Oxyfluorfen (Goal) - Analytical method was revised per IR-4 guidance to improve recoveries. Storage stability studies and treated samples were analyzed using revised method, and submitted to IR-4 for review.
1995 Budget: $8,400 ***1995 Actual: $3,710***

SUMMARY

It is important that we continue to pursue full registration of new products, including biocontrols and compounds which will allow growers to maximize the benefits of natural predators. As growers will have few registrations available to them, resistance management programs will become increasingly important. EPA will continue to cancel registrations for products as it discovers toxicology problems and other concerns. Manufacturers will continue to remove products from the market when the expense of scientific studies required by EPA cannot be offset with future profits from the product. We cannot allow ourselves to be caught short, with no alternatives.

Attachment - "Investigation of Pesticide Residues in Hop Matrices" (3 pages)

INVESTIGATION OF PESTICIDE RESIDUES IN HOP MATRICES

C. P. Weisskopf, Ph.D.
Washington State University
Food and Environmental Quality Laboratory and
Food Science and Human Nutrition

Introduction

Hops have proven to be among the most difficult matrices for achievement of adequate or consistent recoveries of agrichemicals in residue analyses. Although many agrichemicals have been successfully analyzed in this matrix, a number of compounds representing diverse pesticide classes have proven unamenable to analysis. Of the organophosphates, recoveries of several (dimethoate, methyl parathion and its oxon, naled, and the M-1 metabolite of ethoprop) have proven to be variable or low in storage stability studies or method performance evaluations. A wide variety of additional compounds (oryzalin, oxyfluorfen, 2,4-D and fluvalinate) have been similarly difficult to analyze. Several pesticide registration studies have been rejected due to these failures in residue analyses. A generalized hypothesis regarding the source of these problems is difficult given the diversity of compound classes represented.

To investigate the analytical behavior of agrichemical residues in hops, method failures of two pesticides important to the hop industry will be examined. These are oryzalin and the M-1 metabolite of ethoprop. Standard methods for their analyses in agricultural samples have resulted in low to absent recoveries of these compounds from hops.

Justification

Accurate and reliable residue data is necessary for the registration of pesticides. This investigation should provide several indirect benefits to the hop industry: development of methods suitable for the analysis of oryzalin and for ethoprop as well as its M-1 metabolite in hops; a better understanding of the analytical behavior of hops which should allow efficient troubleshooting when for other analytes methods fail; an indication of the fate of agrichemicals in and on hops. Direct benefits resulting from this work would be the ability to pursue pesticide registrations for products for which adequate analytical methods do not currently exist and a reduction in the number of studies that need to be redone due to failure of analytical techniques.

Objectives

To develop and validate a successful method for residue analysis of oryzalin and the M-1 metabolite of ethoprop in hops.

Procedure

Possible causes for loss of analyte during either storage or extraction include:

1) **Non-covalent analyte binding to plant constituents.** In this case, conventional extraction methods would not be powerful enough to cause release of the analyte from hop matrix constituents. This can occur in the plant tissue itself or between the analyte and co-extracted plant components in extract solutions. The analyte may or may not be bioavailable, depending on the nature of the binding.
2) **Covalent analyte binding to plant constituents.** An actual chemical bond may be formed between the analyte and hop matrix components. Extraction methods may release the bound analyte from the plant tissue, but chemical characteristics (polarity, solubility and volatility) of

the complex would be different from that of the analyte alone. This complex would not be carried through the extraction procedure. This form of the compound would probably not be bioavailable.

3) **Rapid degradation.** In this case, enzymes or other compounds present in the tissue would degrade the compound, resulting in loss of chemical structure. This would be a detoxication procedure for most agrichemicals.

Determination of the point of analyte loss

To determine the fate of unrecovered pesticides, the extraction step at which the analyte is lost must be verified. The analytical extraction is initiated using untreated dried hops, the analyte is added at one of the procedural steps, and the extraction method carried to completion. In most studies, fortification occurs prior to initiation of the procedure, and recovery through the entire method is thus tested. If fortification was performed half way through the procedure and analyte recovery failed, the loss would be known to occur during the last half of the procedure. In this manner, each step of the procedure is tested until the step at which the compound is lost is identified. This step has been identified for oryzalin by Chuck Mourer of U. C. Davis, and was found to be the first partitioning step between polar and non-polar organic solvents, one of the earliest steps in the method. A similar process would be used to identify the step at which loss of the M-1 metabolite occurs.

For successful oryzalin recovery using the standard procedure, the analyte must be present in the polar solvent as unbound or free oryzalin. During this step, the analyte was not found in either the polar or non-polar layers after partitioning. During this step of the procedure there is also a "tarry" substance present in the solutions. The analyte, if present, must be associated with one of these three fractions. If free oryzalin were present in the polar layer, completing the extraction would result in analyte recovery. As this is not the case, the polar fraction must not contain the free analyte. Additionally, co-extractants from the hop matrix could modify the polarity of the solvents sufficiently to change the partitioning behavior of oryzalin. Oryzalin present in the tarry fraction in either a bound or unbound form would prevent recovery, as the tarry fraction is physically eliminated during the partitioning. The focus of this research will be in examination of these three extract fractions for oryzalin, and we anticipate that M-1 metabolite investigations will involve examination of a similar two- or three-fraction system.

Determination of loss mechanisms

The primary investigation tool will be our high performance liquid chromatograph-mass spectrometer system (HPLC-MS). At sufficiently high fortification levels, this will allow direct analysis of solvent fractions for the analytes of interest. Determination of a solvent capable of dissolving the tarry material will allow direct analysis of oryzalin in this fraction as well. A similar approach will be taken with the M-1 metabolite. Instrumental analysis of these fractions will first focus on identification and quantitation of the free analytes in a mass-balance approach. If no degradation or binding of the compounds occur, all of the added analytes should be accounted for when the proportion present in each fraction is determined.

At this stage, significant discrepancies between the amount of compound added and the amount of compound detected would be the result of binding or degradation. The procedures necessary to elucidate the nature of these losses are difficult to predict, as they will depend on the results of preliminary investigations. Many potential analyte-matrix complexes and degradation products will also be amenable to analysis using HPLC-MS. It should be possible to verify the magnitude of degradation or to identify complex formation. It may also be possible to identify the structure of the matrix component to which the analytes are bound. Spectral characteristics may also indicate whether binding is covalent or reversible.

After determination of loss mechanisms in the steps at which the methods are found to fail, any earlier steps must also be investigated. As an example, it is known that oryzalin is lost during the first

partitioning step. It is not yet known whether it is actually extracted from the hops. Examination of extract fractions in earlier steps of the methods will proceed as described for the step at which losses are first identified. In this manner, the investigation will work backwards through the methods until the efficiency of removal of the analyte from hops is examined. Any analyte binding that is discovered in method investigations will most likely also occur in the hop cones themselves. Variations in solvents, extraction time or temperature and extraction techniques will be tested if low extraction efficiencies are encountered . Supercritical fluid or soxhlet extraction techniques are examples of stronger procedures that may be investigated.

Analytical method revisions

If degradation is the cause of analyte losses, traditional extraction methods will need no modification. If the cause of loss is due to extraction inefficiencies, development of successful methods for hops will focus on co-extractants. Selection of alternate solvents in the first extraction step may serve to reduce co-extractants while still allowing analyte recovery. Performance of cleanup procedures prior to the steps at which compound losses occur may also prove successful. Working backwards through the methods during loss investigations should result in a successful procedure. The method thus developed, while satisfactory for this research, may be too cumbersome for regular use. Our understanding of hop-analyte interactions should be sufficiently expanded during the course of this investigation to allow development and testing of acceptable methods under GLP standards for analysis of oryzalin, ethoprop and its M-1 metabolite, as well as insight into modifications that may be useful for successful adaptations of methods of extraction for other analytes as well.

Time frame for specific objectives

We anticipate completion of all work and submission of a draft report, including analytical methods, within 6 months of funding.

Budget

Salary (laboratory technician)	$7,000
Material and Supplies	$4,500
Travel	$500
Total	$12,000

U.S. HOP PESTICIDE TOLERANCES			
DOMESTIC REGISTRATIONS AND IMPORT TOLERANCES			
Updated August 9, 1995 - For informational purposes only.			
U.S. Hop Industry Plant Protection Committee			
Contact Ann George, 509-453-4749			
TYPE	COMMON NAME	TRADE NAME	EPA TOLERANCE - DRY HOPS (ppm)
Registered for Domestic Use:			
Acaricide	Propargite	Omite	30.00
Acaricide	Dicofol	Kelthane	30.00
Acaricide	Oxythioquinox	Morestan	None*
* For use only on non-bearing and non-strung hops.			
Insecticide	Diazinon		0.75
Insecticide	Imidacloprid	Provado	*3.00
* Temporary tolerance to expire June, 1996. Proposed permanent tolerance of 6.0 p should be finalized within a month by EPA.			
Insecticide	Methyl Parathion		1.00
Insecticide	Malathion		1.00
Insecticide	Phorate	Rampart	0.50
Insecticide (worms)	Naled	Dibrom	0.50
Insecticide	Bifenthrin	Brigade*	10.00
German import tolerance pending; anticipated Sept. or Oct. '95			
Microbial Insecticide (worms)	Bacillus thuringiensus (kurstaki)	Dipel, Javelin	exempt
Pheromone (mite)	Trimethyl docecatriene	Stirrup M	exempt
Fungicide	copper hydroxide & oxychloride		exempt
Fungicide	Metalaxyl	Ridomil	20.00 (2.00 spent)
Fungicide	Fosetyl-Al	Aliette	45.00
Fungicide/Insecticide	Sulfur		exempt
Herbicide	Norflurazon	Solicam	3.00
Herbicide/Dessicant	Paraquat	Gramoxone	0.20
Herbicide	Trifluralin	Treflan	0.05
Dessicant/Defoliant	Endothall	Des-I-Cate	0.10
Growth Regulator	Gibberillic Acid	various	0.15

TYPE	COMMON NAME	TRADE NAME	EPA TOLERANCE DRY (ppm)
Section 18 Emergency Exemptions approved for 1995 crop year:			
Acaricide	Abamectin	Agri-Mek	*
* Section 18 of FIFRA provides for an Emergency Exemption from tolerance while a full registration and tolerance is being pursued.			
Allowable negligible residues resulting from irrigation water containing residues from applications near aquatic sites:			
(NOTE: Direct application of these products to hop fields is not allowed.)			
Herbicide	2,4-D		1.00
Herbicide	Fluridone		0.10
Herbicide	Dalapon	Dowpon	0.20
Herbicide	Diquat	Reglone	0.02
Herbicide	Glyphosate	Roundup	0.10
Tolerances for import purposes only (no domestic registration):			
Fungicide	Triforine	Saprol	60.00 (60.00 spent)
Fungicide	Zineb		60.00
Insecticide	Cyfluthrin	Baythroid	20.00
Insecticide	Demeton	Systox	1.25
Insecticide	Ethyl Parathion		1.00
Insecticide	Disulfoton	Disyston	0.50
Insecticide	Lambda cyhalothrin	Karate	10.00
Insecticide	Methomyl	Lannate	12.00
Acaricide	Amitraz	Mitac	60.00
Acaricide	Cyhexatin	Plictran	90.00
Acaricide	Tetradifon	Tedion	120.00*
* EPA intends to revoke this tolerance in 1995.			
Herbicide	Dinoseb		0.10

August 9, 1995

Hop Pesticide Registration Efforts - Project Status

Provado/Confidor (imidacloprid): Insecticide (target - hop aphid; systemic activity). This product is marketed under the trade name *Confidor* in Europe. *Provado* will be marketed to the U.S. hop industry in 1995 and beyond.

Final data package was prepared by IR-4 and submitted to EPA 8/94. Germans received a registration last spring. EPA approved a tolerance of 3.0 ppm to cover German imports 6/94; expiration has been extended to 6/96. EPA published proposed tolerance of 6.0 ppm with Aug. 4, 1995 comment deadline; anticipate final tolerance to be published within a month and registration approval shortly thereafter. This final tolerance would cover both domestic and imported hops.

State Special Local Needs or 24(c) registrations have been granted for the 1995 growing season in Washington, Oregon and Idaho. The use pattern includes a maximum of 2 applications per season, in order to comply with the 3.0 ppm tolerance (vs. the 6.0 ppm tolerance which is supported by the IR-4 data, using 3 applications per season).

Additional systemic efficacy studies are being conducted during the 1995 growing season. *(Keith Dorschner, IR-4 Study Director)*

Agri-Mek (abamectin): Acaricide (target - two spotted spider mite). Merck developed a new rapid analytical method and reanalyzed samples previously analyzed at Oregon State University. IR-4 submitted the data package to EPA in 9/94 asking for approval of a time limited tolerance and conditional registration. EPA is ready to published the proposed time limited tolerance, but has been asked by Merck to hold it up until the spent hop issue is resolved. Section 18 Emergency Exemptions have been approved by EPA for all three states, allowing U.S. hop growers to use Agri-Mek in 1995.

New residue studies on dried and spent hops from 1994 are complete and the petition for the permanent tolerance and full registration has been submitted to EPA by IR-4. The independent third party validation of the analytical method has also been submitted to EPA.

The German government approved a time-limited registration on 5/2/95 to allow German growers to use the product in 1995. It will expire on 5/31/97, and will also allow U.S. hops to be shipped to Germany containing abamectin residues. *(George Markle, IR-4 Study Director).*

Baythroid (cyfluthrin): Insecticide (target - hop aphid). Complete data package was submitted to EPA in January, 1992. EPA requested additional raw data documentation, which is being compiled by IR-4. *(Keith Dorschner, IR-4 Study Director)*

Brigade (bifenthrin): Insecticide (target - hop aphid). EPA published the final tolerance of 10.0 ppm in the May 25, 1994 Federal Register, and approved a Sec. 3 registration on June 1, 1995. FMC plans to petition EPA to revise the newly approved label to include aerial application once they have a chance to review aerial efficacy data from the 1995 growing season.

FMC submitted a revised petition to the German government in June, 1994 to request an import tolerance; it has been recommended for approval by the appropriate German

government agencies and awaits a final vote by the German parliament, scheduled for Sept. 27, 1995. A new Codex tolerance of 10.0 ppm was established for bifenthrin on hops in 1993. *(Ken Samoil, IR-4 Study Director)*

Cygon (dimethoate): Insecticide (target - hop aphid; systemic activity). The final lab report was submitted to IR-4 in February, 1995. It is currently under review. *(Ken Samoil, IR-4 Study Director)*

Lorsban (chlorpyrifos): Insecticide (target - hop aphid). The data package and tolerance petition have been completed by IR-4 and the manufacturer; currently in QA review at IR-4. Submission to EPA will occur upon completion of the QA review. *(Keith Dorschner, IR-4 Study Director)*

Mavrik (fluvalinate): Insecticide (target - hop aphid). The complete data package was submitted to IR-4. IR-4 has determined that the storage stability data was too variable, and has requested that we repeat the entire project (including field plots). The USHIPPC has placed this project "on hold" for the present time. *(Keith Dorschner, IR-4 Study Director)*

Mitac (amitraz): Miticide (target - two spotted spider mite). EPA approved Germany's request for a 75.0 ppm tolerance in 3/95. Noram has no plans to seek a U.S. registration at this time due to ADI problems and other concerns at EPA.

Mocap (ethoprop): Insecticide (target - garden symphyllan). Field samples gathered in '91 were discarded due to their age. OSU validated the analytical method for hops, but the WSDA Lab was unable to obtain acceptable recoveries with it. After several weeks of additional developmental work on the method with no progress, we have contacted the WSU Food and Environmental Quality Lab about working on this problem. Field plots in 1994 provided samples will be analyzed as soon as an acceptable method is available. *(Keith Dorschner, IR-4 Study Director)*

Vendex (hexakis or fenbutatin oxide): Acaricide (target - two spotted spider mite). Data was sent to IR-4. Manufacturer determined that the proposed tolerance based on those residues would take up too large a portion of their reference dose, and asked that the study be repeated with fewer applications and a longer pre-harvest interval. IR-4 repeated the study in 1994 and will pay for the lab work (up to $10,000). Samples are currently being analyzed at the WSDA Lab. *(Keith Dorschner, IR-4 Study Director)*

2,4-D: Herbicide (target - broad leaf weed control). All data has been submitted to IR-4. No residues were detectable in the storage stability studies, which IR-4 feels may not be sufficient to support the petition. We have asked IR-4 to proceed with submission of the data "as is" to EPA, to see what they decide. If the study is not acceptable, we will review the situation and decide whether to repeat the study. There is already a 1.0 ppm tolerance for 2,4-D on hops, but it is only to cover contamination from irrigation water. Expect submission to EPA during third quarter '95. *(Dan Kunkel, IR-4 Study Director)*

Goal (oxyfluorfen): Herbicide (target - broadleaf weeds). The final residue report was submitted to IR-4 in May, 1995. It is currently under review. *(Dan Kunkel, IR-4 Study Director)*

Round-Up (glyphosate): Herbicide (target - spot treatment of grasses & broadleaf weeds). 1991 samples were analyzed at Cornell University (Northeast Regional IR-4 Laboratory).

Storage stability studies had to be redone. These samples had to "age" in the freezer for the same time period as the 1991 treated samples were stored before they were analyzed. Additional samples were gathered in 1992 and shipped to Cornell. Recent follow-up indicates that the chemist who did Cornell's glyphosate analysis has departed, and due to a hiring freeze in New York cannot be replaced at this time. Monsanto has agreed to finish analyzing the hop project in July and August of this year. *(Edith Lurvey, IR-4 Study Director)*

Surflan (oryzalin): Herbicide (target - grasses). Residue plots were established for the '94 growing season by Robert Parker; the IR-4 Leader Lab at Davis, CA is currently attempting to develop an acceptable analytical method. We have approached the WSU Food and Environmental Quality Lab about continuing developmental work on this method during the next few months. Samples will be analyzed as soon as a method is available. *(Dan Kunkel, IR-4 Study Director)*

PROJECTS TO SUPPORT REREGISTRATION:

Solicam (norflurazon): Herbicide (dormant treatment for weed control). Data package was submitted to EPA in June, 1992. It had been held by EPA pending review of an animal metabolism study. Although Section 24(c) registrations (State Special Local Needs) are in place for Oregon, Washington and Idaho, the manufacturer hopes to use the new data to reinstate a Sec. 3 (National) registration. It should be established by the end of 1995.

Dibrom (naled): Insecticide (target - Lepidoptera species). Residue data to support reregistration was submitted to IR-4 in August, 1991; IR-4 has submitted the final data package to EPA 12/94. Valent obtained 24(c) SLN registrations in WA, OR and ID for the 1995 growing season. *(Bill Biehn, IR-4 Study Director)*

Rampart (phorate): Insecticide (target - hop aphid; early spring treatment only). Residue data to support reregistration was submitted to EPA in May, 1992. Additional data was submitted in 12/93.

Methyl Parathion: Insecticide (target - hop aphid). Data package is complete and under review; IR-4 anticipates submission to EPA during second quarter 1995. *(Keith Dorschner, IR-4 Study Director)*

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U.S. Hop Industry
Plant Protection Committee

A subcommittee of:
Washington Hop Commission
Oregon Hop Commission
Idaho Hop Commission
Hop Growers of America

504 North Naches Aven
Yakima, Washingtor
Telephone (509) 45
Fax (509) 45
Ann E. George, Admin

June 26, 1995

Anne E. Lindsay, Director
Policy and Special Projects Staff
Office of Pesticide Programs, 7501C
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Anne:

We have received the 6/14/95 Federal Register notice which responds in part to the National Food Processors Petition, and understand that the new policy will be adapted for individual crops. We appreciate the fact that the Agency is willing to implement the "ready to eat" approach to future regulatory actions.

The recent rumors of another potential hop reclassification have prompted numerous questions about our status under the new policy from registrants, brewers, foreign hop producers, etc. Would it be possible to obtain a memo from an appropriate individual in the Agency outlining the impact of this new policy on hops?

If such a memo could address residue data requirements under the new policy, it would be most helpful. Does it appear that EPA will be able to apply standard hydration and dilution factors to dried hop data, in order to calculate assumed residue levels on fresh hops and in beer? Will residue data or processing studies be required on any form of the crop other than dried hops?

Thank you for your efforts to minimize the impact of this new policy on our research and registration support program. We look forward to continuing our work with the Agency as we seek improved plant protection programs for hops.

Sincerely,

Ann E. George
Administrator

cc/ IR-4 Headquarters
Patrick Leavy
U.S. Hop Industry Plant Protection Committee
Senator Slade Gorton
Senator Mark Hatfield
Hoyt Jamerson
Lee Verstandig
William Bryant

EXECUTIVE SUMMARY
NFPA PETITION RESPONSE

BACKGROUND

EPA regulates pesticide residues in foods under the Federal Food, Drug, and Cosmetic Act (FFDCA) as well as under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The FFDCA gives EPA the authority to set legally enforceable limits, or tolerances, for pesticide residues in food. EPA sets tolerances for pesticide residues remaining in raw foods under section 408 of the FFDCA. Under section 409 of FFDCA, EPA sets a food additive regulation (FAR) for pesticide residues in processed foods (1) where the residues result from application of the pesticide to the raw crop and the residues can exceed the applicable raw food tolerance, or (2) where the residues are the result of pesticide application during or after food processing. Section 409 also contains the Delaney clause which prohibits EPA from establishing regulations to cover residues of carcinogens in processed food or feed.

EPA's interpretation of the Delaney clause as not applying to de minimis cancer risks was rejected by the Ninth Circuit Court of Appeals in Les v. Reilly (July 1992). Subsequently, EPA has taken several actions consistent with the court's interpretation of the Delaney clause.

Recently, EPA agreed to a court settlement that requires EPA to make decisions over the next 10 years concerning certain tolerances that may be affected by the Delaney clause and various related policy matters. The first decision required under the settlement is on a petition filed by the National Food Processors Association (NFPA).

NFPA PETITION

On September 11, 1992, NFPA filed a petition with EPA which challenged a number of policies under which EPA administers its tolerance-setting program. The Agency responded with a Federal Register notice soliciting comments on many complex issues involved with the Delaney clause. EPA has not reached a decision on the coordination policy. EPA, however, has made decisions regarding the concentration policy and the interpretation of the term "ready to eat". The Agency's response to these two policy issues published in the Federal Register.

- Concentration policy

Under Section 409 of the FFDCA, an FAR is needed if the pesticide residues from the raw agricultural commodity concentrate in the processed food form above the raw food tolerance. How EPA decides whether there is sufficient evidence of concentration to require establishing a 409 FAR, is therefore important in determining whether or not the Delaney clause applies to many processed food forms.

In deciding whether residues concentrate enough to warrant a FAR, EPA will

place primary emphasis on whether processing studies show that the processing of a commodity results in a level of residues in the processed food which is greater than the level of residues in the raw food. However, EPA believes that modifications should be made to the concentration policy so that it is a better predictor of the likelihood that residues in processed food may exceed the applicable section 408 tolerance. EPA will also consider variability of the analytical method, degree of rounding involved in establishing the section 408 tolerances, information concerning blending of crops, and average field trial values.

• READY TO EAT (RTE) POLICY

EPA currently takes a broad interpretation of the term "ready to eat" such that most processed foods, both for humans and animals, are considered "ready to eat". EPA is modifying its policy to use a common sense interpretation of "ready to eat". Food will be considered ready-to-eat only if it can be consumed without further preparation. For instance, potato chips are ready to eat and mint oil is not ready to eat.

If EPA finds that a processed food form is not ready to eat, then a section 409 FAR would not be needed for that form and the Delaney clause would not apply.

There are, however, examples of human foods or animal feeds for which this interpretation is not readily and easily applied. For example, certain animal feeds are generally mixed with other feed types and would not be considered ready to eat when not mixed. For some feeds, mixing might be the norm, but the feed could nonetheless be eaten by itself. EPA will decide such ambiguous questions on a case by case basis.

Finally, having essentially created a new class of food/feed – that which is processed but not ready to eat – EPA is also announcing its intention to establish tolerances for these food/feed forms under section 701 of the FFDCA. These tolerances would be consistent with use of the pesticide in accordance with the FIFRA label and with the raw crop having residues within the section 408 tolerance.

APPLICATION OF POLICIES

These policy modifications do not immediately impact any specific pesticides or crops. EPA will be using these policies to guide its decisions as it implements the Delaney clause according to the timetable of the court settlement. There will be opportunities to present data and other information relevant to the application of these policies to individual pesticides and crops.

U.S. Hop Industry
Plant Protection Committee

A subcommittee of:
Washington Hop Commission
Oregon Hop Commission
Idaho Hop Commission
Hop Growers of America

504 North Naches Avenue, #11
Yakima, Washington 98901
Telephone (509) 453-4749
Fax (509) 457-8561
Ann E. George, Administrator

August 10, 1995

TO: Hop Research Council

FROM: Ann George

RE: USHIPPC and International Harmonization Update

The attached packet of information will provide you with:
- Updated pesticide registration and tolerance list
- Current project status report for pesticide registration efforts
- Our letter to EPA requesting clarification of the status of hops under their new classification scheme
- An executive summary which outlines EPA's new classification policy

DOMESTIC PROJECTS

1. Savey Residue Study - 1995 trials in WA, OR and ID will provide treated samples for analysis by the manufacturer, Gowan. We are also conducting efficacy trials in the three states under standardized protocols (second year in OR, first year in WA and ID).

2. Brigade/bifenthrin Aerial Efficacy - 1995 trials are underway in WA and OR. The manufacturer intends to pursue the addition of aerial application to the label for hops if the efficacy data is acceptable (to be effective in 1996).

3. Laboratory Status - Two projects are currently being analyzed: Roundup/glyphosate (at Monsanto) and Vendex/hexakis (at the WSDA Lab, Yakima). Two additional projects do not have acceptable analytical methods (Mocap/ethoprop and Surflan/oryzalin). The WSU Food and Environmental Quality Lab, Richland, has proposed a project to complete method development for these two compounds.

4. EPA Status - Two projects are progressing toward issuance of a tolerance and registration. The proposed tolerance for Provado/imidacloprid was published in the Federal Register last month; comment period ended Aug. 4 with no comments, so EPA expects the final tolerance to be issued within a month at 6.0 ppm (current temporary tolerance is 3.0 ppm). The full registration can then be issued.

EPA is ready to publish the proposed time-limited tolerance for AgriMek/abamectin, but has been asked by Merck to wait for resolution of the spent hops issue. This is expected

to occur within the next month. Once the time-limited tolerance is issued a conditional registration can be approved. IR-4 has also submitted the second data package which will support the full tolerance and registration. EPA will begin reviewing this data immediately.

See the attached status sheet for additional information and other compounds.

The USHIPPC is currently reviewing potential residue and efficacy studies for 1996, and attempting to determine what compounds will best fit the "holes" that remain in our plant protection program.

INTERNATIONAL PROJECTS

We have been successful in laying the groundwork for a number of actions, which should allow the International Harmonization program to make major progress. We were successful in getting all the involved parties (governments and manufacturers) to move ahead on the AgriMek/abamectin approval in Germany for 1995, harmonizing the US and Germany on this compound. However, the German parliament did not take final action on the Brigade/bifenthrin import tolerance prior to adjourning for summer recess. It has been recommended for approval by all of the necessary government agencies, and is currently scheduled for a vote by the upper house on September 27.

The International Hop Chemical Residue Standards Database Manual was completed and distributed to International Harmonization Task Force members. Periodic updates will be provided as new information becomes available.

We continue to seek opportunities to work with other hop producing countries in a coordinated fashion on these issues.

OTHER PROJECTS AND ISSUES

The Northwest Minor Crops Symposium is August 22-24, with an excellent turnout anticipated. The hop growing and harvesting portion of the tour will be held in the Prosser area on Aug. 22, with warehousing and pelleting featured on Aug. 23. We will also have a presentation on the use of hops in brewing by Bert Grant on the evening of Aug. 23, as we enjoy dinner and beverages at Grant's Pub.

In an effort to reach additional EPA staff members that are unable to attend the Minor Crop tour, we held two on-site seminars at EPA in Washington, D.C. last spring. A one-hour session on hop growing and harvesting was provided on March 20 to approximately 40 individuals.

I provided a report on the hop industry's plant protection research and international harmonization programs to the American Society of Brewing Chemists during their 1995 symposium in San Diego on April 9.

EXTENSION SERVICE
Marion County Office

OREGON STATE UNIVERSITY
Marion County Health and Service Building
3180 Center Street NE, Room 1361 · Salem, Oregon 97301
Telephone 503-588-5301 Fax 503-585-4940

May 31, 1995

TO: Oregon Hop Growers & Industry Reps.

FROM: Gale Gingrich
Extension Agent, Field Crops

RE: Hop Petiole Sampling to Determine Nitrogen Needs

As most of you are aware, Dr. Neil Christensen, OSU Soil Scientist, has recently done some survey and research work on N uptake and utilization on several area hop yards. The results of his work have helped determine the response of the hop plant and cone yields relating to nitrate (NO_3-N) in the plant petioles. Most of you have seen the results of his past two year's research.

In an effort to assist growers more efficiently to manage their nitrogen application programs, he and Dr. John Hart, OSU Extension Soil Scientist, have developed the enclosed guidelines for taking petiole samples and using NO_3-N test results to determine whether additional nitrogen is required for optimum hop yields. I think this information may be helpful in planning your final nitrogen application without sacrificing yield.

If you have questions about this information, please call any one of the three of us. Neil's number is 737-5733, John's is 737-5714, and mine is at the top of the page.

One final note. I would like to thank each of the growers who allowed us to put the fertilizer plots in their hop yards the past couple years. We appreciate your cooperation and patience with any inconvenience the plots caused. Your cooperation has helped make it possible to get a good look at the effect various nitrogen rates have on yields and helped provide information needed to more efficiently apply plant nutrients.

Directions for collecting and handling hop tissue samples

Sample collection

Collect tissue samples when hops are between ¾ of the way to the wire and just reaching the wire. This stage of growth generally occurs by mid June in the Willamette Valley.

One sample per yard is adequate if field conditions and yield are uniform.

Multiple samples may be needed if the yard is over 20 acres.

Take 30 to 40 petioles randomly across the yard in a "W" or "Z" pattern.

Choose petioles from mature leaves on the main vine, 5 to 6 feet from the ground.

Don't collect petioles from obviously different areas such as weak, weedy or diseased areas, different soil types, low spots or different rotations.

Do not mix varieties in a sample.

Don't allow clothing to contact sap from petioles. The sap will stain clothing!

Sample handling

Put samples in paper bags for mailing to a laboratory.

Label each bag with the yard name, number or identification code.

Do not put hop petiole samples in unvented plastic bags for shipping as the samples may mold in transit.

Avoid shipping after mid week as samples may sit over the weekend before delivery.

Laboratory analyses

Request analysis for nitrate nitrogen, NO_3-N.

Check with the laboratory where your samples will be sent for payment and shipping instructions.

Several laboratories are able to analyze hop petioles for NO_3-N.

OSU Central Analytical Laboratory, 3017 Ag & Life Sciences Building, Oregon State University, Corvallis, OR 97331-7306. (However the OSU Central Analytical Laboratory may not provide results in less than one week.)

The closest commercial laboratory in Oregon that can provide rapid analyses of hop petioles is AgriCheck, P. O. Box 1350, Umatilla, OR 97882.

Several laboratories in adjacent states can analyze petioles for NO_3-N. Check with your county Extension Service office for name and addresses.

Prepared by John Hart and Neil Christensn, OSU Dept. of Crop and Soil Science and Gale Gingrich, OSU Extension Service, Marion County

Interpretation of laboratory data

Laboratory results should be provided in parts per million (ppm) of NO_3-N in the dry hop petioles.

Small-scale N rate experiments and large-scale field demonstrations have shown no yield increase to additional fertilizer when petioles contain more than 4,000 ppm NO_3-N in June.

To determine nitrogen fertilizer needs, compare your laboratory results with figure 1.

If the ppm NO_3-N for the date sampled is in the "Excessive" range, do not apply additional nitrogen fertilizer.

If the ppm NO_3-N for the date sampled is in the "Adequate" range, additional nitrogen fertilizer will generally not increase cone yield.

If the ppm NO_3-N for the date sampled is in the "Deficient" range, apply 50 lb N/a.

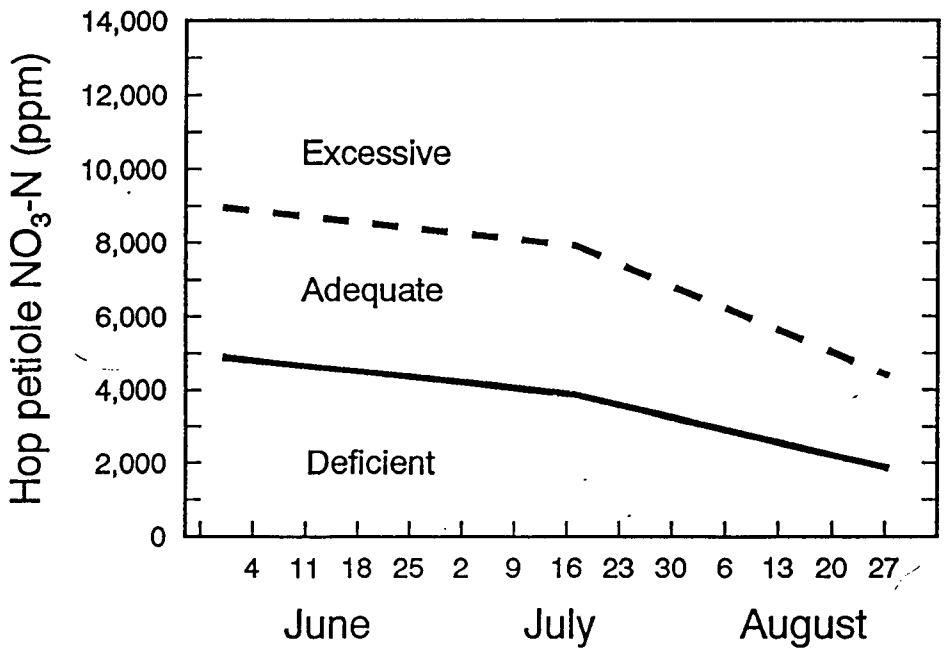


Figure 1. Critical Nutrient Ranges (CNR) for nitrate-nitrogen concentrations in leaf petioles of 'Willamette' and 'Nugget' hop plants. CNRs are based on season-long sampling of petioles in six small-plot and seven field-scale nitrogen fertilizer rate studies in the Willamette Valley during 1993 and 1994 growing seasons.

Issues Review

W.L. BRYANT CO.
INTERNATIONAL AFFAIRS MANAGEMENT
A CONFIDENTIAL REPORT FOR THE US HOP INDUSTRY PLANT PROTECTION COMMITTEE

August 1995

WLBCo. Delivers Hop Database to Industry

In June, W.L. Bryant Co. delivered the hard copy and computer disks for the USHIPPC International Database. The hard copy includes information on eleven countries and numerous chemicals. It also provides comparative analysis on eleven country combinations. In addition to being able to access information by country, chemical or a combination of both chemical and country, the database also provides a chart outlining the US industry's international registration priorities and detailed notes on the status of US international registrations. These notes are regularly updated and provide the industry with information on W.L. Bryant Co. activities. The publishing of this database represents over eighteen months of research and development by WLBCo.

In August the first update will be released to the industry. This update will include a completely new chapter on Korea along with more minor changes to other country chapters.

Codex Tolerance for Diazinon Underway

The WLBCo. and USHIPPC, working with the Codex Joint Meeting on Pesticide Residues (JMPR) staff director Bill Murray, with Ciba-Geigy (Switzerland), and with the US delegation to the JMPR, secured a review of diazinon on hops. While the tolerance still needs to make its way through the Codex approval process before being accepted as an international standard, it is anticipated that Codex will establish a tolerance for diazinon of 0.50 ppm.

Establishing a Codex tolerance for diazinon sets an important precedent for the European Union to use in its chemical approval process. USHIPPC is working to establish a European Union tolerance for the hop/diazinon combination because diazinon no longer has an unofficial import tolerance in Germany. Because diazinon/hops is not registered in any member state, the European Commission does not feel it has the authority to establish a harmonized level.

If Codex were to establish an international level, it might give the European Commission the justification it needs to proceed with a European tolerance in the absence of an EU member state registration.

WLBCo. priorities for 1995-96 include continued monitoring of the diazinon tolerance through the Codex approval process and continuing to work with Ciba-Geigy, US and European officials in support of an EU maximum residue level of at least 0.50 ppm for diazinon on hops.

inside...

German Residue Tolerances Tentatively Secured

W.L. Bryant Co., chemical manufacturers, German industry representatives, Dr. Klaus Zastrow and the USHIPPC all worked with US and German officials to secure bifenthrin, imidacloprid and abamectin tolerances in Germany in time for the 1995 season. In the fall of 1994, and as recently as the spring of 1995, assurances were made that these tolerances would be established by May. The deadline was then moved to July. Consideration of the final levels has now been postponed until September 27.

It is anticipated that a tolerance of 2.00 ppm will be set for imidacloprid; a provisional tolerance of 0.05 ppm will be set for abamectin; and that an import tolerance of 10.00 ppm will be set for bifenthrin. W.L. Bryant Co. is working very closely with the US Embassy in Bonn on these issues. WLBCo. is also working to ensure that the US Mission to the European Union in Brussels is aware of the pending German standards.

In 1995-96 WLBCo. will work to ensure the German standards for these three chemicals are used as precedent for the establishment

WLBCo. Monitors Australian Standards

Over the last several months Australia has been adjusting many of its chemical residue and labeling standards. W.L. Bryant Co. has requested copies of these proposed revisions. Most would not affect US hop exports. However, Australia has announced maximum residue levels for cyfluthrin (Baythroid) that did not include a tolerance for hops. On July 31, WLBCo. requested that the Australian government include hops on the list of products for which Baythroid is approved. WLBCo. is working through the USDA's Office of Food Safety and Technical Services to communicate this request and will continue monitoring changes in Australian regulations.

EU Maximum Residue Standards Still Pending

Throughout 1994-95, W.L. Bryant Co. worked with US and European authorities in both Washington, DC and Brussels to secure European Union maximum residue levels for diazinon, abamectin, bifenthrin, dicofol, fosetyl-al, propargite and paraquat. Other chemicals of interest include dimethoate, fenbutatin oxide and ethoprop.

It had been anticipated that draft levels on these substances would have been issued by the European Commission by the late winter or early spring of 1995.

W.L. Bryant Co. has been working closely with the US Mission to the European Union, European Commission officials, and with manufacturers to ensure the necessary data was provided for evaluation and that maximum residue levels for hops were being considered. Unfortunately, despite repeated requests, the European Commission has not provided any information or updates on these chemical issues since April. On August 8, the US Mission to the EU notified WLBCo. that a response by the Commission would be forthcoming by September. It appears they are far behind schedule.

Based on Bill Bryant's meetings in Brussels in January and on subsequent correspondence and conversations, it appears that acceptable maximum residue levels for dicofol (Kelthane), fosetyl-al (Aliette), and propargite (Omite) are on schedule.

The FMC Corporation remains confident that the Commission will establish a maximum residue tolerance for bifenthrin. However, this tolerance level was to have been discussed in November of 1994. Consideration was delayed until March 15, 1995 when it was held over until June. The provisional approval for bifenthrin in the United Kingdom (which expires in 1997) and the pending import tolerance in Germany (10.00 ppm) could possibly be sufficient grounds for the Commission and the member states to establish a harmonized level consistent with Codex (10.00 ppm). However, the absence of a full registration in any member state could be a barrier to the establishment of a hop

(Continued on page 3)

(Continued from page 2)

(EU Residue Standards)

standard.

Extensive work is continuing in order to secure an EU maximum residue level on diazinon. The problem is that the Commission is unsure whether it has the authority to establish a harmonized level without a member state registration. W.L. Bryant Co. has been working directly with the US EPA and the European Commission to determine how import tolerances could be established in the EU. If a commercially acceptable level for diazinon is established an important precedent would be set.

W.L Bryant Co. has been working with Merck to secure a European Union maximum residue level for abamectin on hops. The establishment of provisional tolerances in Germany and the US should assist these efforts. In November, a proposed EU level of 0.02 ppm was published. In January, when Bill Bryant met with Michael Walsh of the European Commission, concern about establishing tolerances for abamectin on too many products was expressed by Commission staff. The 0.02 ppm proposal was discussed in this meeting with Mr. Walsh. Bill Bryant requested that the final level be consistent with what was being considered in the US and Germany. Merck subsequently followed up with the Commission supporting industry's request.

In 1995-96, W.L. Bryant Co. will work to ensure that maximum residue levels for dicofol, fosetyl-al and propargite will be established.

WLBCo. will also continue to encourage German and UK support for EU tolerances for abamectin and bifenthrin. Efforts will also continue to solicit German, British and Spanish support for an EU tolerance, or import tolerance, for diazinon.

International Cooperation a Goal for 1995-96

Since beginning the international registration project, W.L. Bryant Co. has been working with USHIPPC members, manufacturers, US officials in Washington and overseas, and with representatives of foreign governments to secure specific chemical residue standards. A great deal of groundwork has been laid, and there have been a few successes.

An international diazinon tolerance, a key to acceptance in EU and Asian export markets, is now working its way through the Codex review process as a direct result of WLBCo. efforts. Several people in the public and private sectors have worked to secure German tolerances for bifenthrin, imidacloprid, abamectin. It is hoped that the EU will soon announce residue levels for these and other chemicals.

It is hoped that the EU will soon announce several maximum residue levels on which the USHIPPC has been working.

The effort to secure residue levels for specific chemicals has been an effective and necessarily defensive (and at times, stopgap) effort. However, for the long term, efforts should be focused not only on securing specific tolerances, but on changing policies and systems so that tolerances are easier to obtain.

There are three institutional changes that need to be made. First, the EU needs to have a mechanism for establishing import tolerances. Second, the EU and US need to accept each other's data packages as equivalent, or harmonize data requirements. Finally, the Codex residue setting system needs to be streamlined.

WLBCo., on behalf of USHIPPC, has already begun to work on these issues. However, a successful effort will require support from all the major hop producers and traders. In some cases success will require support from other agricultural organizations.

(Continued on page 4)

(Continued from page 3)

(International Co-op)

The US, UK and German hop industries, working together on a complimentary set of priorities, would have more influence and credibility than would individual efforts.

In January, Peter Glendinning (UK) and Bill Bryant met in London to discuss working together to secure maximum residue levels of interest to both industries, and also to work for some institutional change. Mr. Glendinning formalized notes from this discussion in a memorandum in March that was forwarded to USHIPPC, and W.L. Bryant Co. followed up in May with a proposal for US,UK, and German cooperation. That proposal is still under USHIPPC consideration.

WLBCo. believes that cooperation is essential to accomplishing USHPPIC's short-, near- and long-term goals. This cooperation is integral to the USHIPPC's short term goals, such as securing bifenthrin and diazinon tolerances in the EU. The US request for a bifenthrin tolerance needs Britain's support to succeed. The diazinon tolerance would also move closer to reality if it had written support from Germany.

This ad hoc committee would address the USHIPPC's immediate and near term goals of increasing the distribution of accurate information. If approved by USHIPPC, the database could become a more collaborative and international effort.

Importantly, the proposed international committee could be a more effective and authoritative voice for institutional change. This would help move the industry away from spending significant efforts on one or two chemicals each year, and toward a system where it is easier to get the necessary registrations.

Codex Consideration of Aliette to be Requested

In the fall of 1994, WLBCo. began working with the US Delegation to the Codex to request a maximum residue level for Aliette on hops be established. The request was delayed one year at the request of Rhone Poulenc. Both the US and Germany need to work with Rhone Poulenc this fall to ensure the data will be provided, and with their respective governments to ensure the appropriate requests will be made. This will be a priority project for 1995-96.

New Korean Standards Under Review

Since October 1993, W.L. Bryant Co. has been working with US officials to ensure hops were included in an ongoing Korean review of its chemical residue standards. In earlier drafts methyl parathion and propargite were proposed at below commercially feasible standards. In June and July new tolerances were announced. Korea accepted the USHIPPC request on both of these chemicals. However, diazinon and dicofol are well below the USHIPPC and Codex levels. Levels for phorate and cyfluthrin on hops were not established at all. WLBCo. has already issued a request, on behalf of the USHIPPC, to have Korea reconsider its levels for diazinon, dicofol, phorate and cyfluthrin.

This information will be included in a new chapter update in the WLBCo. database to be released in late August.

W.L. BRYANT CO.
INTERNATIONAL AFFAIRS MANAGEMENT
999 THIRD AVENUE, SUITE 1060A
SEATTLE, WA 98104

U.K. HOP GROWERS PRODUCE 9.7 MILLION LBS. ON 7,749 ACRES IN 1994

U.K. hop production in 1994 totaled 9.7 million pounds, a 19% reduction compared to the 1993 crop of 12.0 million pounds. The country's top producing varieties (in the seeded category) were Target at 4.1 million lbs., followed by Golding with production of 1.1 million lbs. and Challenger at 1.09 million lbs. Last year's hop acreage decreased by 5% to a level of 7,749 acres.

With regards to '94 alpha acid production, the U.K. produced 786,099 lbs., a decrease of 26% from the 1.1 million lbs. produced in 1993. The U.K.'s best producing bitter type hop in 1994 was the seedless version of the Target variety at 10.8% alpha.

1994 English Hop Crop

Variety	Total Acres	Production (1,000 lbs.)	Yields (lbs/acre)	Alpha Acid (%)	Total Alpha Acid (lbs.)	Alpha Yields (lbs/acre)
SEEDED HOPS						
Northdown	658	719	1,093	6.8	48,925	74
Target	2,983	4,114	1,379	10.1	415,485	139
Yeoman	143	186	1,299	10.2	18,958	133
Challenger	858	1,099	1,280	6.8	74,717	87
Golding	835	1,105	1,324	4.6	50,834	61
Fuggle	715	758	1,061	4.0	30,331	42
Progress	333	310	932	5.4	16,744	50
WGV	175	185	1,061	5.9	10,939	63
Bramling Cross	107	139	1,294	6.4	8,882	83
Northern Brewer	15	14	990	8.3	1,199	82
Omega	7	9	1,175	9.3	809	109
Others	107	47	438	11.0	5,130	48
Total Seeded	6,935	8,685	1,252	7.9	682,954	98
SEEDLESS						
Northdown S/L	268	298	1,112	8.3	24,703	92
Target S/L	499	682	1,365	10.8	73,621	147
Challenger S/L	39	49	1,281	7.4	3,655	95
Omega S/L	2	2	892	7.6	134	68
Zenith S/L	7	11	1,657	9.0	1,032	149
Total Seedless	814	1,042	1,279	9.9	103,145	127
GRAND TOTAL 1994	7,749	9,727	1,255	8.1	786,099	101
GRAND TOTAL 1993	8,154	12,007	1,472	8.9	1,065,063	146
% Difference	-5.0%	-19.0%	-14.8%	-8.9%	-26.2%	-30.7%

Source: Reproduced from the Institute of Brewing's publication 'Ferment' - February 1995.

ATTENTION U.S. HOP GROWERS: **Don't forget to watch your mail for the 1995 Sold Ahead Survey. We need your participation !**

publ. in Hop Growers of America Bul. Hops USA Nr. 478: Feb. 28, 1995

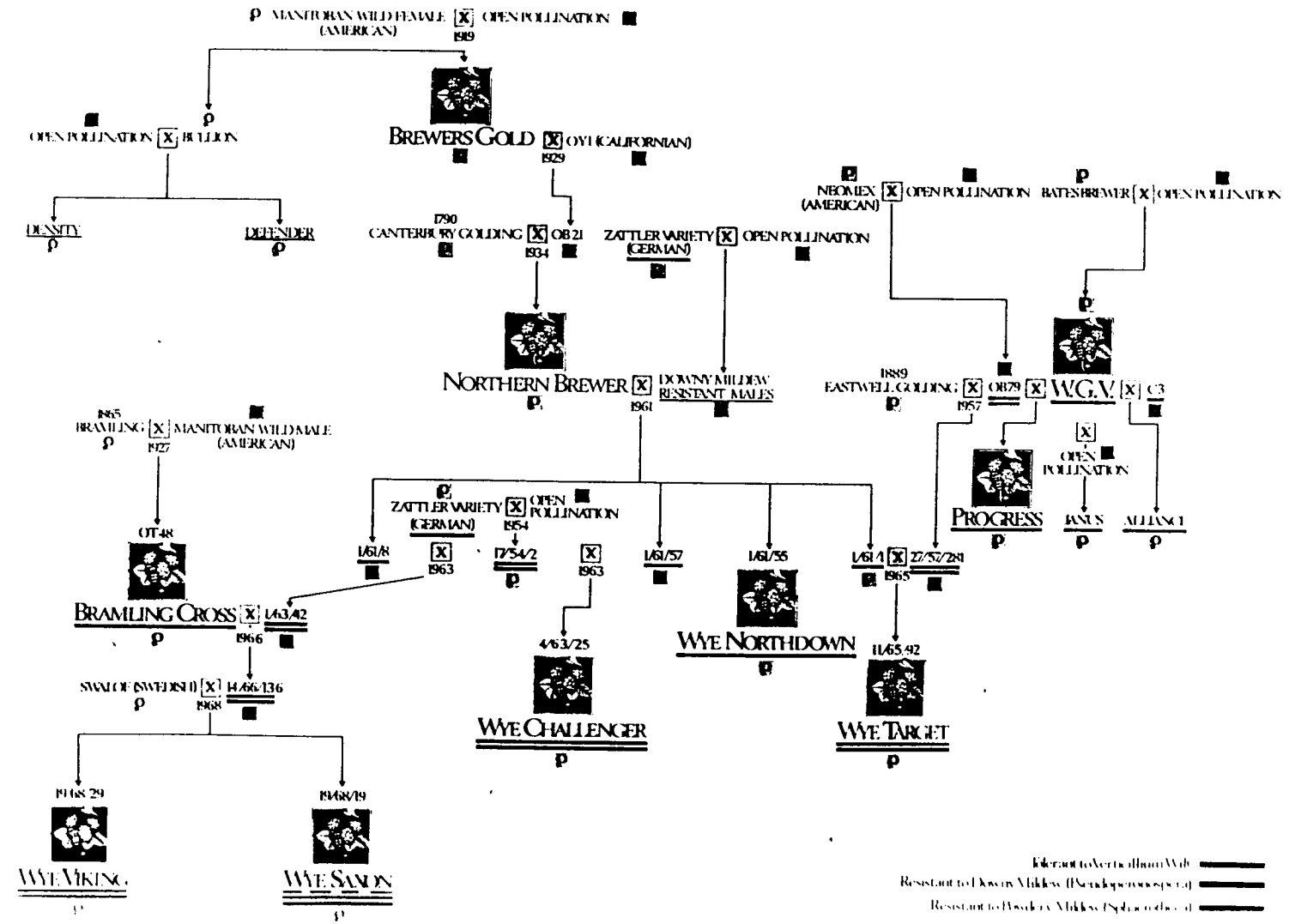
THE PARENTAGE OF ENGLISH HOP VARIETIES

ISSUED BY

MORRIS HANBURY JACKSON LEMAY LTD.

TELEPHONE: 0892 835155 NETTLESTEAD OAST, PADDOCK WOOD, KENT TELEX: 957062 HOPS G.

1980



Tolerant to Verticillium Wilt

Resistant to Downy Mildew (Pseudoperonospora)

Resistant to Powdery Mildew (Sphaerotheca)

HOPUNION USA INC.
GROWER • DEALER • PROCESSOR

April 20, 1995

FIVE NEW ENGLISH HOP VARIETIES

Dr. Alfred Haunold
Oregon State University
Crop Science Department
Corvallis, Oregon 97331

Dear Al:

As promised, these are the data sheets for the new varieties released from Wye College.

Once again my thanks for sending the Golding roots to David Grinnell at Boston Beer.

Yours sincerely,

HOPUNION U.S.A., INC.

Gregory K. Lewis

EHP

ENGLISH ADMIRAL

Pedigree
Grand-daughter of Wye Challenger.

Maturity
Mid-late season.

Yield
29-42 zentners/hectare. (1295 - 1875 lbs/A)

Growth Habit
Vigorous, untidy.

Disease Reaction
Moderate resistance to Verticillium Wilt and Downy Mildew.

Pickability
Easy to pick.

Drying/Packing

Cone Structure
Small, dense cones.

Quality:

Lupulin

Aroma

Alpha-acid
11.5-14.5% w/w.

Beta-acid
5.0-6.1% w/w.

Co-Humulone
42-44% of alpha-acid.

Storageability
Moderate.

Total Oil
1.2-1.7 mls/100 grams.

Myrcene
39-48% of whole oil.

Humulene
23-26% of whole oil.

Caryophyllene
7% of whole oil.

Farnesene
2% of whole oil.

General Trade Perception

Admiral is seen as a replacement to Wye Target.

Other Information

The code number of this variety is RH 40. Admiral has been adopted as its name - subject to final approval.

EHP

ENGLISH FIRST GOLD

Pedigree
Seedling of WGV. Male parent has Golding on pedigree.

Maturity
Mid-season.

Yield
26-38 zentners/hectare. (1160 - 1695 lbs/a)

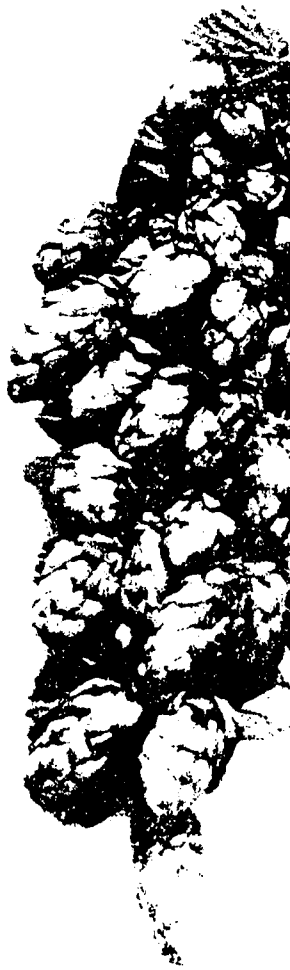
Growth Habit
Dwarf. Short laterals. Very well hopped down.

Disease Reaction
Resistant to Powdery Mildew. Moderate resistance to Verticillium Wilt. Susceptible to Downy Mildew.

Pickability
Satisfactory.

Drying/Packing

Cone Structure
Good size firm cones.



Quality:

Lupulin

Aroma
Similar to Goldings

Alpha-acid
7.0-8.5% w/w.

Beta-acid
3.2-4.1% w/w.

Co-Humulone
31-36% of alpha-acid.

Storageability
Very good.

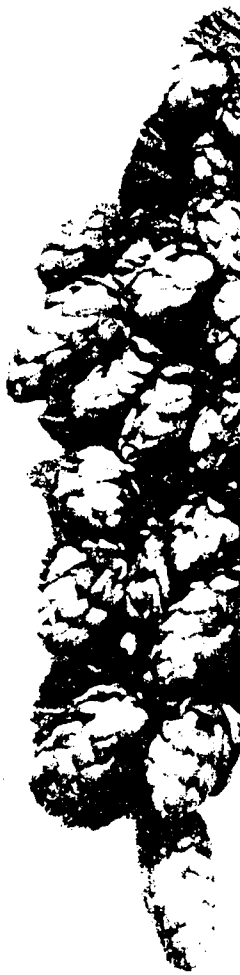
Total Oil
0.7-1.3 mls/100 grams.

Myrcene
27-28% of whole oil.

Humulene
20-24% of whole oil.

Caryophyllene
6-7% of whole oil.

Farnesene
3% of whole oil.



General Trade Perception

First Gold is the first "commercial" dwarf variety to be released with Herald and is seen as an aroma variety similar to Goldings.

Other Information

The code number of this variety is S4. First Gold has been adopted as its name - subject to final approval.

EHP

ENGLISH HERALD

Pedigree
Mostly breeding lines from Wye Omega. Distantly related to Wye Yeoman and sister of Pioneer.

Maturity
Early season.

Yield
22-30 zentners/hectare. (980 - 1540 lbs/a)

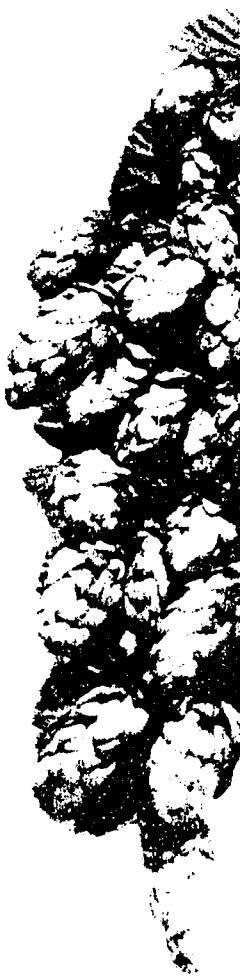
Growth Habit
Dwarf. Very short laterals. Tendency towards yellow leaves.

Disease Reaction
High resistance to Verticillium Wilt. Resistance to Powdery Mildew. Some resistance to Downy Mildew.

Pickability
Satisfactory.

Drying/Packing

Cone Structure
Large heavy coarse cones.



Quality:

Lupulin

Aroma

Alpha-acid
11.1-12.3% w/w.

Beta-acid
4.8-5.5% w/w.

Co-Humulone
36-40% of alpha-acid.

Storageability

Total Oil
1.0-1.9 mls/100 grams.

Myrcene
32-39% of whole oil.

Humulene
18-22% of whole oil.

Caryophyllene
7-8% of whole oil.

Farnesene
Trace.

General Trade Perception

A new dwarf variety with low alpha-acid content and good aroma.

Other Information

The code number of this variety is W8. Herald has been adopted as its name - subject to final approval.

EHP

ENGLISH PHOENIX

Pedigree
Seedling of Wye Yeoman.

Maturity
Early season.

Yield
22-35 zentners/hectare. (980 - 1560 lbs/a)

Growth Habit
Not vigorous with only slight head. Exceptionally well hopped down.

Disease Reaction
Highly resistant to Verticillium Wilt. Resistant to Powdery Mildew. Susceptible to Downy Mildew.

Pickability
Good.

Drying/Packing

Cone Structure
Light open fluffy cones.

Quality:

Lupulin

Aroma
Similar to Wye Challenger

Alpha-acid
8.00-11.5% w/w.

Beta-acid
4.2-6.0% w/w.

Co-Humulone
29-33% of alpha-acid.

Storageability
Very good.

Total Oil
1.3-3.4 mls/100 grams.

Myrcene
24-32% of whole oil.

Humulene
25-32% of whole oil.

Caryophyllene
8-10% of whole oil.

Farnesene
1-2% of whole oil.

General Trade Perception

Phoenix is seen as a replacement to Wye Challenger.

Other Information

The code number of this variety is TC 105. Phoenix has been adopted as its name - subject to final approval.

EHP

ENGLISH PIONEER

Pedigree
Mostly breeding lines from Wye Omega. Distantly related to Wye Yeoman and sister of Herald.

Maturity
Mid to late season.

Yield
26-34 zentners/hectare. (1160 - 1517 lbs/a)

Growth Habit
Semi-dwarf to 13 foot high.

Disease Reaction
Resistant to Powdery Mildew. Moderate resistance to Verticillium Wilt and Downy Mildew.

Pickability
Easy.

Drying/Packing

Cone Structure
Firm round cones.

Quality:

Lupulin

Aroma

Alpha-acid
8-10% w/w.

Beta-acid
3.5-4.0% w/w.

Co-Humulone
36-40% of alpha-acid.

Storageability

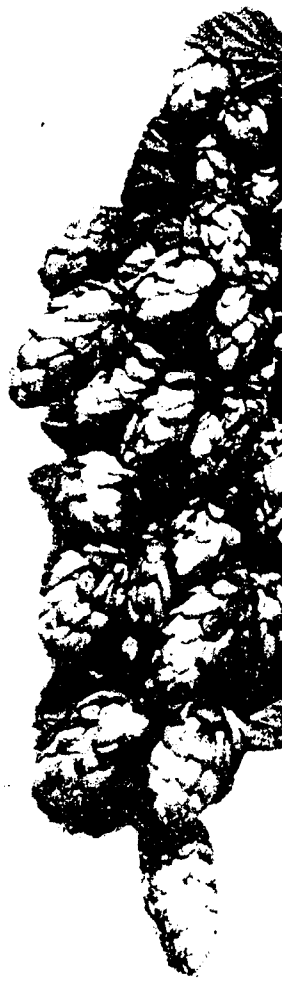
Total Oil
1.0-1.8 mls/100 grams.

Myrcene
31-36% of whole oil.

Humulene
22-24% of whole oil.

Caryophyllene
7-8% of whole oil.

Farnesene
Trace.



General Trade Perception
A semi-dwarf dual purpose hop.

Other Information
The code number of this variety is W 10. Pioneer has been adopted as its name - subject to final approval.

June 27, 1995

Notes from an official call from the U.S. Patent Office (Jim Feyrer) Washington, DC.

Mr. Feyrer called in connection with an application by Hop Union USA for patent protection for Clone 26 which is proposed to be called Columbus Hop.
Hop Union (Dr. Greg Lewsis) has submitted a patent application for the above named hop, stating that nearly 500 acres are already being grown of this hop in the Yakima Valley.

Apparently, Mr. C.E. Zimmermann, Prosser, WA, who was one of the developers of this hop, opposes granting patent status, since this hop has already been freely distributed to several growers in the Yakima Valley area.

Other information pertaining to "Columbus" hop shows that this is a high-alpha hop (alpha about 14%) with very poor storage stability. It should be processed as soon as possible after harvest to avoid losses of alpha acids.
The pedigree of Columbus hop has never been disclosed.

Oregon Business: January 1995.

MID-VALLEY

CORVALLIS

THE POP OF HOPS

If you could follow your favorite beer back to its conception, you'd probably find yourself inside the head of Dr. Alfred Haunold.

Although he's spent the last 30 years in comfortable and relative anonymity, the Austrian-born scientist is the alchemist behind some of the beer industry's most popular brands.

Haunold, who works for the U.S. Department of Agriculture on the Oregon State University campus, is not a brewer. He's a breeder, a master at tinkering with Mother Nature to create aromatic and bitter hops that give beer its distinctive flavor.

Haunold is one of only a dozen or so hops breeders in the world, according to Gregory K. Lewis, executive vice president of Hopunion U.S.A. Inc., a hops grower and dealer based in Yakima.

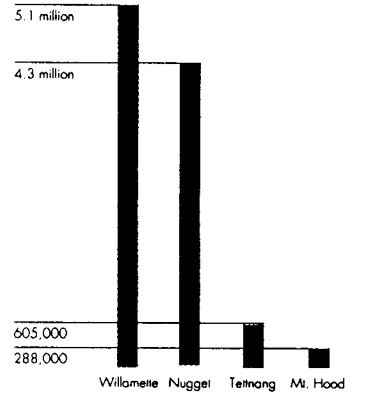
"His achievement has been to produce cheap hops that mimic the flavor of traditional hops," says Lewis, whose company sells to major commercial producers as well as Oregon's $21.8 million microbrew industry.

Haunold takes varieties, some centuries old and weakened with age, and creates stronger domestic versions that are more resistant to disease and promise greater yields.

This is an obvious benefit to major producers, but it also is giving the small guys a competitive edge. "He has allowed us to produce beer using more domestic ingredients," says Kurt Widmer, owner of Oregon's top-selling microbrewery, Widmer Brewing Co. "[This] fosters the image that we have now of being a local product."

To get the full, earthy flavor of specialty beers, microbreweries must use up to four times the amount of hops than commercial brewers. If they had to import all the hops needed for those exotic blends, the cost of an already-expensive bottle of beer could become prohibitive.

Oregon-grown hops



POUNDS AND VARIETY OF HOPS PRODUCED HERE IN 1993. THE PURPLE BARS SHOW THE VARIETIES DEVELOPED BY AL HAUNOLD.

OSU

USDA hop breeder Alfred Haunold checks fragrant cones on experimental plants at Oregon State University's hop yard near Corvallis.

HOPS U.S.A.

The Official Publication of Hop Growers of America

June, 1995
Number 481

HAUNOLD'S HOPS: A LEGACY OF GOOD TASTE

By Kathryn Barry Stelljes, USDA.

Dr. Alfred Haunold has developed or helped commercialize almost every hop grown in the U.S. today. Cone-shaped hop flowers provide beer's bitter, refreshing taste and hearty aroma. The United States alternates with Germany as the top hop producer. American hops flavor beers brewed in more than 90 countries. "He has probably done more for the U.S. hop industry in terms of breeding than any other single person," says Marty Coleman, hop purchaser in Yakima, Wash., for Anheuser Busch, the world's largest brewer.

Haunold, a geneticist with the USDA's Agricultural Research Service, has brought popular Old World aromas to American hops, developed naturally seedless plants, and bred hops with a higher content of important acids than was ever thought possible. Three of Haunold's most popular varieties--Nugget, Willamette and Mt. Hood--were grown on more than a third of the country's 42,000 acres of hops in 1994. In the U.S., hops grow in Washington, Oregon and Idaho. "Beer depends on two types of sensory components--one for aroma and one for bitter taste to balance the sweetness of the wort, which is derived mainly from malted barley," Haunold says. Good bittering hops have high alpha acid levels, while aroma hops are prized for their fragrant oils, he says. Willamette, Haunold's first aroma hop, was also the first naturally seedless hop.

Normally, female hop plants produce seeds if exposed to pollen from male plants. Processors prefer seedless hops because the seeds can add extra fats and may affect beer flavor. "The U.S. has long been known as a producer of alpha-type hops. Haunold's efforts have allowed U.S. growers to diversify their product and double their acreage of aroma hops," says Sean McGree, Executive Director of the Hop Growers of America in Yakima. The aroma hop Mt. Hood brought the potent, filling qualities of German hops to American growers. Liberty, Crystal and the newly released variety, named Ultra, expanded on Mt. Hood's success, giving American microbrewers affordable access to European-like hops. These four varieties are related to the popular Hallertau mittelfrueh hop. Haunold has developed two other types of European hops renowned for their aroma--Saaz and Tettnang--that will be ready for release in the next few years.

(Please see *HAUNOLD* on page 3)

Haunold also helped improve super alpha acid hops. Breeders believed there were two barriers to increasing the alpha acid levels above 10 percent. First they thought the acid level was controlled by multiple genes, making simple selection of the trait difficult. Second, hops with higher alpha acid levels--above 7 or 8 percent--seemed to store poorly. Typically the alpha acid level dropped 3 to 4 percent when the hops were stored over six months at room temperature. "I ignored these theories," Haunold says. The result was Nugget, a variety with 14 percent alpha acid content that loses only 1 percent in storage. He also helped University of Idaho breeder/pathologist Robert Romanko develop Galena, the most popular American super alpha acid hop.

Haunold maintained genetic resources of over 600 hop varieties from around the world and helped provide new virus-free foreign hops to American growers. Haunold also developed ornamental hop varieties that make attractive additions to home gardens. Blue Northern Brewer has bluish-purple leaves instead of the normal green. Sunbeam and Bianca have red stems and yellow leaves. The plant produces a few cones for use in home brewing.

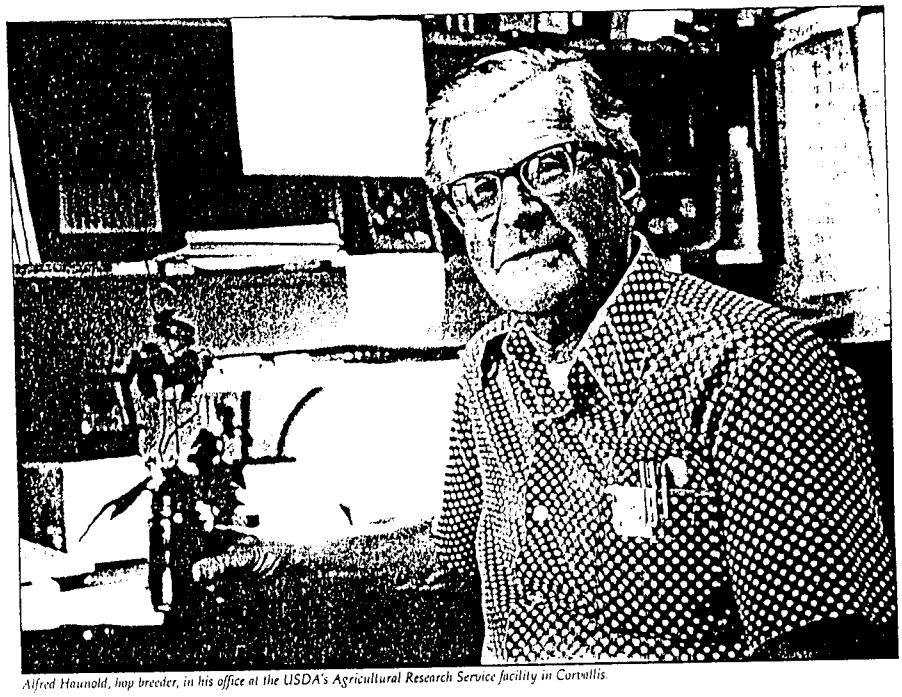
Retail nurseries sell both the ornamental plants and many varieties of hop cones for home brewing. Haunold, the USDA's only hop breeder, plans to retire in June.

He's worked on hops for 30 years at the ARS Forage Seed and Hop Research Unit in Corvallis, Oregon.

AGRICULTURE/*John Gever*

Tops in Hops

World-famous USDA Hop Breeder Alfred Haunold Retires



JOHN GEVER

Alfred Haunold, hop breeder, in his office at the USDA's Agricultural Research Service facility in Corvallis.

When Alfred Haunold told his bosses at Oregon State University that he wanted to retire this year, beer brewers around the world started to get nervous.

Haunold is the only full-time breeder of hops in North America and is probably the world's leading developer of new hop varieties. He is almost single-handedly responsible for putting the Pacific Northwest on par with Germany in hop production during the past 30 years.

Haunold is employed by the U.S. Department of Agriculture, which now has a hiring freeze in place, making it impossible for the department to replace him if he retires. Haunold has several breeding programs still in progress that are being closely watched by brewers and growers. Who would complete them? Who would begin the next phases? The clientele began to sweat.

Call Haunold at his office in the USDA complex adjacent to the Oregon State University campus and you're greeted with the single word "Haunold," delivered in a clipped Austrian accent. Instantly you imagine lederhosen and a Tyrol hat and family hop-growing secrets handed down from generation to generation.

When you visit what you see is a pleasant, silver-haired man in a plaid shirt and slacks who didn't know hops from henbane when he took the OSU job in 1960. He is indeed from Austria, but he spent the early part of his career working with wheat in Nebraska. "Hops grew wild in my hometown, but I didn't recognize them or pay attention to them," he says.

Back in the '60s brewers around the world relied on European hops to give beer its characteristic bitterness and flowery aroma. (Beer without hops tastes like wet Grape-Nuts.) American hops were a poor substitute, used only in the cheapest brews or when the European crop failed—which was frequently. American giants such as Anheuser-Busch were eager for domestic varieties that approached European varieties in flavor and that could be produced with consistent yields.

Haunold's first job was to finish work on a new hop breed that his predecessor had created. Crossing old varieties to produce hybrid seedlings that appear to have the desired characteristics is only part of the job of creating a new breed. Years of field-testing are required before growers will commit commercial-scale acreage to a new variety, and brewers will agree to buy it. Haunold finished testing the new hop breed—called Cascade—and introduced it to the industry.

U.S. production has doubled during Haunold's 30 years in Corvallis, with three times as many varieties now grown.

Cascade soon put Northwest growers on the hops map. Haunold followed it with his own invention, christened Willamette, which he released nine years later in 1976. He calls Willamette "a quantum leap" in hop breeding because it approximated the flavor of Fuggle, an old English variety, but could be grown in huge quantities for brewers such as Anheuser-Busch.

Other varieties developed by Haunold or in collaboration with other researchers include such well-known hop varieties as Mt. Hood and Nugget. Along with Willamette, these varieties account for more than a third of the nation's hop acreage, which is concentrated in the Yakima, Columbia and Willamette river valleys. U.S. production has doubled during Haunold's 30 years in Corvallis, with three times as many varieties now grown.

"He has probably done more for the U.S. hop industry in terms of breeding than any other single person," Marty Coleman, A-B's Northwest hop buyer, said. Because of Willamette and Haunold's work with other new and traditional breeds, A-B has reduced its use of imported hops to 30–40 percent, down from 90 percent when Haunold came to Oregon.

Haunold's achievements are valued as well by microbrewers. "We use Willamette and Cascade," David Sohigian, brewmaster at Field's BrewPub in Eugene, said. "Cascade is one of our favorite hops. It lends what people consider Northwest style to many of our beers, especially the India pale ale."

Teri Fahrendorf, brewmaster at Eugene's Steelhead Brewery, concurs. She characterizes Cascade, Willamette, and Mt. Hood as "wonderful" hops. "We use them here at Steelhead," she said.

Sohigian said having a thriving domestic hops industry is important to microbrewers because consistency and freshness is just as important for his beers as it is for Budweiser. "Plus, you know how it's processed," he said. "You can go look at it being processed, and that's really important."

Haunold is clearly proud of his achievements, yet he remains modest about any special abilities. "I used crosses and combinations that people said couldn't work, but it turned out they did," he said. Mainly he credits himself with luck and intuition. "In plant breeding, you can work a lifetime and collect a lot of material, but never have a smash hit," he said. "Someone else can come in and in a relatively short period of time, come up with [a major achievement]."

Just out of Haunold's test fields is a new variety, Ultra, a descendant of the European variety Hallertauer, as were Mt. Hood and several other of Haunold's breeds. He is also working on adapting two other popular European hops—Saaz and Tettnang—to the Northwest. The program is important to both large and small U.S. brewers because these hops, which impart special flavors to beer, now have to come from central Europe where the crop is unreliable.

Haunold admits that industrial brewers drive his research. "Microbrewing now accounts for about one percent of the market," he said, but "that share could reach five percent." Major brewers have begun to make more flavorful brews that require more flavorful hops, he said, and those opportunities bring brewers and growers to his door.

He said he helped a couple of growers get started with Kent Goldings, a traditional English hop popular with microbrewers back East. "Now they've got a couple of hundred acres, and some are under contract to go back to England," he said.

And how has the industry coped with Haunold's retirement, which became official on June 30? Quite easily. They convinced him to keep going to his office and lab every day until the USDA lifts the hiring freeze. ■

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Hop researcher leaves big hole

By JOHN SCHMITZ
For the Capital Press

CORVALLIS, Ore. — The search for a hop researcher to replace the retired Al Haunold in Corvallis, Ore., will have to wait until Congress decides which Agricultural Research Stations, if any, it wants to close, according to search team leader Lloyd Elliott.

"The position is on hold right now," said Elliott, a research leader with the U.S. Department of Agriculture in Corvallis. "There are some ARS stations that may be closed depending on congressional action."

The five ARS stations that both the House Appropriations Committee and the Clinton Administration agreed should be closed are located in Brawley, Calif.; Chatsworth, N.J.; Orono, Maine, Brentwood, Texas, and Houma, La.

Elliott said that neither the Corvallis ARS station nor the hop research position is in jeopardy.

The new researcher will work in the hop area alone, Elliott said, and, among other things, research genetic resistance to insects and develop better flavor and aroma, he said.

Elliott said that the new geneticist, as was Haunold, will be located in the Oregon State University Department of Crop and Soil Science.

"Al has done a tremendous work for the betterment of hop flavor and aroma. In fact, our hops are exported to some of the most fastidious hop-producing companies in the world, Japan and Germany being two of them," he said.

Elliott said that even though he's retired, Haunold is "on as a collaborator" and taking care of his plots.

During his 30 years as a research geneticist with the USDA, Haunold was involved in one capacity or another, with the development of almost every major hop variety grown in the Northwest today. He retired June 30.

Haunold worked with other researchers in Washington and Idaho in the release of Cascade and Galena, and was solely behind the development of the Willamette, Nugget and Mt. Hood varieties. Willamettes and Nuggets account for about 11 million of the 13 million pounds of hops produced in the Willamette Valley each year.

"I'm filling in between time," Haunold said. The 65-year-old geneticist is heading for Europe shortly, where he will tour hop-producing areas.

Haunold said he sees a good future for the Northwest hop industry, especially in exports. "We lead the world in hops with high alpha acid content," he said. "We produce two times as much as Germany on just two-thirds the acres," he added.

from: Chicago Tribune, Sunday, June 25, 1995

Czechs hopping mad as beermakers switch to cheaper grains

Photo for the Tribune by Pavel Horejsi/AP

Patrons raise a toast in a Prague pub. Czechs say their beers have suffered as breweries have switched from Czech hops to cheaper hops imported from Germany, the United States or China.

By David Rocks
SPECIAL TO THE TRIBUNE

PRAGUE, Czech Republic—Across this nation of inveterate beer drinkers, panels of experts convene daily to discuss politics, religion, the meaning of life and, above all, the status of Czech brewing.

Their conclusions are grim.

"It's definitely true that beer has changed, for the worse," Jiri Strejc, headwaiter at the Sklipek pub in Prague's Vinohrady district, said against a background of thick smoke and pot-bellied men quaffing pints of draft.

The reason for the change? In a word, capitalism.

More specifically, many breweries have switched from their customary recipes, using primarily Czech hops, to brews using cheaper hops imported from Germany, the United States or China.

Hops

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less Czech hops these days, they have also improved their brewing techniques to make purer, longer-lasting beer.

And Cepicka acknowledges thatmost of the largest breweries whose products are well known in the West, such as Budvar, Pilsner Urquell, Staropramen and Radegast, continue to churn out brews every bit as good as they ever were.

"The breweries have modernized," Cepicka said. "I think the famous breweries like Pilsen are very careful to keep their quality up, but many smaller breweries have not had the same opportunities, and their quality has gotten worse."

In a land in which beer seems to constitute its own food group and connoisseurs of fine brew can be found in every corner pub, this is bad enough.

Beer is to the Czech Republic what Scotch is to Scotland and champagne, cognac or wine are to France.

Nearly every town of any size has its own local brew, and brewmasters can only get away with changing their recipes so much before loyal customers complain. This is what Czech hops growers and dealers are counting on to bring brewers back into the fold.

While for the last few years the hop harvest has been slightly below normal and prices have remained high, hop dealers say that an average or better harvest would be difficult to sell at current prices.

"The Saaz hops market is very limited. You can compare it to the Ferrari market or the Rolls-Royce market," said Richard Mattas, managing director of Saaz Hops Worldwide, a trading company.

"You have 25 brewers in the world who can afford them. All of their costs are going up, and they need to find some way to cut costs."

Since the 1989 "Velvet Revolution" that brought down communism, breweries have been free to buy hops from whatever source they can find. With the country's economy reeling from transition, brewmasters sought to reduce costs wherever they could. And because Czech hops cost twice as much as many imports, they were a good place to start.

"Traditionally, Czech beer was brewed from Czech hops, but after the Velvet Revolution the market was opened and the brewmasters took what was the cheapest—and the quality of Czech beer suffered," said Zdenek Lhota, vice president of Top Hop, one of the country's half-dozen hop dealers. "When you're looking at it from an economic point of view, you'll buy the cheapest ingredients for beer."

While most trades and industries have flourished under the invisible hand of the market since 1989, brewing seemed to fare better at the hands of this country's central planners and the closed system they operated in.

Of course, the quality of Czech beer—generally considered among the world's best—depends on a long tradition of brewing, dating from the middle ages. And meticulous brewmasters still seek out the purest water and highest-grade malt for their beers.

But more than any other ingredient, the fine aromatic hops grown around the north Bohemian city of Zatec—known as Saaz in English and German—distinguish Czech beer.

And while vast quantities of those Saaz hops were exported to the West for hard currency in former times, the Czech authorities disliked the idea of importing something they had in such abundance at home. So about 3,000 to 4,000 metric tons per year also found their way into Czech brews; central planners simply expected Czech breweries to use the domestic product. Today, though, Czech breweries use only about 1,000 tons of Saaz hops annually.

"During the last 40 years, our breweries weren't able to buy too many products from Western countries," said Jaroslav Cepicka, a professor at Prague's Institute of Chemical Technology and a frequent judge at beer tastings.

"Now, if they have enough currency, they buy what they can from foreign countries, so they buy more hops from the West. I am afraid that the quality of the beer is changing in the direction of the Western beers—that is, for the worse."

The news, however, is not all bad. Some defenders of the breweries say that while they are using

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«Der Massentourismus geht grösstenteils am «Old Swiss House» vorbei.»

■ Willy Buholzer vom gleichnamigen Luzerner Restaurant, der auch vier Jahrzehnte in Europa den Hopfen-Einkauf für die grösste Bierbrauerei der Welt managte

STADT

(Willi Buholzer, Chief Hop Buyer for Anheuser Busch in Europe retires).
Son Willi jr. follows in the footsteps of his father.

Der Besitzer des «Old Swiss House» ist auch Hopfen-Einkäufer für grösste US-Brauerei

Willy Buholzer ist auch Hopfen-Fan

Er ist Weinkenner und -sammler. Aber er kann ebenso für den Bierhopfen schwärmen wie über Bordeaux-Jahrgänge: Willy Buholzer vom «Old Swiss House».

Gut gehopft: Die Dynastie Buholzer am «Bud»-Zapfhahn im Restaurant Old Swiss House. Von links: Philipp, Willy senior, Willy junior und Hanny Buholzer.
■ *Bild Nique Nager*

[illegible] ist er stolz auf seine einzigartige Sammlung «Mouton-Rothschild». Aber Willy Buholzer, Besitzer des «Old Swiss House», des wohl bekanntesten Riegelhauses Luzerns, hat in den vergangenen [illegible] Jahrzehnten eine gute Hälfte seiner Schaffenskraft dem Hopfen gewidmet, dem [illegible], der zusammen mit Malz das Bier ausmacht. Er kaufte seit 1953 für die grösste Brauerei der Welt, die Budweiser-Produzentin Anheuser-Busch in St. Louis, Hopfen [illegible] damals deckte die amerikanische Brauerei ihren Hopfen-Bedarf zu 80 Prozent in Europa.

Zufällig zum Hopfen-Imperium

Der Einstieg war Zufall der familiären Art: Willy Buholzers Schwester Trudy heiratete jenen August Busch, der eben ein Mann von Anheuser-Busch war und der sie natürlich im «Old Swiss» anlachte. Der junge Willy Buholzer geriet so 1953 erstmals in die Vereinigten Staaten, erlebte US-Hotels auf verschiedensten Stufen (und so nebenbei Gäste wie Frank Sinatra) und erreichte schliesslich das Angebot, für die US-Brauerei in Europa den Hopfen-Einkauf neu zu organisieren. Die Amerikaner wollten sich nämlich aus der Abhängigkeit der Brooker, der Hopfen-Rohstoffhändler, befreien. Willy Buholzer fing in München gewissermassen bei Null an.

Sohn Willy übernimmt

Heute Mittwoch übergibt Willy Buholzer seine Direktion Einkauf Europa seinem Sohn Willy – dazu gehören jetzt eine eigene Hopfenfarm im Gebiet Hallertau nördlich von München, dazu ein eigener Hopfen-Versuchsbetrieb sowie Vertragsproduzenten in der gleichen Region. Zuletzt lieferte Willy Buholzer jährlich gut 100 000 Zentner (zu 50 Kilo) frischen und natürlichen Aromahopfen in die USA.

Etwa 40 Prozent stammen aus Deutschland, der Rest aus Tschechien (böhmischer Hopfen ist immer noch Spitze), dem Elsass und aus Polen. Während Buholzers rund 40jährigem Engagement steigerte die US-Brauerei Anheuser-Busch ihren Bierausstoss von sechs auf 110 Millionen Hektoliter! Buholzer hatte einen steigenden Hopfenbedarf zu decken, obwohl die Brauerei mehr und mehr auch Hopfen in den USA anbauen liess, wo sie heute über mehrere Hopfen-Plantagen verfügt.

Nebenbei: Das Budweiser aus den USA ist im «Old Swiss House» schlicht ein «Bud» – aus namensrechtlichen Gründen. Doch Willy Buholzer meint: «Anheuser hat in den USA Budweiser gebraut, bevor die Budweiser (Ort in Tschechien) auf die Idee kamen, dass ihr Name schützenswert ist.» Heute M[illegible] ist das eine Nebensache: W[illegible] senior feiert im Beisein [illegible] Bier-Dynastien die Übergabe an seinen Sohn Willy, [illegible] der schon seit drei Jahren im Hopfen-Geschäft mitwirkt.

Und da ist neben den [illegible] profis aus den USA auch [illegible] Luitpold von Bayern dabei, ein echter Wittelsbacher [illegible] Nachfahre von Ludwig [illegible] und zudem ein [illegible] bayerischer Bierkönig [illegible] genen Brauereien.

■ [illegible]

«Old Swiss House»

In dem 1859 erbauten Riegelhaus, das heute das Restaurant Old Swiss House beherbergt, [illegible] Hanny und Willy Buholzer seit 1962 Gastgeber (bis 1976 zusammen [illegible] seinem Bruder K[illegible], heute das «Fried[illegible]» Hergiswil führt).

Doch auch im Sta[illegible] haus am Löwenplatz [illegible] direkte Buholzer-N[illegible] ge in Sicht: Sohn P[illegible] gelernter Koch, [illegible] niert derzeit sein K[illegible] unter der Ägide von [illegible] Swiss»-Küchenchef Günther Renz. Und [illegible] sammen servieren [illegible] anderes als die berühmten, am Tisch zubereiteten Wiener Schnitzel, [illegible] im «Old Swiss House» [illegible] natlich 1000mal [illegible] werden – von [illegible] gend hiesigen Gäste[illegible].