

EVALUATION OF OVER-WINTERING ONION FOR PRODUCTION IN THE TREASURE VALLEY - 2004/2005 TRIAL

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Introduction

The objective of the trial was to evaluate onion varieties for over wintering onion production in the Treasure Valley of eastern Oregon and western Idaho. Bulb yield, grade, single centeredness, and pungency were evaluated. Eight varieties were planted in August 2004. They were harvested and graded in June 2005. Marketable yield ranged from 393 to 762 cwt/acre. Five of the varieties were considered sweet due to their pyruvate content.

Materials and Methods

The onions were grown on a field of Owyhee silt loam located northeast of the Malheur Experiment Station on Railroad Ave. between Highway 201 and Alameda Drive. Seed of the 8 varieties (Table 1) was planted in double rows spaced 3 inches apart at 9 seeds/ft of single row on August 30, 2004. Each double row was planted on beds spaced 20 inches apart with a customized planter using John Deere Flexi Planter units equipped with disc openers. On October 26 the seedlings were hand thinned to a plant population of 95,000 plants/acre (6.6-inch spacing between individual onion plants). All cultural practices were performed by the grower.

Onions in each plot were evaluated subjectively for maturity on June 24, 2005 by visually rating the percentage of onions with the tops down and the percent dryness of the foliage. The percent maturity was calculated as the average of the percentage of onion with tops down and the percent dryness.

Onions from the middle two rows in each plot were lifted, topped by hand and bagged on June 28, 2005. The onion bags were transported to the Malheur Experiment Station and graded.

Before grading, all bulbs from each plot were counted to determine actual plant populations at harvest. During grading, 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 inch), medium (2¼-3 inch), jumbo (3-4 inch), colossal (4-4¼ inch), and supercolossal (>4¼ inch). Bulb counts per 50 lb of supercolossal onions

were determined for each plot of every variety by weighing and counting all supercolossal bulbs during grading.

On June 28, 10 randomly chosen bulbs from each plot were shipped via UPS ground to Vidalia Labs International in Collins, Georgia. The bulb samples were analyzed for pyruvic acid content on July 8. Bulb pyruvic acid content is a measure of pungency with the unit being micro mols pyruvic acid per gram of fresh weight ($\mu\text{mols/g FW}$). Onion bulbs having a pyruvate concentration of 5.5 or less $\mu\text{mols/g FW}$ are considered sweet according to Vidalia Labs sweet onion certification specifications.

After harvest bulbs from each plot were rated for single centers. Twenty-five onions ranging in diameter from 3.5 to 4.25 inches were rated. The onions were cut equatorially 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 interior diameter of the first single ring: "small double" had interior diameters less than $1\frac{1}{2}$ inches, "intermediate double" had diameters of $1\frac{1}{2}$ - $2\frac{1}{4}$ inches, and "blowout" had diameters over $2\frac{1}{4}$ inches. Single-centered onions were classed as a "bullet". Onions were considered functionally single centered for processing if they were a "bullet" or "small double."

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

Grower practices were adequate to control thrips during seedling emergence and early plant growth, critical phases for successful over-wintering onion production in the Treasure Valley. The winter of 2004-2005 in the Treasure Valley was mild with the lowest temperature of 12°F occurring on January 4, 2005. Plant populations were below the target of 95,000 plants per acre for some varieties. Plant populations ranged from 79,203 plants per acre for 'XON-430Y' to 96,589 plants per acre for 'Hi Keeper' (Table 1).

Total yield averaged 630 cwt/acre and ranged from 424 cwt/acre for 'McBee' to 807 cwt/acre for 'Stansa' (Table 1). Stansa and Hi Keeper had the highest total yield. Marketable yield averaged 594 cwt/acre and ranged from 393 cwt/acre for McBee to 762 cwt/acre for Hi Keeper. Supercolossal-size bulb yield averaged 9.8 cwt/acre and ranged from 0 cwt/acre for McBee, XON-430Y, and 'Toughball' to 45.1 cwt/acre for Stansa. Stansa had the highest yield of super colossal bulbs. Not considering supercolossals, colossal-size onion yield averaged 77.4 cwt/acre and ranged from 2.4 cwt/acre for McBee to 213.2 cwt/acre for Stansa. Stansa had the highest colossal bulb yields.

Maturity on June 24 ranged from 26 percent for XON-430Y to 90 percent for McBee (Table 2). All varieties, except Stansa, and XON-430Y, had bulb pyruvate concentrations low enough ($< 5.5 \mu\text{mols/g FW}$) to be classified as sweet onions. On a scale of 0 to 10, the subjective evaluation of skin retention ranged from the worst of 5 for 'Megane' to the best of 8.6 for Toughball. The percentage of "bullet" single-centered bulbs averaged 5.9 percent and ranged from 0 percent for Megane, Stansa, and XON-430Y to 36.7 percent for McBee. The percentage of functionally single-centered bulbs averaged 27.6 percent and ranged from 4 percent for XON-430Y to 76.3 percent for McBee.

Table 1. Yield and grade distribution for eight onion varieties planted in August 2004 and harvested in June 2005. Malheur Experiment Station, Oregon State University, Ontario, OR.

Seed company	Variety	Plant population plants/acre	Total yield -- cwt/acre --	Marketable yield by grade						Non-marketable yield		
				Total	>4¼ in #/50 lb	>4¼ in cwt/acre	4-4¼ in cwt/acre	3-4 in	2¼-3 in	Total rot % of total yield	2s - cwt/acre -	Small
A. Takii	Hi Keeper	96,589	781.9	762.1	34.1	5.0	107.1	576.5	73.5	0.00	15.6	4.2
	Toughball	88,748	648.4	623.4	0.0	0.0	43.5	536.9	43.0	0.11	14.7	9.7
Bejo	Megane	69,885	552.9	484.2	37.9	16.5	101.3	354.6	15.6	0.29	55.9	9.0
	Olympic	95,453	711.6	683.0	31.9	2.2	63.5	572.5	42.3	0.07	18.4	8.7
	Stansa	96,362	806.7	746.4	40.3	45.1	213.2	468.4	19.7	0.00	56.3	4.0
Sakata	XON-430Y	79,203	484.0	467.2	0.0	0.0	11.1	416.4	39.7	0.09	10.3	6.0
Scottseed	McBee	90,339	424.1	393.3	0.0	0.0	2.4	248.0	147.3	1.71	7.3	16.7
Average		88,083	630.0	594.2	20.6	9.8	77.4	453.3	54.4	0.32	25.5	8.3
LSD (0.05)		12,784	84.5	89.0	NS	17.1	53.0	105.4	50.7	0.84	24.9	5.1

Table 2. Maturity, bolting, and bulb quality for eight onion varieties planted in August 2004 and harvested in June 2005. Malheur Experiment Station, Oregon State University, Ontario, OR.

Seed company	Variety	Maturity	Bolters	Pyruvate	Sugars	Skin	Intermediate	Small	Functionally single centered "Bullet + small double"		
		24-June %	#/plot	concentration µmols/g FW	% Brix	retention 0-10*	Blowout	double	double	Bullet	small double
A. Takii	Hi Keeper	70.0	0.6	5.44	9.0	8.0	7.5	61.3	29.1	2.1	31.2
	Toughball	76.0	0.2	4.3	8.6	8.6	16.0	52.8	30.4	0.8	31.2
Bejo	Megane	33.0	5.2	5.26	8.1	5.0	71.1	23.3	5.6	0.0	5.6
	Olympic	70.0	0.6	4.58	9.1	7.8	16.8	44.0	37.6	1.6	39.2
	Stansa	38.0	1.8	5.78	9.0	6.6	57.6	36.8	5.6	0.0	5.6
Sakata	XON-430Y	26.0	14.6	5.74	8.6	7.2	53.6	42.4	4.0	0.0	4.0
Scottseed	McBee	90.0	0.2	3.76	8.6	6.8	4.7	19.0	39.6	36.7	76.3
Average		57.6	3.3	5.0	8.7	7.1	32.5	39.9	21.7	5.9	27.6
LSD (0.05)		4.6	4.0	0.69	NS	1.7	12.5	12.7	13.4	6.9	12.7

*10 = best and 0 = worst.