## PERENNIAL PEPPERWEED (*Lepidium latifolium*) ROOTING CHARACTERISTICS

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**Problem:**

One aspect of the biology of perennial pepperweed that makes this weed especially difficult to control is the mass of creeping roots that develop in the surface soil. The rootstocks provide a bank of living tissue for re-infestation when the tops are removed mechanically or by herbicides. With mechanical tillage, the cut portions of the roots produce buds that sprout new plants. The purpose of this study was to develop a bioassay system to determine the reproductive potential of perennial pepperweed roots after mechanical or herbicidal treatments.

**Purpose of Study:**

Experiment Number One: To determine the influence of root diameter on the sprouting and regrowth of perennial pepperweed plants.

Experiment Number Two: To determine the influence of applications of the herbicide 2,4-D on the sprouting of perennial pepperweed root buds.

**Experimental Procedures:**

Experiment Number One: Perennial pepperweed roots were collected in the field and divided into diameter classes from 0.5 to 4.0 cm. Each root section was 2.5 cm long. The root sections were planted in flats of soil in the greenhouse in randomized complete block experimental design. Emergence and shoot growth was measured daily. Two, 1-way Randomized Complete Block Analyses of Variance were performed (one for % sprouting, and one for sprout length). Treatments consisted of the root diameter classes and blocks were the flats in the greenhouse containing roots of varying diameter sizes.

Experiment Number Two: Perennial pepperweed roots were collected from replicated field experiments that had received 2 lb/ac of an amine of 2,4-D ([2,4-dichlorophenoxy]acetic acid) at the flower bud stage of growth the previous summer. The stems were cut in 2.5 cm sections. Roots were collected from untreated control plots from the same experimental design. The roots were planted in flats containing soil and kept moist in the greenhouse.

**Results**

Experiment Number One. The sections of perennial pepperweed roots sprouted profusely.

Table 1. Perennial pepperweed root sprouting in relation to root diameter. Summer 1993, USDA-ARS, Reno, NV.

| Root diameter Classes cm | Sprouting Length (%) | Sprout cm |
|---|---|---|
| 0.05 - 0.75 | 89 | 4.8 |
| 1.00 - 1.25 | 33 | 10.0 |
| 1.50 - 1.75 | 68 | 5.7 |
| 2.00 - 2.75 | 68 | 19.1 |
| 3.00 - 4.00 | 56 | 14.2 |

Despite considerable differences among the means for both percentage sprouting and shoot growth, there were no significant differences ($P \geq 0.5$). The important point is all diameter classes of perennial pepperweed roots produced abundant shoots.

Experiment Number Two: There was a significant ($P \geq 0.05$) difference in sprouting between the control and 2,4-D treated perennial pepperweed roots, even accounting for the significant relationship between the covariate of initial root weight and number of sprouts. Only 5 percent of the treated roots sprouted, while 50 percent of the control roots sprouted. Unfortunately, we know from experience with field plots that the 5 percent sprouting is sufficient to result in complete recolonization of the treated plots by the end of the first growing season following herbicide treatment.

**Discussion**

In other experiments we determined that even when perennial pepperweed roots were cut much shorter than the 2.5 cm segments used in this experiment, proficient sprouting occurred. Using normal tillage treatments (disk harrow) it is not possible to cut the majority of the roots to the 2.5 cm size, much less into smaller segments. Several times in this experiment it was noted that 2.5 cm segments produced more than one sprout. Several times in the experiment it was noted that 2.5 cm segments produced more than one sprout. The shoots produced by these perennial pepperweed segments, which were planted in early summer in the greenhouse, produced flowers and seed in late summer.

The results of the herbicide-treated root experiment indicates that considerable quantities of 2,4-D was being translocated to the roots. Unfortunately, it did not prevent sprouting of sufficient root buds, whereby the control became ineffective at the end of the second growing season. Obviously, the influence of repeated treatments with 2,4-D, either in the same season (early flowering and fall) or in subsequent years, needs to be studied. It is also important to know *which* roots sprout after 2,4-D applications. Is it a specific portion of the roots of all plants, or a portion of the roots of specific plants? If it is the roots of specific plants that sprout, repeated treatments with 2,4-D may select for herbicide resistance.