Effect of Priming on Parsley Seed Germination

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Abstract

Rapid seed germination is essential for parsley plants to survive the winter in the fields in central Oregon. The objective of this study was to examine whether seed priming could increase germination rate or percentage of parsley seed. Seeds of two cultivars (cv. 'Forest Green' and 'Evergreen') were subjected to seven different treatments: scarification (S), polyethylene glycol (PEG), S + PEG, gibberellic acid (GA), S + GA, water (W), and S + W. They were then sown, together with control untreated seeds, in trays containing commercial potting mix or soil from a farmer's field. Seeds sown in the potting mix emerged faster than those sown in the soil. The cultivar Forest Green exhibited a greater germination percentage than Evergreen. Scarification plus priming (S + PEG, S + GA, or S + W) significantly reduced germination speed and percentage compared to the control in the soil. In contrast, there was no difference between treatments at 425 growing degree days after sowing in potting mix. There was no interaction between cultivar and treatment at any point throughout the experiment. As far as field conditions are concerned, it is unlikely that parsley production benefits from any seed treatments tested in this experiment. Scarification plus priming was rather detrimental in parsley growth in potting mix.

Introduction

Parsley is sown as a seed crop in central Oregon and is typically slow to emerge when sown in early July. Growers are interested in applying seed priming to enhance seed germination and ensure rapid stand establishment. Pill and Kilian (2000) found that priming seeds with gibberellic acid (GA) increased germination rate, percentage and uniformity, and also the length of the hypocotyl when they were sown in a "peat-lite" medium. Priming of parsley seed is now common where parsley seedlings are sold in trays (personal communication Gordon Jamieson, Germain's Technology Group). This study was undertaken to determine whether a simple way of priming parsley seed is effective when seeds are sown under field conditions.

Materials and Methods

Seeds of cultivars 'Forest Green' and 'Evergreen' were primed prior to sowing. Treatments included: control (unprimed); priming in water (W); 192 g/l polyethylene glycol (PEG) or 0.346 g/l gibberellic acid (GA) at 18°C for 7 days; scarification (S, rubbing gently on fine sandpaper for 10 sec), S + W, S + PEG, and S + GA. Twenty-five seeds of each cultivar and treatment combination were then sown 5 mm deep in the potting mix or soil from a local farmer's field placed in planting trays. Trays were then placed in a growth chamber at 18/10°C with 16 hours light/8 hours dark photoperiod (light intensity: 295µmol/m^2/sec mercury lamps). The date of emergence was defined as

shoot emergence through soil surface. The experiment was terminated 450 growing degree days (GDD) (base temp of 0°C) after sowing.

Results and Discussion

Forest green seeds germinated faster and exhibited a greater germination percentage than Evergreen seeds (Fig. 1), while seeds sown in the potting mix germinated faster than those grown in soil with 50 percent of the final germination percentage achieved at 200 and 245 GDD for the potting mix and soil medium, respectively. It is unclear why germination was slower in the soil. It might have taken longer for seedlings to push through the surface crust of soil compared to that of potting mix. When sown in soil, control seeds had a greater germination percentage than any other treatment except for PEG (Fig. 2a). Scarification and priming in either GA, PEG, or water had the lowest germination. When the seeds were sown in potting mix there was no treatment that was significantly different from the control (Fig. 2b), although there was a tendency for the scarified seeds to germinate slower and have a lower germination percentage as observed in soil. There was no interaction between cultivar and treatment throughout the experiment.

Pill and Kilian (2000) found that soaking parsley seeds in water or GA for a week decreased the germination percentage, while priming with PEG increased the germination from 74 percent to between 82 and 86 percent, depending on temperature, duration, and GA application after priming. This was not the case in the present study: we found that the unprimed seed had 88 percent germination in the soil medium. It may be that priming is successful in germinating less vigorous parsley seeds in some situations, but if there are few of these seeds in the seed lot then priming has little effect.

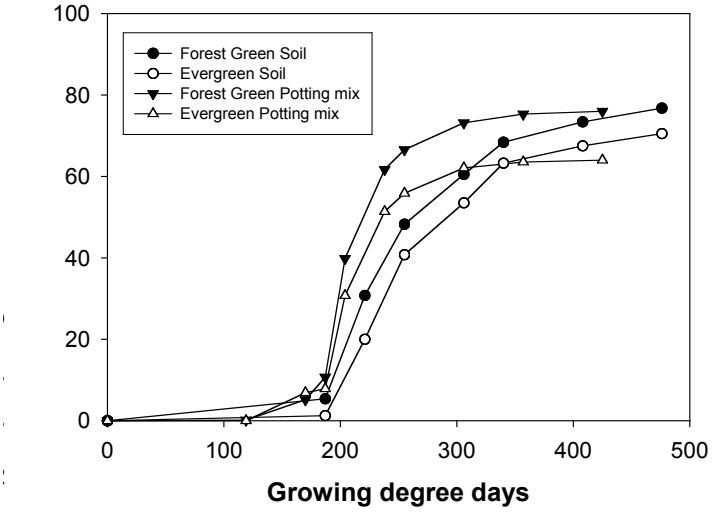

Figure 1. Germination of two parsley cultivars sown in trays containing soil or potting mix.

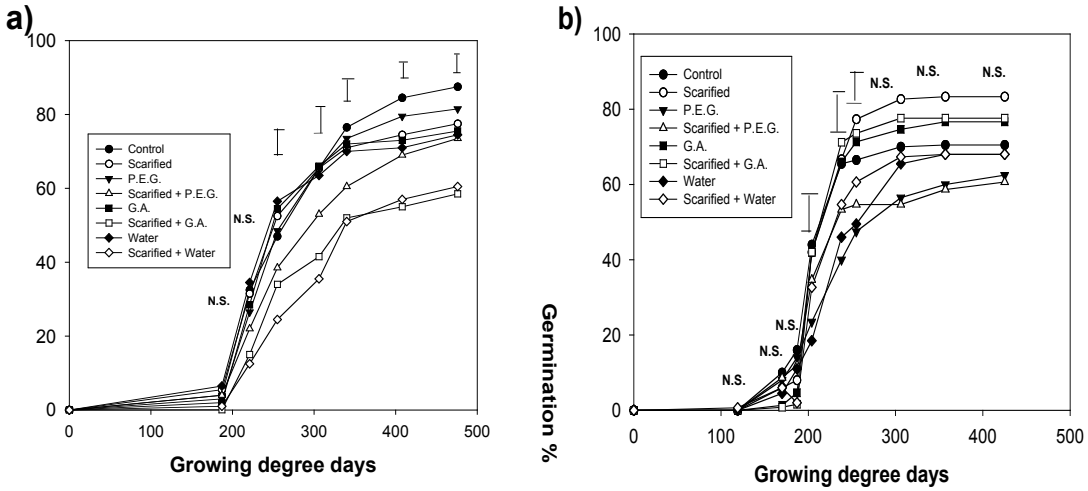

Figure 2. Germination percentage of parsley seed in a) soil and b) potting mix after exposure to different priming treatments. Error bars indicate LSD (0.05)

References

Pill, W.G., and E.A. Kilian. 2000. Germination and emergence of parsley in response to osmotic or matric seed priming and treatment with gibberellin. HortScience 35(5):907-909.

Acknowledgements

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