Seed Germination Response of Penstemon spp. to Gibberellic Acid

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ABSTRACT

Treatment of seed with gibberellic acid (GA) resulted in significant increases in germination percent for Penstemon ambiguus, P. barbatus, P. eatoni, P. palmeri, P. parryi, P. pseudospectabilis, P. secundiflorus, and P. strictus in one or both of two experiments which were conducted. Germination of several other species increased with GA treatment, but differences were not significant.

INTRODUCTION

The genus Penstemon contains hundreds of species which produce very attractive flowers. In Arizona alone, about 40 species of Penstemon occur, at sites ranging from less than 1,500 feet to more than 10,000 feet in elevation. For such an attractive and widely adapted group of plants, the genus Penstemon is surprisingly little used in landscapes. One problem limiting use of these plants is seed germination. Germination may be poor (low final percent), slow or erratic. For P. parryi, a common low-elevation species in Arizona, Raeber (1) found that seed germination is greatly stimulated by treatment with gibberellic acid (GA). GA has also been reported to stimulate germination of many other species. The objective of this study was to determine whether seed germination of Penstemon species of the Western U.S. other than P. parryi could be stimulated with GA.

MATERIALS AND METHODS

The effect of gibberellic acid on seed germination of the 15 Penstemon species listed in Table 1 was studied. For each species, 25 seeds were placed on top of two layers of Whatman #1 filter paper in a 9 cm plastic petri dish, and then 4 ml of either distilled water or a 100 ppm solution of gibberellic acid (GA) was added. Three dishes were prepared for each of the two treatments for each of the species. The petri dishes were randomized on trays and enclosed in a polyethylene bag to prevent drying.

Seeds were incubated in the dark at 20°C in a germinator. Germination counts were made starting day 4 and made approximately every 2 days thereafter. Results for day 8 are given in Table 1. The entire study was repeated. In the repetition, only 10 seeds were used for each replicate of P. cobaea, 25 seeds were used for all other species. Germination results for day 7 are given in Table 1.

Table 1. Seed germination of 15 Penstemon species in response to treatment with 100ppm gibberellic acid (GA).

Species	Experiment 1[1]		Experiment 2	
	Control	GA	Control	GA
P. alpinus	0	8	0	9
P. ambiguus	40	68	31	79*
P. angustifolius	36	48	17	19
P. barbatus	44	83*	4	55*
P. cobaea	0	0	0	0
P. cyananthus	0	0	0	0
P. eatoni	0	15*	0	0
P. jamesii	35	56	43	69
P. palmeri	0	16*	0	25*
P. parryi	8	47*	5	64*
P. pinifolius	20	33	21	19
P. pseudospectabilis	0	24*	0	17*
P. secundiflorus	17	68*	24	36
P. speciosus	73	83	68	84
P. strictus	83	99*	76	92*
Average	24	43	19	37

[1]Data collected on day 8 in experiment 1 and on day 7 in experiment 2.
*Significantly different from correspondilng control value (5% level).

RESULTS

Germination of untreated Penstemon seed in the first experiment varied from 0% for 6 species, up to 83 percent for P. strictus. Treatment of Penstemon seed with gibberellic acid resulted in increased germination % for 13 of the 15 species, however, the increase was statistically significant for only 7 species. Four of the 6 species which had 0% germination when untreated, had improved germination (8 to 24%) following treatment with GA. Responses to GA were especially impressive in P. barbatus, P. parryi, P. pseudospectabilis, and P. secundiflorus. The overall average for GA treated seed (43%) was almost double that of untreated seed.

Results in the second experiment were very similar to those in the first. Again, six species had 0% germination when untreated. Of these 6, 3 showed germination ranging from 9 to 25% when treated with GA. In general the same species showed significant increases in germination in response to GA in both of the experiments. The overall average for GA-treated seed was slightly less in the second experiment (37%), but it was again almost double that of untreated seed (19%).

In experiment 1, P. cobaea and P. cyananthus had some germination (19 and 7%, respectively) after 18 days if treated with GA, but no germination at that time if untreated.

REFERENCES

1. Raeber, A.C. 1985. Studies on the germination of Penstemon parryi seed. M.S. Thesis, The University of Arizona, Tucson, AZ.