

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

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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 severe IYSV 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 2009.

Materials and Methods

Onion seed of 12 varieties was planted in double rows spaced 3 inches apart at 9 seeds/ft of single row on April 8. 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 June 2, 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 equivalent to 95,000 plants/ac).

On July 31 and August 24, 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. Onions from 23 ft of the middle 2 rows in each plot were topped by hand and bagged on August 24.

The onions were graded on September 10. 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

Bulb yields were low over all varieties, probably due at least in part to late planting and heavy virus presence. Varieties 'Charismatic', 'Swale', and 'Affirmed' were among those with the highest total and marketable yield (Table 1). 'Arcero', 'Joaquin', 'OLYX06-25', and 'Granero' were among the varieties with the highest percentage of single-centered bulbs (Table 2).

'The Rock', Charismatic, and Joaquin were among those with the lowest severity of symptoms of IYSV (Table 2).

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.

Acknowledgements

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Table 1. Yield, and grade of onion varieties planted in a field with high iris yellow spot virus incidence, Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

Seed company	Variety	Total yield	Marketable yield by grade				Non-marketable yield			Bulb counts >4¼ in	
			Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	No. 2s	Small		Total rot
			----- cwt/acre -----				-- cwt/acre --		%	#/50 lb	
D. Palmer	Evolution	398.2	376.9	0.0	17.6	280.3	79.0	5.7	14.0	0.3	
Nickerson-Zwaan	Ringleader	306.1	284.9	1.8	27.8	196.6	58.7	2.8	14.2	1.7	16.0
Crookham	The Rock	389.8	376.4	0.0	4.6	302.3	69.5	0.0	13.4	0.0	
	OLYX06-25	358.1	320.3	0.0	1.9	215.1	103.3	3.4	28.8	1.9	
Nunhems	Arcero	315.1	291.9	0.0	0.0	169.8	122.1	1.6	19.4	0.8	
	Granero	426.5	412.3	0.0	3.6	343.0	65.8	4.6	8.0	0.5	
	Joaquin	315.8	298.4	0.0	2.6	226.5	69.3	6.4	11.0	0.0	
	Vaquero	403.0	395.8	0.0	11.0	320.6	64.1	0.0	7.3	0.0	
Seminis	Affirmed	433.8	408.0	0.0	6.8	329.7	71.5	8.4	12.1	1.6	
	Charismatic	489.5	473.1	8.2	55.3	360.1	49.5	7.8	12.8	0.6	14.2
	Monarchos	373.8	347.9	0.0	16.9	265.0	66.0	5.1	13.7	2.1	
	Swale	440.0	419.9	0.0	0.8	349.3	69.8	8.4	7.4	0.9	
	Average	387.5	367.1	0.8	12.4	279.9	74.0	4.5	13.5	0.9	15.1
	LSD (0.05)	98.6	94.4	NS	28.8	84	NS	NS	NS	NS	NS

Table 2. Onion bulb multiple-center and iris yellow spot virus (IYSV) ratings, Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

Seed company	Variety	Maturity Aug. 24	Multiple center			Single center		IYSV ^b
			Large	Medium	Small	Functional ^a	Bullet	
			----- % -----					0 - 5
D. Palmer	Evolution	44.0	0.8	3.2	12.0	96.0	84.0	3.2
Nickerson-Zwaan	Ringleader	42.5	1.0	9.0	12.0	90.0	78.0	3.5
Crookham	The Rock	32.0	0.8	9.6	14.4	89.6	75.2	2.6
	OLYX06-25	42.0	0.0	0.8	12.0	99.2	87.2	3.4
Nunhems	Arcero	50.0	0.0	2.4	8.0	97.6	89.6	4.2
	Granero	51.0	3.2	0.8	9.6	96.0	86.4	4.0
	Joaquin	41.0	2.4	3.2	7.2	94.4	87.2	3.0
	Vaquero	54.0	0.8	4.0	16.0	95.2	79.2	4.0
Seminis	Affirmed	52.0	1.6	4.0	19.2	94.4	75.2	3.6
	Charismatic	41.7	4.7	5.3	21.3	90.0	68.7	2.8
	Monarchos	43.0	3.2	1.6	14.4	95.2	80.8	3.2
	Swale	47.0	0.8	7.3	29.8	91.9	62.1	3.4
	average	45.0	1.6	4.3	14.7	94.1	79.5	3.4
	LSD (0.05)	6.6	NS	NS	NS	NS	NS	0.6

^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.