ONION PRODUCTION FROM SETS

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Introduction

Early harvest of quality bulbs at a reasonable production cost would be a strategic marketing advantage. Our earlier research showed that onions can be harvested in July when grown from transplants started in the winter (Shock et al. 2004). Transplants must be grown locally due to the onion white rot quarantine that prohibits importation of onion transplants. Onion transplant production in the Treasure Valley of eastern Oregon and western Idaho is expensive due to the need for heated greenhouse production during the winter.

Alternatively, over-wintering onions allow early harvest, but the bulb quality of over-wintering onions leaves much to be desired.

A third alternative is to produce onion sets in a brief summer season and then use the sets in the following year to establish a crop with the potential of early harvest. However, long-day onions are supposedly unable to form sets and tend to bolt uniformly when grown from bulbs of the previous year.

This preliminary trial screened 48 onion varieties to determine their potential to produce sets and whether these sets would bolt or bulb in the successive year.

Materials and Methods

Onion seed of 48 varieties (Table 1) was planted in plots 4 double rows wide and 27 ft long on May 18 and June 1, 2004. Seed was planted in double rows spaced 3 inches apart at 33 seeds/ft of single row. Each double row was planted on beds spaced 22 inches apart with a customized planter using John Deere Flexi Planter units equipped with disk openers. Onions from the first planting were lifted on August 23, and were topped and bagged on September 1. Onions from the second planting were lifted on August 30 and topped and bagged on September 9.

On October 1, half of the sets from each planting date were placed in one of two storage rooms. One storage room was maintained at 59°F and the other at 77°F. The relative humidity of both storage rooms was maintained at 70 percent. On March 1, the sets stored at 77°F had the storage temperature reduced to 59°F to delay sprouting.

On March 16, the sets were removed from storage and sorted into 3 sizes according to bulb diameter: less than 1 inch, 1-1.4 inch, and over 1.4 inch. All available sets of each variety from each storage temperature and set size were planted in single separate plots. The sets were manually planted in conventional double rows on 22-inch beds on March 24, 2005. The spacing between sets in each single row was 6 inches, equivalent to 95,000 plants per acre. Due to the small number of available sets of each variety and each size, treatments were not replicated, so this trial was more of a feasibility study. The field was drip irrigated using drip tapes buried at 4-inch depth between the double onion rows.

Weeds were controlled with an application of Prowl® at 1 lb ai/acre on April 8, Goal® at 0.2 lb ai/acre, Buctril® at 0.3 lb ai/acre, and Poast® at 0.38 lb ai/acre on April 22. The field had 50 lb nitrogen (N)/acre applied on April 28 as N-phuric injected through the drip system. On June 14, 20 lb N/acre as N-phuric and phosphorus (P) at 10 lb/acre as phosphoric acid were injected through the drip system. After lay-by the field was hand weeded as necessary. On July 27 the number of bolted and non-bolted bulbs in each plot was determined. On August 3, the middle two rows in each plot were harvested.

The bulbs were graded on August 4. 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 inches), medium (2¼-3 inches), jumbo (3-4 inches), colossal (4-4¼ inches), and supercolossal (>4¼ inches). 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. Varietal and set size differences were compared without ANOVA because treatments were not replicated.

Results and Discussion

Onions grew very well from seed planted May 18, but not from seed planted June 1. None of the varieties had much bulbing or produced sets from the June 1 planting. Of the 48 varieties planted May 18 (Table 1), 26 produced considerable bulbing and some sets (Table 2). Storage of sets at 59°F resulted in substantial loss of sets compared with 77°F, possibly due to higher relative humidity. Maintenance of the relative humidity at 70 percent at 59°F was not adequate despite the use of a dehumidifier. Storage of sets at 59°F also resulted in substantially more bolting than storage at 77°F (Table 2). The smallest set size (<1 inch) resulted in the least bolting for either storage temperature.

The lowest bolting at the 59°F storage temperature was for variety 'Delgado' (20 percent). At the 77°F storage temperature with the smaller than 1-inch set size, varieties 'Daytona' and 'Bandolero' did not bolt. At the 77°F storage temperature with the 1- to 1.4-inch and larger than 1-inch set sizes, variety '4001' did not bolt.

When grown from sets stored at 77°F, a number of varieties produced high yields of large bulbs with little to moderate bolting (Table 3). The exact yield estimate is only approximate due to the very small plot sizes without replication.

The partial success of the May 18 planting for set production and the total failure of the June 1 planting for set production suggests that a wide range of planting dates should be tried. Onion plants need to be the right age to bulb during the longest days that precede and follow June 22. Perhaps a May 1 or April 15 date would be more successful than May 18.

References

Shock, C.C., E. B. G. Feibert, and L.D. Saunders. 2004. Onion production from transplants in the Treasure Valley. Oregon State University Agricultural Experiment Station Special Report 1055:47-52.

Table 1. Long-day onion varieties planted in 2004 for set production, Malheur Experiment Station, Oregon State University, Ontario, OR.

Seed Company	Variety
A. Takii	T-433
	T-439
	9003G
Bejo	Daytona
	Delgado
	Gladstone
	Redwing
	BGS 196 F1
Crookham	Harmony
	OLYS97-24
	OLYS97-27
	XPH95345
Dorsing	Harvest Moon
D. Palmer	Mesquite
	Tequila
Rispens	Export 151
	Brite Knight
	Red Fortress
Scottseed	Oro Blanco
Seedworks	Varsity
	4001
	6001
	6011
Seminis	Exacta
	Golden Spike
	Mercury
	Red Zepelin
	Santa Fe
	Vision
	Quest
	PX 2599
	PX 5299
	SVR 7106
	SVR 5646
	SVR 5819
Nunhems	Bandolero
	Granero
	Pandero
	Ranchero
	Sabroso
	Salsa
	Tesoro
	Torero
	Vaquero
	SX7004 ON
	Aquila
	Renegade
	Cometa

Table 2. Influence of onion set storage temperature and set size on bolting by long-day onion varieties. Malheur Experiment Station, Oregon State University, Ontario, OR.

Seed Company	Variety	Storage at 59°F			Storage at 77°F		
		<1 inch	1-1.4 inch	>1.4 inch	<1 inch	1-1.4 inch	>1.4 inch
		------ % of bolted bulbs ------			------ % of bolted bulbs ------		
A. Takii	T-433	23.3	90.2	96.0	13.9	18.9	29.0
	T-439	97.0	100.0	100.0	9.1	15.2	66.7
Bejo	Daytona				0.0	58.8	73.9
	Delgado	20.0	76.5	97.5	10.7	38.5	66.7
	Gladstone				27.3	86.7	88.9
	BGS 196 F1				21.2	27.3	46.9
Crookham	OLYS97-27					63.3	66.7
	XPH95345				60.0	86.5	100.0
Dorsing	Harvest Moon					97.6	98.0
D. Palmer	Tequila				50.0	30.8	87.5
Rispens	Export 151					46.1	25.0
Seedworks	Varsity	38.5	100.0	100.0	25.0	28.6	44.1
	4001	53.1	100.0	100.0		0.0	0.0
	6001	42.9	100.0	100.0			
Seminis	Santa Fe	70.4	97.6	100.0	12.5	67.6	83.8
	PX 2599	50.0	87.1	100.0		66.7	
Nunhems	Bandolero	55.2	90.0	100.0	0.0	10.0	18.8
	Ranchero	58.1	95.5	100.0		15.4	75.0
	Sabroso	70.4	100.0	100.0			
	Salsa	64.3	95.5	100.0		36.4	27.3
	Vaquero	38.5	86.2	100.0	9.4	48.6	69.4
	Aquila		88.9	100.0		46.4	64.7
	Renegade	80.0	97.6	100.0			
	Cometa				20.0	77.4	100.0
Seminis	Exacta				7.7	33.3	100.0
	Golden Spike				6.3	46.9	90.7
	Average	54.4	93.7	99.6	18.2	45.5	64.7

Table 3. Performance data for onion varieties grown from sets stored at 77°F and having less than 20 percent bolting*. The confidence of yield estimates is low, because of the small plot sizes and lack of replication. Malheur Experiment Station, Oregon State University, Ontario, OR.

Seed company	Variety	Bolting	Total yield	Marketable yield by grade: Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	Bulb counts >4¼ in	Double	Small
		%	cwt/acre						#/50 lb	cwt/acre	
<1 inch set size											
A. Takii	T-433	13.9	881.8	878.6	132.0	169.3	534.7	42.6	39.4	0.0	3.3
	T-439	9.1	753.2	753.2	53.4	124.4	551.1	24.2	41.7	0.0	0.0
Bejo	Daytona	0.0	495.1	424.3	0.0	0.0	319.6	104.8		70.7	0.0
	Delgado	10.7	652.3	652.3	50.4	85.8	486.6	29.5	58.9	0.0	14.0
Seminis	Santa Fe	12.5	1,041.6	1,027.6	164.1	282.0	518.6	62.9	36.2	0.0	0.0
Nunhems	Bandolero	0.0	682.4	682.4	0.0	93.0	518.7	70.7		0.0	0.0
	Vaquero	9.4	1,443.4	1,443.4	208.3	169.0	1,066.2	0.0	42.8	0.0	0.0
Seminis	Exacta	7.7	1,477.3	1,477.3	662.7	416.5	398.1	0.0	39.4	0.0	0.0
	Golden Spike	6.3	911.5	911.5	0.0	267.2	644.4	0.0	43.3	0.0	0.0
1-1.4 inch set size											
A. Takii	T-433	18.9	738.0	657.1	0.0	64.2	481.3	111.7		30.5	50.4
	T-439	15.2	830.3	739.6	54.7	101.2	525.2	58.6	40.7	75.6	15.1
Seedworks	4001	0.0	466.2	466.2	0.0	0.0	345.8	120.5		0.0	0.0
Nunhems	Bandolero	10.0	575.0	540.3	46.5	32.8	438.1	22.9	31.9	17.7	17.0
	Ranchero	15.4	1,105.5	1,105.5	398.2	344.5	298.6	64.2	29.8	0.0	0.0
>1.4 inch set size											
Seedworks	4001	0.0	698.0	698.0	117.9	305.2	197.8	77.3	25.2	0.0	0.0
Nunhems	Bandolero	18.8	565.8	565.8	0.0	0.0	500.3	65.5		0.0	0.0

*Yields of varieties and set sizes with bolting greater than 20 percent are not reported.