PERFORMANCE OF ONION VARIETIES IN A FIELD WITH HIGH IRIS YELLOW SPOT VIRUS PRESENCE

Clinton C. Shock, Erik B. G. Feibert, and Lamont D. Saunders
Malheur Experiment Station
Oregon State University
Ontario, OR

Introduction

Onion plants infected with iris yellow spot virus (IYSV) can progressively lose leaf area, resulting in reduced yield and reduced bulb size. The IYSV is transmitted by onion thrips (*Thrips tabaci*). The incidence of IYSV can be increased by inadequate control of onion thrips. Thrips control has been complicated by their increasing resistance to pyrethroid and organophosphate insecticides.

A certain degree of varietal tolerance to thrips and IYSV is suggested by the results of the yearly onion variety trials conducted at the Malheur Experiment Station (Shock et al. 2007). The severity of IYSV infestation in these trials is often low or modest and varies from year to year. A high severity of infestation has occurred consistently each year in onion fields in an area approximately 10 miles to the east of the experiment station. A subset of the onion varieties in the station trial was evaluated in a commercial onion field in the area of high IYSV severity in 2008.

Materials and Methods

Onion seed of 8 varieties was planted in double rows spaced 3 inches apart at 9 seeds/ft of single row on April 14. Each double row was planted on beds spaced 22 inches apart. Planting was done with customized John Deere Flexi Planter units equipped with disc openers. On May 28, alleys 4 ft wide were cut between plots, leaving plots 23 ft long. Onion emergence was poor and uneven. On May 28, the seedlings were hand thinned, as closely as possible, to a plant population of 2 plants/ft of single row (6-inch spacing between individual onion plants, or 95,000 plants/acre). Excellent onion stand and perfect spacing proved to be impossible in this commercial field.

On August 7, thrips in each of 15 plants in 1 of the middle 2 rows in each plot were counted. On August 20, onions in each plot were evaluated subjectively for severity of symptoms of iris yellow spot virus (IYSV). Twenty consecutive plants in a row in each plot were rated on a scale of 0 to 5, where 0 = no symptoms, 1 = 1 to 25 percent of foliage diseased, 2 = 26 to 50 percent of foliage diseased, 3 = 51 to 75 percent of foliage diseased, 4 = 76 to 99 percent of foliage diseased, and 5 = 100 percent of foliage diseased.
The onions were lifted on September 15 to field cure. Onions from the middle two rows

in each plot were topped by hand and bagged on September 16.

The onions were graded on October 13. 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 (<2.25 inches), medium (2.25-3 inches), jumbo (3-4 inches), colossal (4-4.25 inches), and supercolossal (>4.25 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.

After grading, bulbs from each plot were rated for single centers. Twenty-five consecutive 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 inside diameter of the first single ring: small had diameters less than 1.5 inches, medium had diameters from 1.5 to 2.25 inches, and large had diameters greater than 2.25 inches. Onions were considered "functionally single centered" for processing if they were single centered or had a small multiple center.

Results and Discussion

Onion emergence was poor despite the high seeding rate, resulting in lower than planned plant populations after thinning (Table 1). Bulb yields were low over all varieties, probably due at least in part to late planting and heavy virus presence. Varieties ‘Affirmed’, ‘Vaquero’, ‘Granero’, ‘Joaquin’, and ‘Charismatic’ were among those with the highest total and marketable yield (Table 1). Varieties Charismatic, Affirmed, Granero, Joaquin, and ‘Evolution’ were among those with the highest jumbo bulb yield. ‘Ringleader’, Joaquin, ‘Arcero’, Vaquero, and Evolution were among those with the highest percentage of single-centered bulbs (Table 2).

Charismatic, Ringleader, Evolution, Affirmed, and Joaquin were among those with the lowest severity of symptoms of IYSV (Table 2). Vaquero, Granero, and Arcero had among the highest severity of IYSV symptoms.

References

Shock, C.C., E.B.G. Feibert, L.D. Saunders, L. Jensen, and K. Mohan. 2007. 2006 Onion Variety Trials. Oregon State University Agricultural Experiment Station Special Report 1075:33-42.

Table 1. Yield, grade, and onion plant population, Malheur Experiment Station, Oregon State University, Ontario, OR, 2008.

Seed company	Variety	Total yield	Marketable yield by grade					Non-marketable yield		Plant population
			Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	Total rot	Small	
		---------- cwt/acre ----------						%	cwt/acre	plants/acre
D. Palmer	Evolution	187.0	171.7	0.0	0.0	95.2	76.5	0.0	15.3	46,747
Global Genetics	Ringleader	154.4	123.3	0.0	0.0	42.6	80.7	1.5	28.2	55,477
Nunhems	Arcero	161.7	135.2	0.0	0.0	27.3	107.9	0.0	26.5	56,096
	Granero	237.7	208.0	0.0	0.0	107.5	100.5	0.0	29.7	63,922
	Joaquin	205.5	183.9	0.0	0.0	106.3	77.6	0.0	21.7	54,495
	Vaquero	238.6	203.1	0.0	0.0	76.7	126.4	0.0	35.5	75,587
Seminis	Affirmed	260.7	243.6	0.0	0.0	127.7	115.9	0.0	17.1	66,806
	Charismatic	233.0	217.2	0.0	0.0	143.4	73.9	0.0	15.8	52,481
average		209.8	185.8	0.0	0.0	90.8	94.9	0.2	23.7	58,951
LSD (0.05)		55.7[a]	54.1[a]	NS	NS	57.9	NS	NS	NS	NS

[a] significant at 0.10 probability level.

Table 2. Onion bulb multiple-center rating and iris yellow spot virus (IYSV), Malheur Experiment Station, Oregon State University, Ontario, OR, 2008.

Seed company	Variety	Multiple center			Single center		Iris yellow spot virus rating[b]
		Large	Intermediate	Small	Functional single center[a]	Bullet	
		---------- % ----------					0-5
D. Palmer	Evolution	2.0	5.0	9.0	93.0	84.0	1.9
Global Genetics	Ringleader	2.4	1.6	0.0	96.0	96.0	1.8
Nunhems	Arcero	4.0	6.4	4.0	89.6	85.6	2.5
	Granero	7.0	13.0	2.0	80.0	78.0	2.6
	Joaquin	4.0	4.0	4.0	92.0	88.0	2.1
	Vaquero	4.0	5.3	5.3	90.7	85.3	2.6
Seminis	Affirmed	20.0	13.3	5.3	66.7	61.3	2.0
	Charismatic	8.0	27.2	19.2	64.8	45.6	1.5
average		6.4	9.5	6.1	84.1	78.0	2.1
LSD (0.05)		8.1	9.5	5.5	13.6	15.5	0.5

[a] bullet single center + small multiple center.

[b] IYSV: 0 = no symptoms, 1 = 1-25% of foliage diseased, 2 = 26-50% of foliage diseased, 3 = 51-75% of foliage diseased, 4 = 76-99% of foliage diseased, and 5 = 100% of foliage diseased.