Using Saltcedar (*Tamarix* spp.) for Weed Science Education

M.K. Ohrtman[1,2] and S.A. Clay[1]
[1]South Dakota State University, Department of Plant Science, Brookings, SD 57007
[2]michelle.ohrtman@sdstate.edu

Introduction

- Saltcedar (*Tamarix* spp.) (Figure 1) will be encountered by most land managers, agronomists, and weed professionals in the western U.S.
- Applied experience with saltcedar biology, identification, and effective control methods enhances the ability of emerging professionals to manage this plant.
- A laboratory exercise was developed that combined saltcedar research with student training in invasive weed management.

Figure 1. Mature saltcedar in Pennington County, SD.

Objectives

- Train future professionals in range, agricultural, and biological sciences to identify and effectively treat saltcedar infestations before plants become well-established.
- Demonstrate efficacy differences among young saltcedar treatments.
- Provide students with experience controlling a troublesome weed.
- Raise awareness of local weed issues.
- Involve students in cutting-edge research (the response of immature saltcedar plants to mechanical, chemical, and fire treatments was unknown prior to this experiment).
- Facilitate learning of Weed Science concepts through innovative teaching approaches.

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Experimental Set-up

- Saltcedar seeds were sown on a sandy clay loam soil in cone-tainers (4 cm dia x 21 cm), immediately surface watered, and placed inside tubs to maintain subsurface water.
- Tubs were placed in a greenhouse with temperatures ranging between 20 and 30 C.
- Plants were grown for 4, 8, and 12 wks (Figure 2).

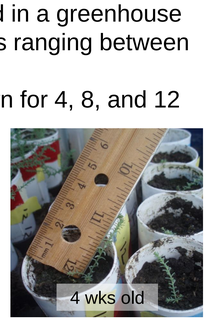

Figure 2. Saltcedar plants that are 4, 8, and 12 wks old.

Student Experiential Experience

- Students performed treatment applications during a 2-hr laboratory period (Figure 3).
- Treatments included:
  - Clipping to 2 cm,
  - Application of a low (1X) or high (2X) rate of Imazapyr (Arsenal®),
  - Fire for 30, 60, or 120 s, or
  - Combination of clipping with herbicide or fire.
- 9 replicates were used for each plant age treatment^{-1} including untreated controls.
- 6 wks after treatment:
  - Number of surviving plant live stems and height of the tallest shoot were recorded (Figure 4).
  - Root biomass was determined.
- Students formed hypotheses about treatment efficacy prior to treatment and wrote reports about how research results supported or refuted their hypotheses.

Figure 3. Weed Science students treating saltcedar plants in fall, 2011. Above left: Tyler Steinkamp is removing plants from a spray cabinet after herbicide treatment. Above right: Michelle Ohrtman (right), is treating plants with fire. Emily Helms (middle right) and Chris Opdahl (middle left) are monitoring burn temperature using a thermocouple. Jared Schulz (left) is recording fire duration.

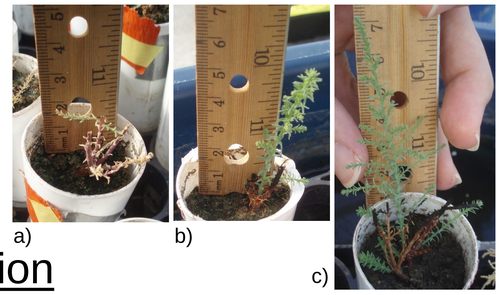

Figure 4. Resprouts on saltcedar plants that were treated at 12 wks of age with a) clipping + herbicide, b) clipping + fire for 30 s, and c) fire for 120 s.

Student Evaluation

- Student evaluation was conducted using online software (Survey Monkey™).
- Students rated nine statements on a 1 to 5 scale (1= strong agreement, 3 = neutral, 5 = strong disagreement).
- 45% of the total course participants responded to the survey.
- More than 60% agreed or strongly agreed that this exercise:
  1) was a valuable activity, and
  2) increased their understanding of weed biology, weed science concepts, and weed management (Table 1).
- More than 70% of respondents agreed that this exercise increased there awareness of saltcedar invasion potential.

Table 1. Fall 2011 South Dakota State University Weed Science student evaluation of the saltcedar control exercise. Statements were rated on a scale of 1 to 5; 1 = strongly agree, 3 = neutral, and 5 = strongly disagree.

	Distribution						
Statement	1	2	3	4	5	Mean	SD
The laboratory exercise on saltcedar control was a valuable activity.	3	10	6	2	0	2.3	0.9
This exercise increased my awareness of saltcedar invasion in South Dakota.	7	8	4	2	0	2.0	1.0
I had an increased understanding of weed biology after completing this exercise.	5	8	8	0	0	2.1	0.8
I had an increased understanding of weed management after completing this exercise.	3	12	5	1	0	2.2	0.7
This exercise increased my understanding of weed science concepts.	5	10	5	1	0	2.1	0.8
I can transfer the concepts learned in this exercise to other situations.	3	12	4	2	0	2.2	0.8
This exercise improved my critical thinking skills.	2	7	11	1	0	2.5	0.7
This exercise improved my ability to receive information effectively through observation.	5	10	5	1	0	2.1	0.8
This exercise improved my ability to summarize simple research data.	5	10	5	1	0	2.1	0.8

Conclusions

- The favorable student response to the saltcedar control exercise suggests that:
  - Activities using living invaders may be valuable additions to Weed Science curricula.
  - Integration of research, education, and experiential techniques is important in training young professionals and increases student awareness of the potential threats in new habitats.
  - It is important to present both effective and less effective method(s) for removing new infestations so that informed decisions can be made.
- There are other opportunities to develop educational training programs using invasive weeds to better train individuals with diverse learning styles and backgrounds and provide valuable research contributions to the field of invasive plant management.