



**Juniper (*Juniperus davurica* 'Parsonii', *J. conferta*
'Blue Pacific', *J. squamata* 'Blue Star')
Tolerance to Glyphosate.**

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NATURE OF WORK: To evaluate the tolerance of 3 juniper species to varying rates of glyphosate.

For many reasons preemergent herbicides can fail to control weeds. Once weed seeds germinate, nurseryman and landscapers are often left with hand weeding as their only control option. Including junipers, many plants are known to be very tolerant to glyphosate. Moreover, glyphosate can control a wide number of herbaceous plants at 0.5 lbs. ai./A and lower. The goal of the test is to determine the maximum amount of glyphosate that can be applied without damaging select juniper species.

MATERIAL AND METHODS: On July 27, 2003 at the Center for Applied Nursery Research, 18, 1 gallon pots of each of the following junipers were assembled: Shore juniper (*Juniperus conferta* 'Blue pacific'), Dahurian juniper (*J. davurica* 'Parsoni'), Singleseed juniper (*J. squamata* 'Blue Star'). Nine, one gallon pots, of each species were placed in a 6 ft. x 6 ft. area. Herbicide treatments were applied to the area containing the 27 one gallon pots. Pots were then carefully moved to an evaluation area where they were arranged in a randomized complete block (RCB) design. Each treatment contained 3 replications, and each replication contained 3 subsamples. The process was continued for each herbicide treatment. Sprays were applied with a CO₂ backpack sprayer calibrated to deliver 20 gallons per acer (GPA). Watering occurred on an as needed basis, and this represented approximately ½ to 1 inch of water per day. The treatment list was as follows:

Treatment#	Treatment	Rate
1	Roundup Pro 4L	0.5 (lb ai/A)
2	Roundup Pro 4L	1.0 (lb ai/A)
3	Roundup Pro 4L	2.5 (lb ai/A)
4	Roundup Pro 4L	5.0 (lb ai/A)
5	Roundup Pro 4L	10 (lb ai/A)
6	Check	

Injury ratings were taken at 4, 8, and 12 weeks after treatment (WAT). At the termination of the study, 12 WAT, plant shoot biomass was collected from each treatment. Plant injury was taken on a (0-100 scale) and numbers represented the following:

Value	Plant Symptoms
0	No visual injury present
10-30	Minimal injury to desirable plant. Less than 10% of the plant leaf surface area showing chlorosis and necrosis.
40-70	More noticeable plant injury or stunting. Greater than 50% of the leaf area showing symptoms of chlorosis and/or necrosis.
80-90	Plants severely injured. Most of the leaves and leaf surface showing signs of chlorosis and necrosis.
100	Plant appears dead. No signs of regrowth.

RESULTS: No injury was recorded with any of the glyphosate treatments at 1 or 2 weeks after treatment (WAT). At 4, 8, and 12 WAT, no injury was recorded to juniper species receiving the 0.5 lb ai/A glyphosate rate (Table 1-3). With the 1.0 lb ai/A glyphosate rate, minimal injury (<5%) was recorded to the dahurian juniper at 8 and 12 WAT. At the termination of the study, significant injury (23.3 %) was recorded only to the dahurian juniper (Tables 1-3). Both the 5.0 and 10 lb ai/A glyphosate treatment resulted in significant injury (>8.3 to 76.7) to all juniper species during all rating periods (Table 1-3). No significant differences in dry weights occurred with both the shore juniper and singleseed juniper (Table 1 and 3). The shoot dry weights of the dahurian juniper were significantly different from the check with the 0.5, 5.0 and 10 lb ai/A glyphosate treatments (Table 2).

SIGNIFICANCE TO INDUSTRY: This research shows the possibility of using low rates of glyphosate to control herbaceous weeds in glyphosate tolerant crops. At present, this is not a labeled application of glyphosate. It should be noted that this processes could not be used routinely as phytotoxic glyphosate and phytotoxic glyphosate breakdown products accumulate in the plant. The accumulation of glyphosate and glyphosate breakdown products can results in plant injury or death. However, this uses of glyphosate could provide another tool to control weeds when preemergent herbicides fail and no other alternatives are available.

Table 1. Injury and Shoot Dry Weight to Shore juniper (*Juniperus conferta* 'Blue pacific') 2003.

Treatment#	Treatment	Rate	Juniper Injury (0-100)*			Shoot Dry Weight (grams)
			4 WAT	8 WAT	12 WAT	12 WAT
1	Roundup Pro 4L	0.5 (lb ai/A)	0.0c	0.0c	0.0b	83.8a
2	Roundup Pro 4L	1.0 (lb ai/A)	0.0c	0.0c	0.0b	95.8a
3	Roundup Pro 4L	2.5 (lb ai/A)	3.3bc	5.0bc	8.3b	76.1a
4	Roundup Pro 4L	5.0 (lb ai/A)	10.0b	8.3b	8.3b	74.1a
5	Roundup Pro 4L	10 (lb ai/A)	16.7a	20.0a	36.7a	75.2a
6	Check		0.0c	0.0c	0.0b	88.4a
LSD (p=0.05)			5.75	8.08	8.73	24.5

*Means followed by same letter do not significantly differ (P=0.05, LSD)

Table 2. Injury and Shoot Dry Weight to Dahurian Juniper (*Juniperus davurica* 'Parsoni') 2003.

Treatment#	Treatment	Rate	Juniper Injury (0-100)*			Shoot Dry Weight (grams)
			4 WAT	8 WAT	12 WAT	
1	Roundup Pro 4L	0.5 (lb ai/A)	0.0c	0.0c	0.0c	50.9bc
2	Roundup Pro 4L	1.0 (lb ai/A)	0.0c	3.3c	0.0c	59.9ab
3	Roundup Pro 4L	2.5 (lb ai/A)	0.0bc	16.7c	23.3b	52.8ab
4	Roundup Pro 4L	5.0 (lb ai/A)	13.3b	36.7b	43.3b	36.2cd
5	Roundup Pro 4L	10 (lb ai/A)	50.0a	76.7a	93.3a	31.1d
6	Check		0.0c	0.0c	0.0c	66.5a
LSD (p=0.05)			4.29	18.76	22.03	15.54

*Means followed by same letter do not significantly differ (P=0.05, LSD)

Table 3. Injury and Shoot Dry Weight to Singleseed Juniper (*Juniperus squamata* Blue Star') 2003.

Treatment#	Treatment	Rate	Juniper Injury (0-100)*			Shoot Dry Weight (grams)
			4 WAT	8 WAT	12 WAT	12 WAT
1	Roundup Pro 4L	0.5 (lb ai/A)	0.0c	0.0	0.0c	133.2a
2	Roundup Pro 4L	1.0 (lb ai/A)	0.0c	0.0c	0.0c	117.0a
3	Roundup Pro 4L	2.5 (lb ai/A)	16.7b	5.0cbc	13.3c	99.8a
4	Roundup Pro 4L	5.0 (lb ai/A)	26.7b	16.7b	33.3b	97.3a
5	Roundup Pro 4L	10 (lb ai/A)	70.0a	60.0a	60.0a	112.3a
6	Check		0.0c	0.0c	0.0c	118.9a
LSD (p=0.05)			13.96	13.15	17.47	30.91

*Means followed by same letter do not significantly differ (P=0.05, LSD)