2008 Progress Report

Seed germination potential of untreated and late treated Spartina clones in Willapa Bay

Kim Patten
Washington State University Long Beach Research and Extension Unit

Introduction. Eradication of Spartina in Willapa Bay is completely feasible if there are no new sources of seedlings. This is controlled by three variables: the seed bank, transport of new seeds into Willapa, and new seed production. Owing to the short-lived seed viability (1 year), there is no true seed bank to contend with. Transport of new seeds in Willapa is beyond our control. New seed production is still occurring, but at reduced rates. Research was conducted to assess the amount of viable seeds that could be produced from small remaining clones of Spartina and what effect late season herbicide treatment had on seed production.

Methods.
Clone size: Spartina seed heads were collected from 1 m^2 areas within various clones in late September to early October at five locations. Samples were put in screen bags and secured in an oyster grow-out container in the upper tide flats. After 3 months the samples were moved to the greenhouse, put in aerated bay water for 1 month and assessed for germination (see Figure) 1).

Herbicide effects: Replicated plots 2 X 3 m were treated with herbicide in mid-August, late August, and mid-September. Seed heads were collected and percent germination assessed, using germination protocol established at UC Davis for Spartina.

Results and Discussion:
Clone size effect: Results were highly variable and not entirely related to clone size (Table 1). The most isolated clumps of Spartina (North Bay tidal gut and a small clone north of Nahcotta) had no viable seeds. The two other sites had viable seeds, especially the site at Leadbetter. The Leadbetter site was treated by herbicide in late September, but

there was poor control. The sample size of this study was too small to make a definitive inference. However, it indicated the methodology worked. It also indicated that small clumps of Spartina treated late in the season are very capable of copious viable seed production.

Table 1. Effect of clone size and location on viable seed production.

Location	Clone size	# seed heads/m^2	# seedlings/m^2
North Bay tidal channel	>400ft^2	50	0
LB Peninsula - Nahcotta	20 ft^2	13	0
LB Peninsula - Nahcotta	100ft^2	25	10
LB Peninsula – south of Leadbetter	200-400ft^2	38	500

Herbicide timing effects: The later the herbicide treatment occurred, the greater the amount of viable seed that was produced (Table 2). Based on these data, any herbicide treatments past August could result in a abundant amount of viable seed, even though all these treatments resulted in 90 to 100% control.

Table 2. Effect of herbicide (5 pt Habitat +3% Rodeo + 1% Competitor) timing on viable seed production.

Time of treatment	% germination (± Std. Err.)	% control year after treatment (± Std. Err.)
August 24	0.08 ± 0.08	99 ± 0.2
September 6	0.2 ± 0.11	100 ± 0.6
September 26	1.5 ± 1.4	90 ± 5
Untreated control	4.5 ± 2.1	0

Conclusion: Our data would suggest that isolated patches of Spartina can not be assumed to be infertile. The sexual fecundity of Spartina is such that several small untreated clones or patches of Spartina that were sprayed after September are capable of germinating enough viable seed to infest vast areas of the bay. For example, the Leadbetter sample produced ~50 germinating seeds/ft^2. Assuming 10% survival of germinated seed, this translates to 1 acre of untreated Spartina generating over 200,000 seedlings that could be spread over thousands of acres.