

**2002 Eastern  
Washington  
On Farm  
Malt Barley  
Trials**



# 2002 EASTERN WASHINGTON ON FARM MALT BARLEY TRIALS

Compiled by Roland Schirman  
Columbia County/WSU Extension Agent

Objective: To evaluate adaptability of selected spring malt barley varieties to eastern Washington conditions using commercial production conditions.

## Grower Cooperators:

<u>Name</u>	<u>Location</u>	<u>County</u>
Lynn Ausman	Anatone	Asotin
Broughton Land Co	Dayton	Columbia
Double D Farms	Dayton	Columbia
Eslick Farms	Dayton	Columbia
David Harlow	Palouse	Whitman
Jim & Jeff Pittman	Rosalia	Whitman
David Ruark	Pomeroy	Garfield

Great Western Malting Representative: Kevin Anderson - Vancouver

## Cooperative Extension Coordinators:

John Burns - WSU Dept Crops & Soils (Whitman County)  
Mark Heitstuman - Asotin County  
Roland Schirman - Columbia County

## Methods:

Seven sites were selected by WSU Cooperative Extension agents in an effort to provide a cross section of the agroclimatic zones of eastern Washington. Seed of Baroness feed barley and six potential malt varieties was provided by in quantity great enough to allow seeding of up to 1 acre at each location. Baroness and Harrington were provided by Columbia County Grain Growers, while Drummond, Lacey, Legacy, Metcalfe and Manley were supplied by Great Western Malting. Seedbeds were prepared and seeding made with standard equipment at each location. Weed and insect control was provided by the cooperating grower at a time that they deemed optimum. Harvest was made with production size combines and each plot individually weighed. Sub samples taken at harvest were evaluated for quality by Great Western Malting at their Pocatello facility.

## Growing Season:

The 2002 growing season in eastern Washington was disappointing in general for spring grain production. The soil moisture recharge during the winter months was marginal although above the 2001 season at most locations. There were also below average temperatures and very limited precipitation after June 15, which greatly reduced the yield potential. State wide an acceptable quality barley crops was recorded but lower quality than that of recent cropping history.

All sites were dryland - recrop with a reduced or direct seed system.

Precipitation records for 2001-2002 as compared to the long term average and the 2001 - 02 daily average Maximum/Minimum temperatures of selected locations are shown below. It must be recognized that these are from NOAA recording sites and were not taken at the plot site.

## Selected Climatic Records for 2001 - 02 Growing Season

Month	Dayton		Cloverland		Pomeroy		Pullman		Rosalia	
	01-02	20 Year Ave	01-02	20 Year Ave	01-02	20 Year Ave	01-02	20 Year Ave	01-02	20 Year Ave
Sept	0.62	0.95	0.36	Na	0.37	0.85	0.28	1.00	0.27	0.88
Oct	1.97	1.40	3.13	Na	2.09	1.08	2.46	1.42	2.04	1.14
Nov	2.59	2.43	0.77	Na	1.72	1.79	2.76	2.67	2.73	2.18
Dec	2.11	2.53	1.22	Na	2.08	2.05	2.61	5.27	2.62	2.6
Jan	1.61	2.38	1.01	Na	1.74	2.12	2.88	2.73	1.63	2.16
Feb	1.19	1.71	0.43	Na	1.11	1.48	1.06	2.15	0.93	1.69
March	2.46	2.00	1.8	Na	2.43	1.62	2.69	2.10	1.45	1.69
April	0.94	1.76	1.11	Na	1.26	1.14	0.96	1.56	0.35	1.45
May	1.11	1.35	1.28	Na	1.07	1.35	1.23	1.56	0.66	1.53
June	2.09	1.06	2.2	Na	1.60	1.01	1.64	1.43	0.91	1.33
July	0.17	0.54	0.78	Na	0.26	0.60	0.15	0.73	0.43	0.78
Aug	0.09	0.66	1.07	Na	0.38	0.74	0.38	0.91	0.13	0.7
Total	16.95	18.77	15.16	Na	16.11	15.83	19.1	23.53	14.15	18.13

### Monthly Ave Temperature (F)

Month	Dayton		Cloverland		Pomeroy		Pullman		Rosalia	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Sept	81.5	50.0	Na	Na	79.0	46.5	79.3	46.5	79.4	45.7
Oct	63.3	38.8	Na	Na	61.1	36.9	59.4	36.7	59.0	34.2
Nov	53.4	33.6	Na	Na	52.6	32.3	48.4	34.3	50.0	33.3
Dec	42.6	28.6	Na	Na	39.7	25.7	36.6	25.0	34.9	23.8
Jan	43.7	29.4	Na	Na	41.4	27.4	38.0	26.4	37.8	26.1
Feb	49.0	29.0	Na	Na	40.0	25.9	39.8	24.9	40.1	21.0
March	48.1	32.1	Na	Na	45.1	29.1	42.2	27.6	41.9	26.2
April	61.5	38.7	Na	Na	58.2	35.3	56.9	35.4	57.2	32.9
May	68.7	43.7	Na	Na	65.0	41.0	63.9	39.7	63.8	38.0
June	79.8	52.4	Na	Na	75.8	48.0	73.8	47.2	75.0	46.3
July	90.2	57.6	Na	Na	87.2	52.7	84.8	51.7	86.3	50.8
Aug	84.0	53.4	Na	Na	81.8	48.5	80.6	47.5	81.5	47.1

### Pest and other Environmental Pressure

Broadleaf weeds were satisfactorily controlled at all locations in a timely manner. Wild oat continues to be a concern as producers move toward reduced tillage but this year herbicides gave a satisfactory level of suppression at all locations. No recordings of aphid, wire worm or Hessian fly were ever above the economic threshold level. Of the potential pathogens, low levels of rhizoctonia were noted in most fields. Although detailed evaluation was not made, the general conclusion was that varietal differences in their reaction to this disease did not exist. Heavy rain followed the April 12 seeding at the Eslick site with soil crusting resulting. The site was harrowed when it became suspect that some plants would not emerge. Final stands were less than optimal but at the time it was felt the delayed reseeding date would

impact performance more than the observed stand reduction.

#### **Varieties Tested:**

**BARONESSE:** This 2-row feed grade variety has become the industry standard for barley production in eastern Washington. Released by Western Plant Breeders in 1992 this variety was planted on 238,000 acres in 2002 which was 85% of all feed barley varieties acreage of eastern Washington (see Figure 1). Yield and quality have been outstanding over a wide range of agroclimatic zones.

**DRUMMOND:** Drummond is a six row barley developed at North Dakota State University from a cross he made in 1991 that involved two North Dakota experimental lines and Stander. It was rated satisfactory in two years of plant scale malting evaluation by Miller Brewing Co., which was the basis of its addition to the recommended list by the American Malting Barley Association. North Dakota State University evaluations indicate that Drummond has a greater yield potential than Morex, Robust and Foster and is similar in yield to Stander. Drummond has a greater degree of straw strength than any commercially available six-rowed cultivar and is similar in heading date and plant height to Robust.

**HARRINGTON :** Currently recognized as the PNW standard for malt varieties this two row, 1986 University of Saskatchewan release was planted on 25,840 acres in Washington in 2002 (84% of malt variety acreage) down from 42,700 acres in 1996 (see Figure 1). It has excellent straw strength and mid season maturity. It is adapted to dryland production, but tends to yield below the best dryland feed types. Test weight has been better than some of the other varieties

**LACEY:** A six-row barley developed at the University of Minnesota yields about 6 % greater than CDC Sisler, has stronger straw, is about 5 inches shorter, and tends to carry higher test weight, kernel weight, and higher percent plump in Canadian trials. Under summer rainfall conditions is susceptible to septoria, scald, fusarium head blight and the net form of net blotch. It was rated satisfactory in two years of plant scale evaluation by Miller Brewing Co., but at Anheuser-Busch, Inc. after the second year of evaluation of Lacey with the 2000 crop has rated it unsatisfactory.

**LEGACY (BT290):** Legacy is a six-row variety released in 2001 by Busch Agricultural Resources that was grown IN 2002 with limited acreage in Idaho, Montana and the western Canadian provinces. It has reported better yield, percent plump and lower protein than comparative 6-row varieties. It shows resistance to stem rust, surface-borne smuts, moderate resistance to common root rot, and spot form of net blotch. Standability under eastern Washington conditions has not been evaluated.

**MANLEY (TR490):** Manley was released in 1990 by the University of Saskatchewan, Saskatoon. It is a 2-row malt barley moderately resistant to spotted form of net blotch and has good test weight and yield. Its maturity is about three days later than Harrington and it is susceptible to net form of net blotch, loose smut, scald and septoria leaf blotch. Manley is a rough awned variety and is similar in height to Stander and Harrington and shorter than Argyle with fair lodging resistance.

**AC METCALFE (TR 232)** AC Metcalfe is a high yielding, white aleurone malting variety. In western Canadian trials the yield potential has been 8.3% higher than Harrington and 2.2 % lower than Manley. It is medium early in maturity, one day later than Harrington but two - three days earlier than Manley. Metcalfe has good resistance to loose smut, is moderately resistant to the spotted form of net blotch, fusarium head blight and carries the T gene for stem rust resistance. It is susceptible to the net-form of net blotch, scald and septoria as are Manley and Harrington. Its height is equal to Manley and slightly taller than Harrington. It has shown better lodging resistance than Harrington and similar to Manley.

AC Metcalfe has shown a very high malt acceptance level of samples submitted for testing. It generally has a plumper kernel than many other varieties when grown under similar conditions.

### **Results**

Data obtained from these trials has been grouped into several tables & graphs. In summary these include:

- Table 1 Yield by location showing variety yield and basic information of each site.
- Table 2 Summary of quality factors by variety with sub standard ratings highlighted for malt varieties.
- Figure 1 Estimated Washington barley acreage for 1992 - 2000.
- Figure 2 Variety yield by location expressed as percent of Baronesse.
- Figure 3 Comparative protein percentage by variety at each location.

The weather factors noted under growing conditions show that the 2002 crop was under some weather stress during the fill period. This may not have been true for all sites but no measure was made of this factor. General grower reaction was that performance of all spring crops in eastern Washington was below the long term average given the rainfall pattern. The planting date at all sites was considered to be in the desired range.

### **Yield Potential**

Yield of the varieties seeded at each location are shown in Table 1. Average yields of the various sites varied from 1272 lb/A at Anatone(Ausman), a site with a limited soil profile, to 3928 lb/A at the Rosalia (Pittman) site. This year most growers in the region were reporting yields in the 3000 to 3400 lb/A range.

When statistical analysis was applied to these data using location as replication, the high degree of variability did not allow significant differences to be shown.

To reduce the possibility of skewing yield comparisons across all sites a ranking for varieties at each location was made and then these rankings averaged. Using this approach it can be seen that Morex ranked lowest under this system.

This years trials if the Manley data are ignored no varietal grouping by yield is shown as has been observed in other years. Lacey does seem to be superior in high stress situation. Unfortunately seed was not available at the time the Eslick site was planted. Baronesse again ranked highest overall.

In that Baronesse is the primary variety grown in Washington, Figure 3 has been prepared expressing yield of each varieties as a percent of Baronesse at each location. Actual Baronesse yield for the location is shown in the Label parenthesis.

### **Quality grade**

The current minimum standards for malt barley are shown below. It has been suggested by the American Malting Barley Association that breeders raise their standard when evaluating six row lines to 80 percent plump. If this standard were also adopted for production fields it could pose a challenge for dryland areas that occasionally have late season moisture stress.

## Current Malt Quality Standards

Type	2 Row	6 Row
Protein	< 13.5 %	< 13.5 %
Plump	> 80 %	> 70 %
Thins	< 5 % (5/64 screen)	< 5 % (5/64 screen)

Based on laboratory analysis, all of the malting varieties failed to meet the minimum standards for protein and plumpness at the Asotin (Asuman) location. In addition to this site having a very shallow soil profile, from the Cloverland weather records, it can be seen that effective precipitation was probably less than 10 inches. This would have placed the crop under stress during most of the growth cycle. At the McKinley site only Lacey met all quality criteria. In that the Eslick site had been fertilized with a 3500 lb/A yield goal it is not surprising that protein levels are elevated.

Comparative protein levels are shown in Figures 3.

If the sites considered to have minimal stress, it is seen that the protein level is well within acceptable levels at these locations.

Test weight essentially paralleled the percent plump.

### SUMMARY

These trials continue to confirm that malt barley production has economic potential for many agroclimatic zones in eastern Washington. Although Harrington continued to give acceptable yields it appears other varieties have an agroclimatic range of adaptability and potential for this area. The two row cultivar Metcalfe and the 6 row variety Legacy continue to show good quality and yield potential if the malted product meets the standards preferred by the brewing industry. Lacey also looks promising but has not been fully accepted by the malt industry. Although historically lodging has been a limiting factor with six row varieties under this years conditions it was not a factor.

### Future Plans

On Farm testing of potential Malt Barley varieties was continued in 2002 in response to request from extension advisory committees. With the performance of varieties in failing to meet quality standards at the Asotin sites the past two years further discussion must occur to determine if this area of the state will be continued. Growers have also expressed a desire to again establish a site in the Reardan area. With the present staffing restraints in Extension any trials in this area during the 2003 growing season would be limited.

### Appendix to Report:

Included as an appendix to this report are yield results of selected varieties (most early generation lines were omitted) that were in the 2002 WSU Variety Testing program. All locations utilized small plots (4x16') with at least 3 replications. Seeding and harvesting was with standard small plot equipment.

Appendix Table 1 gives measured variety yield in pounds/acre.

To allow you the reader to more easily compare performance across locations Appendix Table 2 expresses the yields of 6 row type barley varieties as percent of Morex at that location and for the two row varieties as percent of Baronesse.

Questions on these results or requests for information on numbered lines that were also included in these trials should be directed to either Dr Steve Ulrich or John Burns at the Dept of Crop & Soil Science, Washington State Univ. Pullman, WA.

Report prepared 2/03

Figure 1  
**Estimated Washington Barley Acreage for 1993 - 2002**

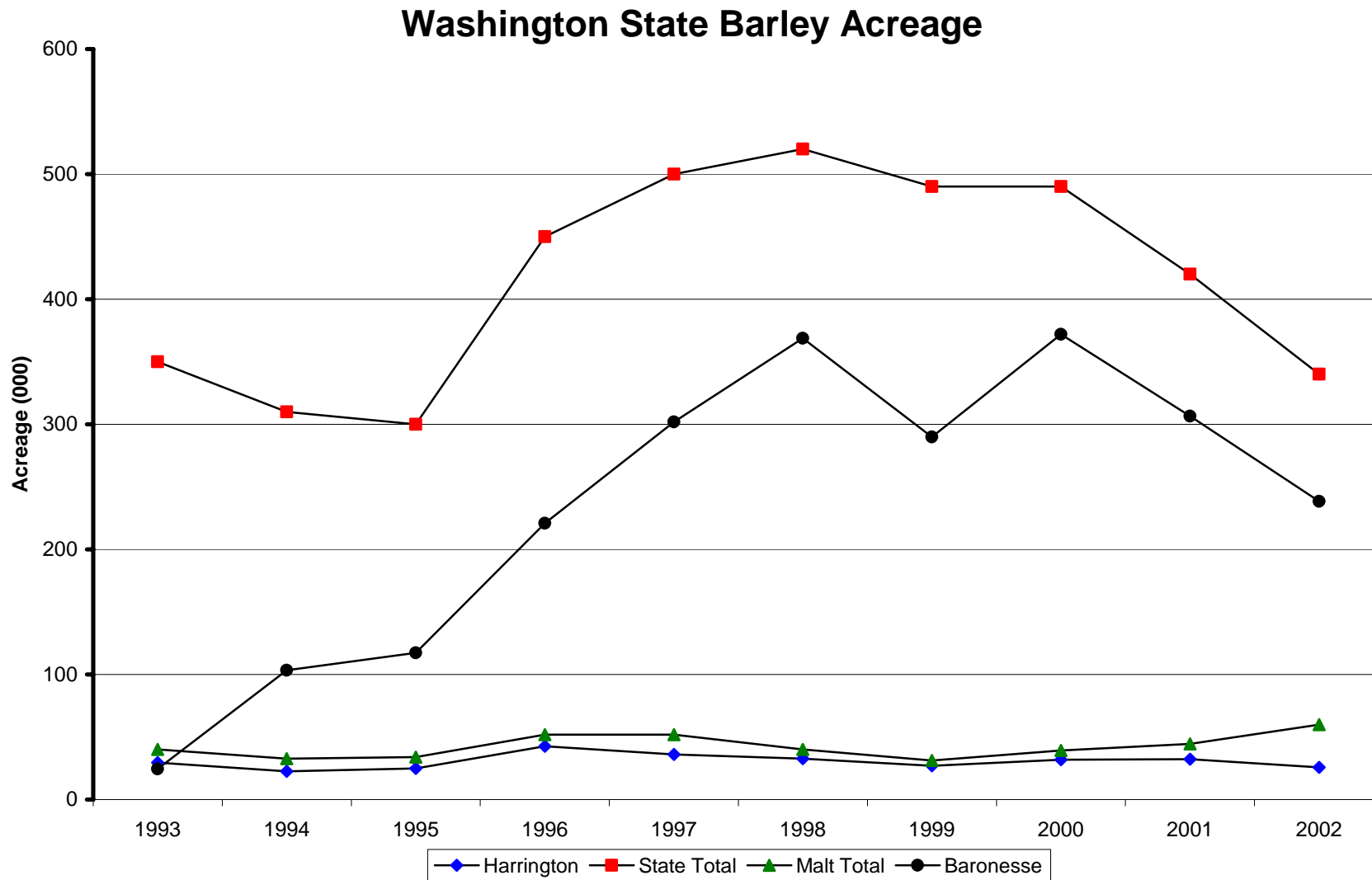


Figure 2  
**2002 Barley Yields as Percent of Baronesse**

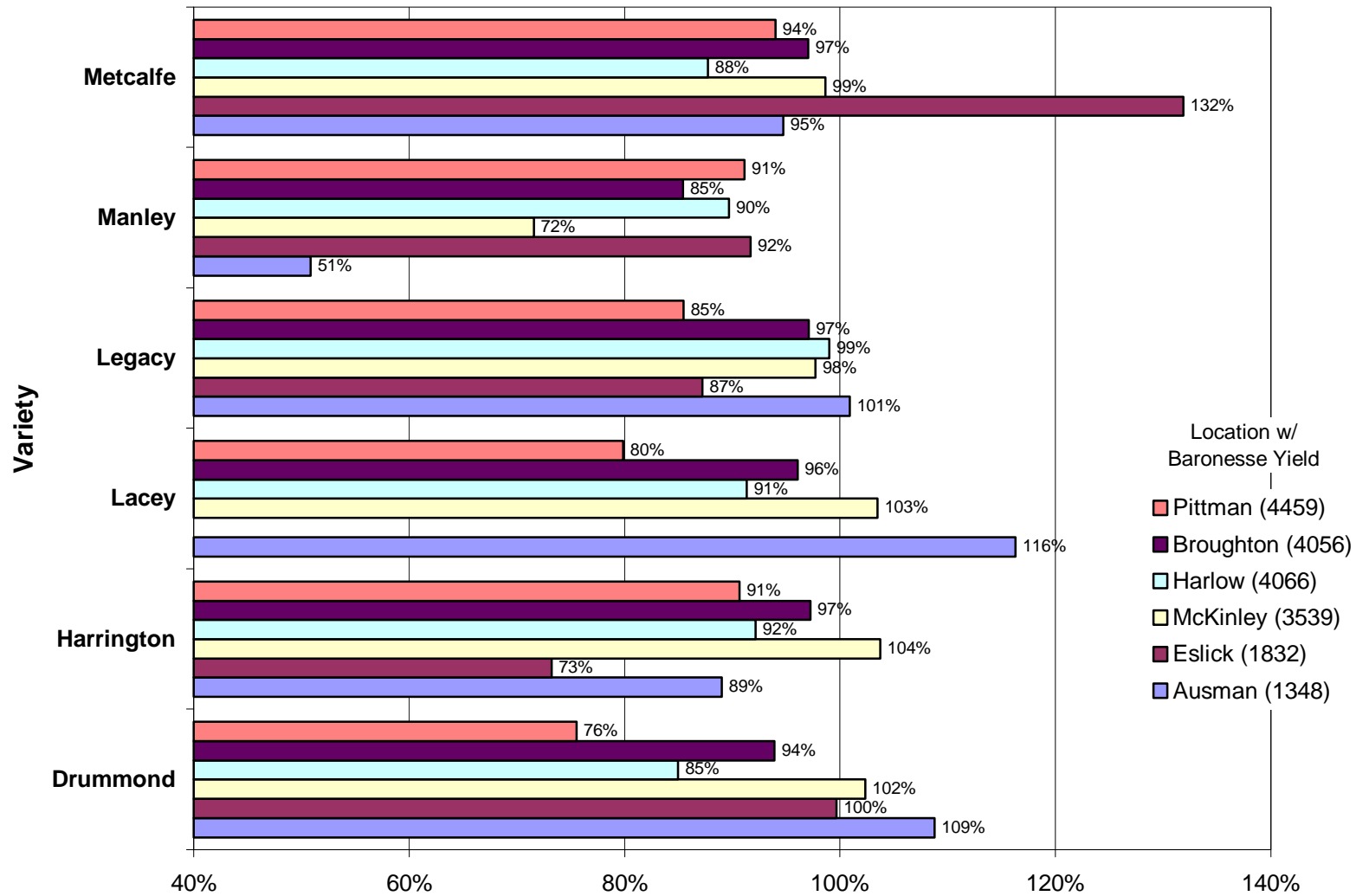


Figure 3  
**Percent Protein by Location**

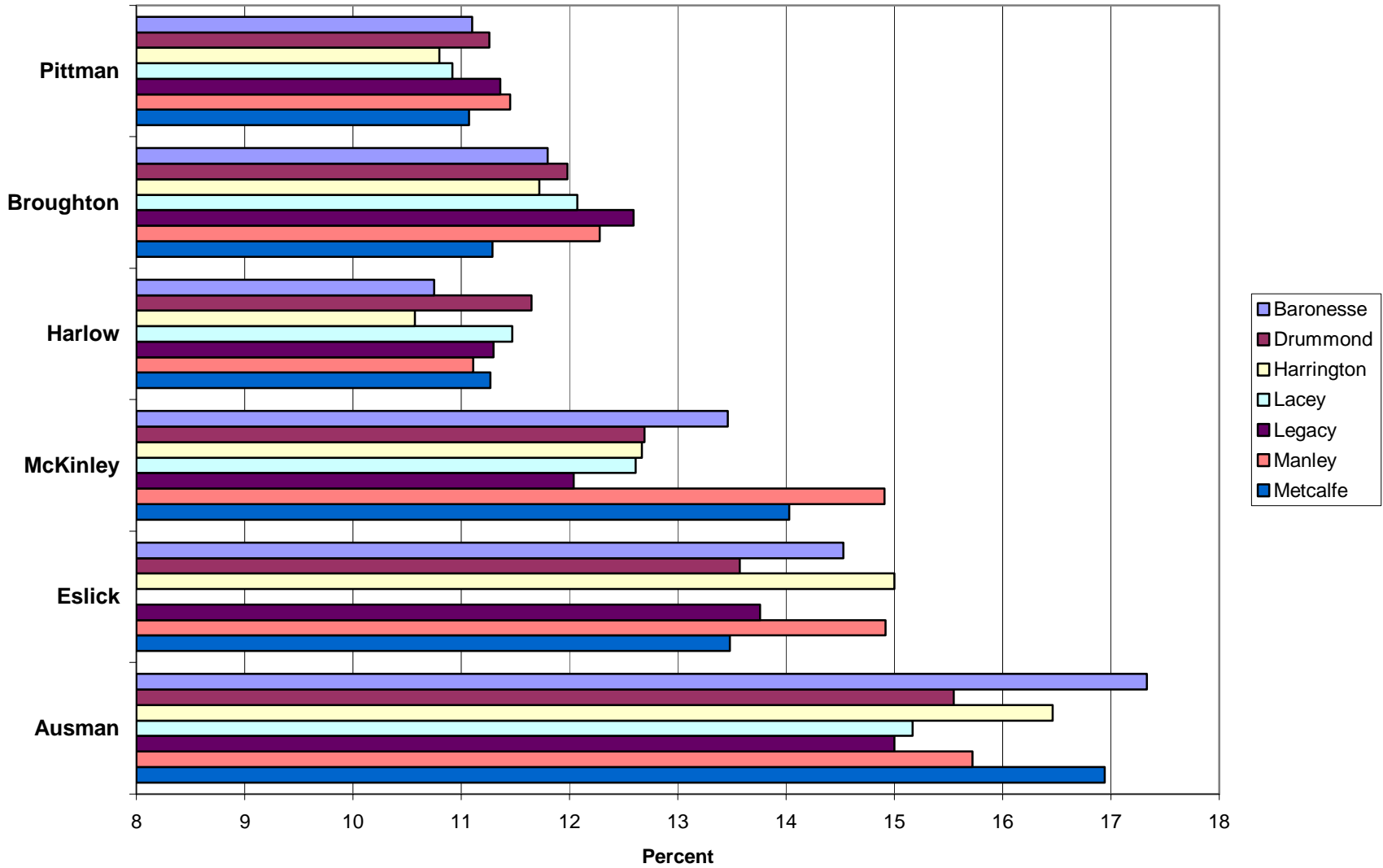




Table 1: **Yield by Location in Lb/A and (Ranking) at that Location**

	Ausman	Eslick	McKinley	Harlow	Broughton	Pittman	Mean
Baronesse	1347 (4)	1832 (2)	3539 (4)	4066 (1)	4056 (1)	4459 (1)	3216 (2.17)
Lacey	1567 (1)		3662 (2)	3713 (4)	3897 (5)	3561 (6)	3280 (3.60)
Harrington	1200 (6)	1342 (6)	3672 (1)	3746 (3)	3944 (2)	4042 (4)	2991 (3.67)
Metcalf	1276 (5)	2416 (1)	3490 (5)	3568 (6)	3937 (4)	4191 (2)	3146 (3.83)
Legacy	1359 (3)	1598 (5)	3458 (6)	4024 (2)	3937 (3)	3810 (5)	3031 (4.00)
Drummond	1466 (2)	1826 (3)	3623 (3)	3455 (7)	3809 (6)	3368 (7)	2924 (4.67)
Manley	686 (7)	1680 (4)	2534 (7)	3647 (5)	3465 (7)	4064 (3)	2679 (5.50)
Site Ave	1272	1782	3425	3745	3863	3928	
Seeding Date	4/22/02	4/12/02	4/17/02	5/3/02	4/23/02	4/30/02	
Harvest Date	8/13/02	8/12/02	8/14/02	10/9/02	8/21/02	8/19/02	

Table 2: **Quality Evaluation Factors**

	Ausman	Eslick	McKinley	Harlow	Broughton	Pittman
<b>Protein</b>						
Baronesse	17.33	14.53	13.46	10.75	12.28	11.10
Drummond	15.55	13.57	12.69	11.65	11.72	11.26
Harrington	16.46	15.00	12.67	10.57	12.07	10.80
Lacey	15.17		12.61	11.47	11.80	10.92
Legacy	15.00	13.76	12.04	11.30	11.29	11.36
Manley	15.72	14.92	14.91	11.11	12.59	11.45
Metcalf	16.94	13.48	14.03	11.27	11.98	11.07
<b>Bushel Weight</b>						
Baronesse	44.4	49.90	48.60	49.00	49.80	51.90
Drummond	39.2	48.80	49.70	46.70	47.80	49.10
Harrington	42.9	48.30	48.50	48.70	48.60	51.60
Lacey	39.1		50.80	47.30	47.20	50.00
Legacy	40.1	48.80	49.00	47.20	49.50	48.30
Manley	41.8	48.30	45.70	48.20	47.10	50.40
Metcalf	44.4	50.10	49.70	49.40	50.50	51.60
<b>Plump</b>						
Baronesse	44	87	53	91	75	95
Drummond	18	81	61	86	76	88
Harrington	42	84	74	92	85	95
Lacey	18		77	86	63	90
Legacy	28	81	59	83	82	84
Manley	59	68	32	79	66	78
Metcalf	54	88	73	92	89	95
<b>Thins</b>						
Baronesse	7	1	6	1	2	1
Drummond	26	2	4	2	2	1
Harrington	8	2	3	1	1	1
Lacey	19		2	2	4	1
Legacy	16	2	5	2	1	1
Manley	5	4	13	2	5	2
Metcalf	5	2	3	1	1	1



Appendex Table 1  
2002 WSU Small Plot Nursery Yields (Selected Cultivars)

VARIETY	YIELD (LBS/A)															VARIETY MEAN
	RITZVILLE	BICKLETON	DUSTY	ANATONE	ALMIRA	LAMONT	ST. JOHN	WALLA WALLA	MAYVIEW	DAYTON	REARDAN	PULLMAN	FARMINGTON	FAIRFIELD	ROYAL SLOPE	
2 Row																
BARONESSE	2224	2161	3068	2900	3146	3572	3632	3856	3827	4832	4678	5268	5509	6568	7011	4150
85AB2323	2167	2310	3258	3008	2892	3486	3369	4318	3787	4603	4835	5343	6527	5915	6307	4142
XENA	2123	2258	3092	3359	3239	3674	3421	4250	3920	4351	4503	5355	4399	6627	7140	4114
FARMINGTON	2090	2310	3088	2566	2375	3303	3724	3848	3978	4410	4195	5371	6647	5475	7922	4087
SAMISH 23	2058	2202	2583	2388	2948	3523	3388	4027	3883	3729	4538	5244	6235	6524	7757	4068
BOB	2236	2190	3103	2874	3034	3600	3913	4306	3611	4383	4370	5294	5695	5638	6370	4041
NZDK 00-170	1920	2110	2454	2540	2614	3146	3729	3612	3850	4133	4685	5271	5448	5762	7467	3916
JERSEY	1997	2191	2790	2571	3033	3201	2832	3685	3601	4643	4191	5004	6145	5528	7302	3914
CAMELOT	2242	2209	2775	2823	2774	3250	3466	3886	3965	4563	4429	5106	5591	5383	6150	3907
CAMAS	2334	2236	2896	2736	2552	3458	3373	3722	3529	3837	4583	5385	4702	5304	7073	3848
CDC STRATUS	2133	2176	3180	2731	2789	3230	3347	3888	3493	4040	4398	5079	4658	5538	6090	3785
MELTAN	1828	2081	3001	2609	2821	3271	3170	3733	3746	4545	4161	5314	5575	4578	6014	3763
GALLATIN	1986	2032	2849	2699	2620	2956	3415	3829	3658	4094	4256	5065	5346	4838	6442	3739
HARRINGTON	2024	1984	2374	2794	2328	2889	3577	3445	3775	4027	4130	5174	5192	5508	6821	3736
6 Row																
LEGACY	2158	2235	2715	2826	2671	2956	3574	3293	3119	4548	4113	4860	5819	6108	5373	3758
STEPTOE	2150	2376	2464	2834	2781	2383	2498	3822	3713	4617	4830	5305	5590	4089	6412	3724
WA 9262-98	2057	2113	2022	1815	2212	3056	4042	3154	3440	4081	4271	4960	5362	5728	5940	3617
MOREX	1844	2070	1886	1906	2349	2429	2683	3428	2829	3768	3440	4367	4704	4267	4520	3099
NURSERY MEAN	2058	2112	2619	2647	2805	3204	3350	3669	3676	4204	4354	5113	5596	5614	6617	3843

VARIETY	RITZVILLE	BICKLETON	DUSTY	ANATONE	ALMIRA	LAMONT	ST. JOHN	WALLA WALLA	MAYVIEW	DAYTON	REARDAN	PULLMAN	FARMINGTON	FAIRFIELD	ROYAL SLOPE	VARIETY MEAN
<b>2 Row</b>	<b>Yield as Percent of Baronesse</b>															
85AB2323	97	107	106	104	92	98	93	112	99	95	103	101	118	90	90	100
BOB	101	101	101	99	96	101	108	112	94	91	93	100	103	86	91	97
CAMAS	105	103	94	94	81	97	93	97	92	79	98	102	85	81	101	93
CAMELOT	101	102	90	97	88	91	95	101	104	94	95	97	101	82	88	94
CDC STRATUS	96	101	104	94	89	90	92	101	91	84	94	96	85	84	87	91
FARMINGTON	94	107	101	88	75	92	103	100	104	91	90	102	121	83	113	98
GALLATIN	89	94	93	93	83	83	94	99	96	85	91	96	97	74	92	90
HARRINGTON	91	92	77	96	74	81	98	89	99	83	88	98	94	84	97	90
JERSEY	90	101	91	89	96	90	78	96	94	96	90	95	112	84	104	94
MELTAN	82	96	98	90	90	92	87	97	98	94	89	101	101	70	86	91
NZDK 00-170	86	98	80	88	83	88	103	94	101	86	100	100	99	88	107	94
SAMISH 23	93	102	84	82	94	99	93	104	101	77	97	100	113	99	111	98
XENA	95	104	101	116	103	103	94	110	102	90	96	102	80	101	102	99
<b>6 Row</b>	<b>Yield as Percent of Morex</b>															
LEGACY	117	108	144	148	114	122	133	96	110	121	120	111	124	143	119	121
STEPTOE	117	115	131	149	118	98	93	111	131	123	140	121	119	96	142	120
WA 9262-98	112	102	107	95	94	126	151	92	122	108	124	114	114	134	131	117