

The Influence of Uprooting Time on Seed Production in Common Purslane

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Introduction

Common purslane has re-emerged as a major weed problem in the Salinas Valley during the 1990s. Previous to the mid-1970s purslane was a major problem weed and caused major crop losses¹. Because of the efficient herbicides used on agronomic crops, such as sugar beets and dry beans, yield losses due to purslane declined from 1975 to 1985. During the 1980s agronomic crop production decreased as lettuce and cole crop acreage increased. Decreased crop rotation led to limited choices in herbicides such as Kerb and Dacthal, all of which may have contributed to purslane problems. Furthermore, the standard configuration for lettuce herbicides in the Salinas Valley is twin 5" herbicide bands centered over the rows. Thus, furrow bottoms and bed tops are left unsprayed, and purslane plants in the row centers or furrow bottoms are managed through mechanical cultivation or hand-weeding. We have observed that many uprooted purslane plants survive.

What then is the seed production potential of an uprooted common purslane plant? When must a purslane plant be uprooted to prevent seed production? The objective of this study was to determine how many viable seeds a purslane plant produces after uprooting at 1 to 6 weeks after emergence. If plants are not uprooted before the 3-week stage, how can seed production be minimized? A second study was conducted to determine if propane flaming, Round-up or crushing can be used to significantly reduce the number of viable seeds produced by established purslane plants.

Materials And Methods

Field plots. Purslane seeds were planted between two rows of lettuce seed on 40" beds. The plots were 13 ft. by 25 ft., and included four replicates per treatment and four subsamples per plot. The lettuce was thinned, cultivated once, and the plot was irrigated regularly. The plants were uprooted at 1, 2, 3, 4, 5, and 6 weeks after emergence, and were placed in open paper bags to dry in a greenhouse for three weeks. Seeds were hand-threshed from each plant and maintained separately.

Viability tests. The purslane seeds were counted and sorted by color into groups of tan, brown, and black seeds per the method of Egley (Egley 1974). The seeds were punctured with a scalpel and imbibed approximately 24 hours in a 1% tetrazolium solution to determine viability

¹ Personal communication, Harry Agamalian, Farm Advisor Emeritus Monterey County

(Ellis, et al. 1983). The number of black seeds was so great on the plants uprooted 5 and 6 weeks after emergence that the decision was made to take viability estimates on samples of black seed to estimate the fraction of viable black seeds. Tan and brown seeds from five and six-week-old plants continued to be imbibed in tetrazolium.

Treatments used to reduce seed output. The experimental units consisted of four uprooted purslane plants. The plants were each treated by one of the following treatments: (1) flaming plants with a propane torch, (2) spraying plants with 2% v/v Round-Up, (3) driving over the plants once with a tractor, and (4) an untreated control. The plants were placed into paper bags 24 hours later and dried in a greenhouse for three weeks after treatment. After hand threshing, the seeds were weighed and the weights were used to estimate the number of seed produced per plant.

Results

No viable seeds were produced in plants uprooted 1 and 2 weeks after emergence, though some viable seeds were produced in week 3 (Table 1). The number of seeds produced increased rapidly in 4- to 6-week-old plants. No tan seeds were viable. The relationship between the time of pulling and seed production was described by the linear function $s=810.6w+(-468.0)w^2+78.1w^3$ (Fig. 1), where s = number of seed and w = weeks from emergence to uprooting. The 6.2% viability rate of the brown seeds and the 93.6% viability rate of the black seeds are comparable to Egley's data (Egley 1974).

In the flaming study, the four propane-flamed plants yielded a total of 1359 seeds with an average of 339.8 seeds per plant. The plants sprayed with Round-Up produced 3737 seeds, an average of 934.3 seeds per plant. Plants that were crushed with a tractor produced a total of 15,173 seeds with an average of 3793.3 seeds per plant. The untreated plants yielded 20,298 seeds with an average of 5074.5 seeds per plant.

Discussion

These data indicate that common purslane uprooted 3 weeks after emergence or later are capable of producing viable seed and replenishing the seed bank. The best approach to purslane management appears to be to apply the herbicide prior to purslane emergence. The next best alternative is to remove the purslane within three weeks of emergence.

The most effective way to reduce the number of seeds in an established purslane plant is by flaming. This method kills the plant instantly, scorches the seeds, and minimizes further seed production. Spraying the plant with Round-Up significantly reduces the amount of seed by killing the plant quickly after treatment. Treatment of purslane plants with flaming or 2% v/v Round-Up significantly reduced the number of seeds per treatment relative to driving over the plants with a tractor or the control plants. The crushed plants did not show a reduction in the number of seed and most seeds appeared to be viable (fig. 2).

In future replications of this experiment, it would be wise to use plot flags instead of plant stakes. The purslane and crop plants can cover small plant stakes as they grow, making it

difficult to find the marked plants. It is also recommended that the plants around the marked weeds be thinned to a uniform distance so that shading and variable competition does not occur. In the flaming study, plants should be marked on the date of germination to ensure that each plant is the same age on the date of treatment. The number of plants in this study should also be increased to include approximately 16 plants per treatment. The seed used in this study was purchased from a weed seed dealer in the Fresno area. It may be more valuable to use native Salinas Valley purslane seed in future studies.

Literature Cited

Egley, G.H., 1974, Dormancy Variations in Common purslane Seeds. *Weed Science* 22, pp. 535-540.

Ellis, R.H., Hong, T.D. & Roberts, E.H., 1985, Handbooks for Genebanks. Rome: International Board for Plant Genetic Resources, pp. 125-134.

Table 1. Relationship between the time of uprooting and the mean number of viable seeds, separated by color, as per Egley (1974).

Weeks ²	Mean number viable seed of each stage		
	Tan	Brown	Black
1	0	0	0
2	0	0	0
3	0	0.81	1.06
4	0	5.19	164.75
5	0	8.75	1857.40
6	0	2.5	4162.7

² Weeks from emergence to uprooting.

Figure 1. Relationship between time of pulling and seed production

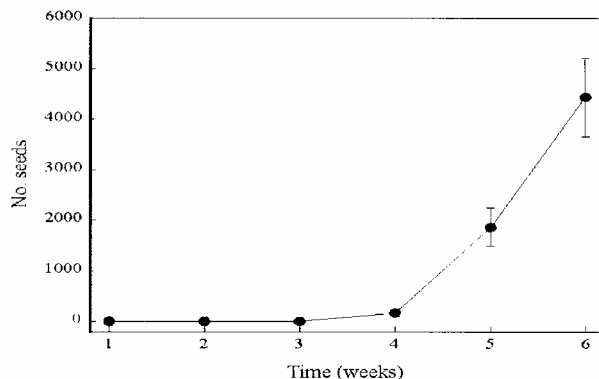


Figure 2. Relationship between treatments and number of viable seeds

