SUGAR BEET (*Beta vulgaris*)
Botrytis sp.
Penicillium sp.
Basidiomycete

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Evaluation of fungicides as root dips for the control of root rot in storage, 2009.

Six experimental and commercial fungicides were tested for their ability to control *Botrytis* sp., *Penicillium* sp., and an undescribed Basidiomycete (associated with sucrose losses in storage) under controlled indoor storage conditions. Beets of the cultivar B-5 (consult Betaseed Inc. for actual cultivar name) were grown under fall strip tillage and were planted to a stand density of 128,099 seeds/ha on 12 May 09. The seeds were treated with fungicides Allegiance FL (15.6 g a.i. metalaxyl/100 kg seed) and Thiram 42S (250 g a.i. thiram/100 kg seed) to limit the influence of damping-off pathogens and allow for good stand establishment. The seeds were also treated with Poncho Beta (60 g a.i. clothianidin and 8 g a.i. beta-cyfluthrin/100,000 seed) which was the sole pest control treatment during the growing season. The fields were managed using standard commercial cultural practices. Plants were mechanically defoliated and harvested on 20 Oct 09. At harvest, two eight-root samples per treatment were submitted to the Amalgamated Tare Lab to determine percent sucrose, conductivity, nitrates, and tare. An additional eight-root sample per treatment was placed in a mesh onion bag and subjected to a dip treatment. For the dip treatment, fungicides were dissolved in 35 L of water, individual bags were submerged for 5 sec, and air dried before being placed in plastic lined transport boxes. Boxes were sealed to prevent evaporation losses and transported to the commercial indoor storage facility of Amalgamated Sugar Company, Paul, ID. They were stored at 1.7 °C until individual bags were placed on the shoulder of the beet pile on 26 Oct 09. Roots were evaluated for percent root surface covered by *Botrytis* sp., *Penicillium* sp., and Basidiomycete on 03 Dec 09, 04 Jan 10, 28 Jan 10, 17 Feb 10 and data were used to calculate the area under disease progress curve. Experimental design was a randomized complete block with four replications per treatment. Data were analyzed using the GLM procedure (SAS), and Fisher's protected least significant difference (LSD, *P=0.05*) was used to separate means.

Storage conditions were optimal (average temperature 1.7 °C) and fungal growth developed slowly. Significant treatment differences were only observed in the last two ratings. On 17 Feb 10, the percentage of root surface area covered by *Botrytis* sp., *Penicillium* sp., and Basidiomycete ranged from 0 to 20%, 0 to 3%, and 0 to 75%, respectively. All treatments significantly reduced the AUDPC for *Botrytis* sp. and Basidiomycete, but no significant differences were observed for control of *Penicillium* sp. when compared to the non-treated check.

Treatment	Concentration	AUDPC [z] for percent root surface covered by					
	ml/100 L	*Botrytis* sp.		*Penicillium* sp.	Basidiomycete		
Non-treated check		203.66	a [y]	2.99	884.88	a
A9859E……	94.7	10.24	cd	0.00	269.41	c
A9859E……	151.6	10.33	cd	6.02	296.57	c
A9859E……	227.4	34.55	b	0.00	252.16	c
A9859E……	303.2	16.70	bcd	0.00	252.25	c
A10466F……...	101.1	26.75	bc	10.64	704.31	b
A15696C……...	126.3	10.42	cd	0.00	88.00	de
Phostrol……..	80.1	27.66	bc	23.28	280.92	c
USF2018A…….....	1.3	7.72	cd	0.00	151.14	cd
USF2019A…….	1.3	1.43	d	0.00	1.07	e
P > F [x]		<.0001		0.4486	<.0001	
LSD (P=0.05)		23.742		NS [w]	148.94	

[z] AUDPC = Area under disease progress curve calculated based on four individual ratings using the formula $\sum [(i + j) / 2 * (\text{day } j - \text{day } i)] + [(j + k) / 2 * (\text{day } k - \text{day } j)]$

[y] Means followed by the same letter were not significant different based on Fisher's protected least significant difference (P=0.05)

[x] *Pr > F* was the probability associated with the F value. LSD = Fisher's protected least significant different value.

[w] NS = not significantly different