ONION VARIETIES GRADED OUT OF STORAGE FROM THE 1999 SEASON

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Introduction

The objective of this trial was to evaluate varieties of yellow, white, and red onions for bulb yield and quality. In 1999, the yellow bulb varieties also were evaluated for single centers.

Methods

The 1999 trial was conducted on an Owyhee silt loam with 1.4 percent organic matter and a pH of 7.4. The field had previously been planted to wheat. In the fall, before plowing, 100 lb P_2O_5/acre and 20 lb N/acre were broadcast. The wheat stubble was shredded, and the field was deep-chiseled, disked, irrigated, moldboard-plowed, roller-harrowed, fumigated with Telone C-17 at 24 gal ai/acre, and bedded.

Beds were knocked down March 16. Seed of 52 varieties from 13 companies was planted March 19 in plots four rows wide and 27 feet long. The experimental design was a randomized complete block with five replicates. The onion seed was planted at 12 seeds per ft of row in single rows on beds spaced 22 in apart using four Almaco cone seeders mounted on a John Deere Model 71 Flexi Planter equipped with disc openers. The onion rows received 3.7 oz of Lorsban 15G per 1,000 ft of row (0.82 lb ai/acre), and the soil surface was rolled on March 24. On May 17, alleys 4 ft wide were cut between plots, leaving plots 23 ft long. From May 18 through 22, the seedlings were hand thinned to a plant population of four plants per ft of row (3-in spacing between individual onion plants, or 95,040 plants/acre). The field was sidedressed with urea at 90 lb N/acre on May 13 and at 110 lb N/acre on June 16.

The trial was managed to avoid yield reductions from weeds, pests, and diseases. Weeds were controlled with cultivations on May 13, May 27, and June 17, and with low-rate herbicide applications as needed until lay-by (Table 1). After lay-by, the field was hand weeded as necessary. Thrips were controlled with four aerial applications of Warrior and Lannate. A brown wheat mite infestation in early August was controlled by Microthiol Special at 8 lb ai/acre.

Table 1. Herbicides and quantities (ai/acre) applied after onion emergence. Onion variety trial, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Date	Herbicides and rates/acre
April 30	Buctril 3.3 oz
May 10	Buctril 3.3 oz, Poast 3.6 oz
May 22	Goal 1.2 oz, Buctril 3.3 oz, Poast 2.9 oz
June 2	Goal 1.2 oz, Buctril 3.3 oz, Poast 2.9 oz, Prowl 0.45 pint
June 17	Goal 1.2 oz, Prowl 0.9 pint

The trial was furrow irrigated as necessary. Soil water potential was monitored by eight granular matrix sensors (GMS, Watermark Soil Moisture Sensors Model 200SS, Irrometer Co., Riverside, CA) installed on June 7 below the onion row at 8-in depth. Thereafter, the field was irrigated to maintain soil water potential at 8-in depth above -20 kPa until the last irrigation on August 23.

The onions were lifted on September 17 to field dry. Onions from the middle two rows of every plot were topped by hand on September 28 and placed into storage in wooden crates on September 30. The storage shed was managed to maintain an air temperature of approximately 34°F.

Following harvest of the middle two rows in each plot, bulbs from one of the border rows in each plot of yellow onions were rated for multiple centers. Twenty-five consecutive onions ranging in diameter from 3.5 to 4.25 in were rated. The onions were cut directly through the bulb middle and, if multiple centered, the long axis of the inside diameter of the first single ring was measured. These multiple centered onions were ranked according to the diameter of the first single ring: small double (<1.5 in), intermediate double (1.5 to 2.25 in), and blowout (>2.25 in). Single centered onions were classed as a "bullet".

Onions were graded out of storage on January 4 to 6, 2000. Bulbs were separated according to quality: bulbs without blemishes (No. 1s), split bulbs (No. 2s), neck rot (bulbs infected with the fungus *Botrytis allii* in the neck or side), plate rot (bulbs infected with the fungus *Fusarium oxysporum*), and black mold (bulbs infected with the fungus *Aspergillus niger*). The No. 1 bulbs were graded according to diameter: small (< 2¼ in), medium (2¼ to 3 in), jumbo (3 to 4 in), and colossal (4 in and larger). Varietal differences were compared using ANOVA and least significant differences at the 5 percent probability level, LSD (0.05).

Results and Discussion

Varieties are listed by company in alphabetical order. The LSD (0.05) values at the bottom of each table should be considered when comparisons are made between

varieties for performance characteristics. Differences between varieties equal to or greater than the LSD (0.05) value for a characteristic should exist before any variety is considered different from any other variety in that characteristic.

The percentage of single centers ranged from 1 to 54 percent, and averaged 19 percent (Table 2). The percentage of onions in the combined single center and small double categories ranged from 3 to 63 percent, and averaged 32 percent.

Total yield out of storage in January, 2000 averaged 903 cwt/acre and ranged from 521 to 1,170 cwt/acre (Table 3). Colossal size onion yield averaged 437 cwt/acre and ranged from 69 to 900 cwt/acre. Decomposition in storage averaged 7 percent and ranged from 2 to 44 percent. Split bulbs averaged 96 cwt/acre and ranged from 10 to 324 cwt/acre. Bolting averaged 0.7 bolted onions out of approximately 368 onions in each 4-row plot. Bolting ranged from 0 to 11 bolted onions per plot.

Table 2. Yellow onion multiple center rating. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Seed company	Variety	Blowout	Intermediate Double	Small double	Bullet	Bullet + Small double
				%		
American Takii	T-433	45.8	41.6	7.3	5.3	12.7
	T-434	68.7	20.0	8.7	2.7	11.3
	T-439	59.1	24.9	11.4	4.7	16.0
Aristogenes	Bravo	58.0	18.7	10.0	13.3	23.3
	Envoy	48.0	24.7	14.0	13.3	27.3
	Maritime	51.1	33.1	9.2	6.7	15.8
	Seville	35.3	27.3	20.0	17.3	37.3
Asgrow	Regiment	42.9	21.0	13.3	22.7	36.0
	Viper	38.0	28.0	9.3	24.7	34.0
	Tradewind*	20.0	32.7	22.7	24.7	47.3
	Mira**	39.4	46.1	11.8	2.6	14.5
	XP15113	55.3	16.7	9.3	18.7	28.0
	XP15120	28.0	24.0	21.6	26.4	48.0
	XP15122	21.8	39.8	21.8	16.6	38.4
	XP15232	40.7	36.0	16.7	6.7	23.3
Bejo	Legend	52.7	24.7	12.7	10.0	22.7
	Daytona	64.7	27.6	6.7	1.0	7.7
	BGS 153 F1	58.9	24.6	11.2	5.2	16.4
Crookham	Sweet Perfection	40.7	17.3	12.7	29.3	42.0
	Zorro	42.8	16.4	13.2	27.6	40.7
D. Palmer	Mesquite	32.7	20.0	23.3	24.0	47.3
	Sierra	48.5	22.6	14.5	14.4	28.9
Dorsing	Harvest Moon	41.2	25.8	13.6	19.4	33.0
Petoseed	Pinnacle	48.9	25.5	11.8	13.8	25.6
	Teton	40.4	22.8	11.1	25.7	36.8
	Vantage	44.8	27.1	5.2	22.9	28.1
	Vision	33.3	21.3	9.3	36.0	45.3
	Quest	36.0	27.3	15.3	21.3	36.7
	PS 663395	44.7	26.0	15.3	14.0	29.3
Rio Colorado	Rio Rita	57.7	21.8	9.9	10.6	20.5
	Raptor	54.0	28.0	8.0	10.0	18.0
	RNX 10298	48.0	28.0	12.0	12.0	24.0
Rispens	Golden Security	58.0	16.7	12.7	12.7	25.3
	Superstar	31.7	21.2	13.5	33.6	47.2
	Ringstar	39.6	23.9	11.9	24.7	36.5
Sunseeds	Sabroso	12.0	32.0	18.7	37.3	56.0
	Torero	28.0	29.3	14.7	28.0	42.7
	Vaquero	12.7	26.7	6.7	54.0	60.7
	Tesoro	43.6	34.6	14.5	7.3	21.8
	SXO 1428	28.7	8.7	17.3	45.3	62.7
	SXO 1430	15.3	25.9	12.5	46.3	58.8
Vilmorin	Santos	87.2	9.7	2.1	1.0	3.1
Mean		42.8	25.5	12.8	18.9	31.7
LSD (0.05)		16.7	12.3	8.6	10.7	13.8

*formerly XP15042

**formerly XP15040

Table 3. 1999 performance data for experimental and commercial onion varieties graded out of storage January, 2000. Malheur Experiment Station, Oregon State University, Ontario, Oregon.

				Marketable yield by grade				Non-marketable yield						Maturity		Bolters
Seed company	Onion variety	Bulb color	Total yield	Total	>4 in.	3-4 in.	2¼-3 in.	Total rot	Neck rot	Plate rot	Black mold	No. 2s	Small	Aug. 27	Sept. 8	Sept. 8
			cwt/acre					% of total yield				cwt/acre		%		#/plot
American Takii	T-433	yellow	1,041.3	807.1	631.3	173.9	1.9	11.0	2.6	8.1	0.2	116.7	1.2	24	51	0.0
	T-434	yellow	1,049.1	480.2	352.1	127.5	0.7	29.1	12.3	16.5	0.3	262.0	1.0	25	55	0.4
	T-439	yellow	990.3	834.3	585.9	244.2	4.2	5.4	0.8	3.6	0.9	104.1	1.0	51	73	0.0
Aristogenes	Bravo	yellow	1,029.9	821.3	634.1	182.0	5.2	9.3	3.9	3.9	1.5	122.6	2.1	28	52	0.4
	Envoy	yellow	817.4	682.6	347.8	332.1	2.7	5.1	1.1	3.3	0.8	94.0	0.6	50	75	0.2
	Maritime	yellow	994.0	856.5	567.1	284.9	4.4	6.3	2.0	3.8	0.5	74.4	1.3	51	74	0.0
	Seville	yellow	1,012.5	862.0	627.0	229.5	5.5	3.8	1.2	2.3	0.4	110.3	1.3	33	62	0.2
Asgrow	Regiment	yellow	933.8	755.0	467.5	281.8	5.7	8.5	1.0	5.8	1.7	99.3	1.8	55	73	0.4
	Viper	yellow	905.3	744.3	457.1	282.2	4.9	6.2	0.4	4.4	1.4	102.8	2.0	49	69	0.0
	Tradewind*	yellow	817.4	773.0	304.5	463.5	5.1	2.7	0.1	2.6	0.0	22.3	0.4	54	83	0.0
	Mira **	yellow	873.7	792.9	456.9	330.0	6.0	3.6	0.9	2.2	0.4	49.1	0.3	55	79	0.4
	XP15113	yellow	972.0	838.9	583.5	252.9	2.5	4.3	1.1	2.3	0.9	92.2	0.5	41	69	0.0
	XP15120	yellow	791.9	685.2	327.6	350.5	7.1	4.1	0.9	3.1	0.0	73.8	1.4	42	69	0.0
	XP15122	yellow	854.2	803.7	330.1	468.9	4.7	2.9	0.3	2.7	0.0	25.1	0.6	56	79	0.0
	XP15232	yellow	786.5	711.7	236.7	465.7	9.3	3.3	0.4	2.8	0.2	46.7	2.3	46	74	0.0
Bejo	Gladstone	white	738.4	571.8	259.9	305.3	6.6	11.3	3.2	6.6	1.5	76.8	0.5	32	58	0.0
	Legend	yellow	849.9	673.8	312.8	357.0	4.0	5.8	0.9	3.7	1.2	125.7	1.4	35	62	0.2
	Redwing	red	743.4	708.4	238.8	463.9	5.7	3.2	0.5	2.7	0.0	9.6	1.7	34	64	0.0
	Daytona	yellow	832.6	672.4	259.6	406.6	6.2	3.3	0.0	3.1	0.2	133.1	0.1	29	67	0.0
	BGS 153 F1	yellow	843.7	328.7	163.3	163.1	2.4	43.8	29.6	12.8	1.5	147.2	1.1	36	68	0.0
Champion	Flare	red	864.8	730.5	262.1	453.2	15.2	3.7	0.3	3.1	0.3	101.6	2.5	49	75	0.0
Crookham	Sweet Perfection	yellow	1,078.2	839.1	568.3	267.5	3.3	10.8	3.0	5.0	2.8	118.9	1.6	37	61	0.4
	Zorro	yellow	988.9	785.2	524.2	254.3	6.6	5.5	2.6	2.8	0.1	148.3	2.4	17	50	1.6
D. Palmer	Mesquite	yellow	995.8	821.3	612.4	208.1	0.8	6.2	2.4	2.9	0.9	112.9	0.3	16	45	2.2
	Sierra	yellow	952.2	689.2	441.9	242.8	4.5	10.1	3.9	5.8	0.3	167.2	0.9	10	42	11.2
	Frosty	white	792.6	717.0	283.9	424.1	9.0	4.1	1.5	2.1	0.4	43.0	1.0	34	56	0.0
Dorsing	Red October	red	651.1	507.4	159.5	340.6	7.3	4.4	0.5	3.3	0.7	113.1	1.8	63	88	0.0
	Harvest Moon	yellow	1,033.3	890.8	700.2	184.4	6.3	4.1	0.7	3.1	0.2	98.9	1.3	36	55	2.4

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			cwt/acre					% of total yield				cwt/acre		%		#/plot
Petoseed	Pinnacle	yellow	910.3	795.0	454.7	334.5	5.8	3.1	0.2	2.4	0.6	85.9	0.7	51	71	0.2
	Teton	yellow	818.0	651.1	382.2	265.5	3.3	13.6	1.0	12.3	0.2	58.9	0.0	49	72	1.6
	Vantage	yellow	816.6	677.8	361.5	315.5	0.7	9.1	0.5	8.4	0.2	63.5	0.4	57	76	0.0
	Ember	red	757.0	596.9	166.2	415.6	15.1	3.8	0.3	2.7	0.8	131.9	1.0	49	72	0.0
	Vision	yellow	884.2	741.8	550.2	188.6	3.0	7.8	0.5	7.3	0.0	73.6	0.5	44	65	0.4
	Quest	yellow	1,119.0	956.4	775.2	175.3	5.9	8.7	2.3	6.1	0.4	65.7	0.8	35	63	2.2
	Mercury	red	779.7	649.9	205.3	431.2	13.4	3.6	0.1	2.8	0.7	99.2	3.3	56	83	0.0
	PS 663395	yellow	910.6	778.6	370.6	402.4	5.6	3.3	0.0	2.4	1.0	99.5	2.3	53	72	0.0
	PX 901494	white	809.9	711.6	467.6	237.6	6.4	7.6	1.3	6.1	0.2	37.4	0.2	20	50	0.2
Rio Colorado	Rio Rita	yellow	857.1	722.0	387.9	328.3	5.9	7.3	2.1	2.7	2.5	71.6	0.3	45	65	0.4
	Raptor	yellow	1,049.0	918.6	719.4	195.9	3.3	2.5	1.2	1.0	0.3	102.8	1.0	35	57	1.4
	RNX 10298	yellow	1,127.9	925.9	698.9	224.2	2.9	8.9	4.6	3.1	1.1	99.2	1.4	33	57	1.8
Rispens	Golden Security	yellow	859.5	615.2	311.4	299.2	4.5	2.0	0.8	1.2	0.0	226.6	0.5	29	58	0.4
	Superstar	yellow	998.3	765.0	549.8	213.8	1.5	7.6	2.8	3.2	1.5	156.8	0.3	26	51	4.2
	Ringstar	yellow	1,014.7	839.0	514.8	318.9	5.3	4.1	2.2	1.5	0.4	133.9	0.6	27	57	3.0
Sunseeds	Flamenco	red	520.5	447.0	68.5	362.3	16.2	3.7	0.0	3.7	0.0	50.1	4.5	61	87	0.0
	Sabroso	yellow	743.9	667.6	244.4	413.7	9.4	6.7	0.8	5.8	0.0	25.0	2.5	45	73	0.0
	Mambo	red	701.4	547.4	153.8	383.3	10.3	5.0	0.5	4.5	0.0	117.9	1.3	52	77	0.0
	Torero	yellow	1,072.1	961.7	706.2	250.1	5.4	5.5	1.1	2.9	1.5	50.1	0.3	39	64	0.2
	Vaquero	yellow	1,078.4	1011.3	763.4	243.3	4.6	4.6	2.0	2.6	0.0	15.6	0.2	33	60	0.4
	Tesoro	yellow	908.0	810.4	343.0	459.2	8.2	2.6	0.7	1.9	0.0	70.4	2.9	56	73	0.0
	SXO 1428	yellow	937.6	879.4	622.5	252.5	4.4	4.6	0.8	3.6	0.2	13.8	1.5	26	60	1.2
	SXO 1430	yellow	1,170.1	1095.1	899.7	192.3	3.2	2.6	1.4	0.7	0.6	46.0	0.7	42	66	0.4
Vilmorin	Santos	yellow	882.3	528.2	282.3	237.9	8.0	3.4	0.7	2.3	0.4	323.5	0.7	46	68	0.0
Mean			903.1	743.8	436.5	301.6	5.8	6.8	2.0	4.1	0.6	96.4	1.2	40	66	0.7
LSD (0.05)			108.5	122.7	115.0	75.7	6.0	5.6	3.1	3.1	2.1	41.3	2.2	10	6	1.7