

Developing an Educational Program on Preventing Noxious Weed Invasion on Farms and Ranches in Nevada and Utah

Final Report for EW08-019

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Project Information

Abstract:

A survey of weed management professionals and agricultural producers has been completed to assess current perceptions and practices regarding weed prevention. An in-depth literature review on weed prevention has also been completed. The information gathered from these two steps of the project was presented at the annual meetings of the Nevada Weed Management Association, Utah Weed Control Association, Western Society of Weed Science, and the American Society of Agronomy. Weed prevention workshops have been held at 33 locations across 5 states and inspired a series of county specific factsheets and education workshops in Nevada. A reference manual has been created and will be distributed this summer. A website has also been developed and populated with links to publications, YouTube videos, and other pertinent information. Evaluations of the project's impact will consist of two surveys involving attendees at workshops, number of visits to the project website, and information requests. This will be completed following during the upcoming year.

Project Objectives:

The objectives for this project were to: 1) collect, review, and summarize current knowledge about weed prevention techniques applicable on agricultural lands, 2) develop an educational program to present and distribute this information to CE,

NRCS, and others weed management professionals and 3) evaluate program impact.

Introduction:

Invasive non-native plants are one of the greatest modern challenges to the productivity, ecological integrity, and economic viability of farms and ranches in the western U.S. The impacts of weeds on agricultural operations have been well documented and include reduced crop and livestock yields, poorer-quality products, less efficient land use, increased cost of controlling other pests (including insects and diseases), increased soil erosion, and reduced human efficiency. The presence of weeds has a profound negative impact on the economic viability of agricultural operations in the U.S. In fact, crop yield losses caused by weeds, alone, are estimated to be \$32 billion, annually. Because of this some research indicates that agricultural producers spend billions of dollars each year on weed control tactics such as herbicides, grazing, burning and tillage.

Traditionally, weed management programs have focused, primarily, on control after the weed species has invaded and become established on the land. Despite management efforts to date, noxious weeds continue to spread rapidly and are an increasing threat to the sustainability of agricultural operations. While programs that emphasize control can be successful, it is widely accepted among weed management professionals that preventing weed invasion is the most effective method of weed management. However, there was no reliable, accessible, and practical source of information regarding weed prevention. The primary objective of this proposal was to develop an educational program that will strengthen the abilities of CE, NRCS and other weed management professionals to advise agricultural producers on the importance of weed prevention as a weed management tool.

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Education & Outreach Initiatives

Objective:

Description:

Methods

We used the topic “Fortifying Farms and Ranches Against Weed Invasion” as the basis of our publication, educational program outreach, meetings and related activities. We focused heavily on direct training methods and development of a reference manual to be used to further the knowledge gained at the trainings. The project objectives were accomplished by using the following methods: 1) the current knowledge base regarding noxious weed prevention was developed and summarized using an in-depth literature review and formal surveys of over 6,000 Utah and Nevada agricultural producers and weed management professionals, 2) a reference manual (paper and electronic formats) with text and color photos and illustrations was created and is currently in peer-review to be published as a numbered USU Extension publication, 3) popular press articles were published in a number of state, regional, and global periodicals and a regional peer-reviewed fact sheet was also published, 4) a multi-faceted educational program was developed and delivered in five western states at a variety of venues ranging from scientific and grower meetings to undergraduate and master gardener classes, 5) 2,000 copies of the manual will be produced and distributed to attendees at workshops, to every CE and NRCS office in Utah and Nevada, and to other entities, 6) a website was created featuring the manual, narrated powerpoints of the workshop, YouTube videos of considerations for weed prevention created on-farm, and other relevant information, 7) the project was presented at national and regional meetings and a paper is in process to be published in a peer-reviewed journal. Evaluations of the project’s impact will consist of two surveys involving attendees at workshops, number of visits to the project website, and information requests. This will be completed following during the upcoming year.

We supplemented this publication and educational efforts in Nevada with a series of County specific workshops that expanded our efforts, and were supported by a separate funding source. The work was completed in an attempt to increase the ability of CE, NRCS, and other weed management professionals to recognize and prevent these new weedy invaders from becoming established in accordance with the premise of prevention is more effective than control. New weed species mostly likely to invade each Nevada County were determined by a completing a multi-state survey of weed management professionals and utilizing local focus groups comprised of weed management professionals. The weed species most likely to invade a particular County were identified and selected for presentations at County specific workshops held throughout Nevada. The presentations were supported by County specific color posters which included photographs, identification tips, instructions on reporting new populations and suggested control methods. The published materials are also available via the internet to be accessed electronically.

Outreach and Publications

Publications

Peer-reviewed publications:

Creech, E., R. Whitesides, and J. Davison. 2013. Fortifying Farms and Ranches

Against Weed Invasion. Utah State University Extension Bulletin. 36 p. (Submitted – in review)

Newton, J., Davison J., Schultz, B. Blecker, L and J E Creech. 2012 Early Detection and Rapid Response (EDRR) Education and Implementation Results in Nevada. University of Nevada Cooperative Extension Fact Sheet (in review).

Blecker, L., E. Creech, J. Davison, B. Schultz, and S. Donaldson. 2011. Weeds to Watch: New Weed Threats for Washoe County. University of Nevada Cooperative Extension Publication. FS-11-05. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and S. Foster. 2011. Weeds to Watch: New Weed Threats for Pershing County. University of Nevada Cooperative Extension Publication. FS-11-06. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and A. Meier. 2011. Weeds to Watch: New Weed Threats for N. Nye and Esmeralda Counties. University of Nevada Cooperative Extension Publication. FS-11-07. 2 p.

Blecker, L., E. Creech, J. Davison, and B. Schultz. 2011. Weeds to Watch: New Weed Threats for Nevada. University of Nevada Cooperative Extension Publication. FS-11-08. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and S. Emm. 2011. Weeds to Watch: New Weed Threats for Mineral County. University of Nevada Cooperative Extension Publication. FS-11-09. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and L. Singletary. 2011. Weeds to Watch: New Weed Threats for Lyon County. University of Nevada Cooperative Extension Publication. FS-11-10. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and H. Gatzke. 2011. Weeds to Watch: New Weed Threats for Lincoln County. University of Nevada Cooperative Extension Publication. FS-11-11. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and R. Davis. 2011. Weeds to Watch: New Weed Threats for Lander County. University of Nevada Cooperative Extension Publication. FS-11-12. 2 p.

Blecker, L., E. Creech, J. Davison, and B. Schultz. 2011. Weeds to Watch: New Weed Threats for Humboldt County. University of Nevada Cooperative Extension Publication. FS-11-113. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and G. McCuin. 2011. Weeds to Watch: New Weed Threats for Eureka County. University of Nevada Cooperative Extension Publication. FS-11-14. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and K. McAdoo. 2011. Weeds to Watch: New Weed Threats for Elko County. University of Nevada Cooperative Extension Publication. FS-11-15. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and S. Lewis. 2011. Weeds to Watch: New Weed Threats for Douglas County. University of Nevada Cooperative Extension Publication. FS-11-16. 2 p.

Blecker, L., E. Creech, J. Davison, and B. Schultz. 2011. Weeds to Watch: New Weed Threats for Clark and S. Nye Counties. University of Nevada Cooperative Extension Publication. FS-11-17. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and M. Evans. 2011. Weeds to Watch: New Weed Threats for Carson City and Storey Counties. University of Nevada Cooperative Extension Publication. FS-11-18. 2 p.

Blecker, L., E. Creech, J. Davison, and B. Schultz. 2011. Weeds to Watch: New Weed Threats for Churchill County. University of Nevada Cooperative Extension Publication. FS-11-19. 2 p.

Blecker, L., E. Creech, J. Davison, B. Schultz, and D. Nelson. 2011. Weeds to Watch: New Weed Threats for White Pine County. University of Nevada Cooperative Extension Publication. FS-11-20. 2 p.

Creech, E., B. Schultz, R. Torell, and K. Davies. 2008. Ranch Biosecurity as a Weed

Control Measure. Cow-Calf Management Guide - Cattle Producer's Library. University of Idaho, Moscow. CL543. 4 p.

Non-peer-reviewed publications:

"Ranch Biosecurity as a Weed Control Measure." Article written for Progressive Rancher. May 2008. p. 5. (circulation 10,000 statewide).

"Ranch Biosecurity as a Weed Control Measure." Article written for Nevada Rancher. May 2008. p. 4. (circulation 2,000 statewide).

"Ranch Biosecurity as a Weed Control Measure." Article written for Nevada Farm Bureau Journal. May 2008. pp. 6-7. (circulation 1,000 statewide).

"Ranch Biosecurity as a Weed Control Measure." Article written for National Cattlemen's Producer Education. May 2008. pp. 30-31. (circulation 35,000 globally).

"Weeds: a \$12 Billion Struggle." Article written for Western Farmer Stockman. pp. 27-28. June 2008. (circulation 30,000 regionally).

"Ranch Biosecurity as a Weed Control Measure." Article written for the American Angus Journal. Aug 2008. pp. 122-123 (circulation 17,500 globally).

"Best Weed Control: Nip 'em in the bud." Article written for Western Farmer Stockman. Sept 2008. pp. 22-23. (circulation 30,000 regionally).

Electronic resources:

Weed prevention website: extension.usu.edu/weeds

YouTube videos:

<http://www.youtube.com/playlist?list=PLMnDQoXFVBEalHrvxVh5uif9vHygIFYoM>

Outreach activities

Summary of the meetings and activities where the topic "Fortifying Farms and Ranches Against Weed Invasion" and related topics was featured.

University classes

Fall semester 2012 - Forage Production and Pasture Ecology (PSC 4320). This class is taught fall semester every other year. The information related to weed prevention was used as a portion of the class. One complete lecture and a portion of a 3-hour laboratory were dedicated to this topic. There were 30 students registered for this class.

Fall Semester 2012 - Weed Management (PSC 4550). This class is taught annually at the Utah Botanical Center in Kaysville, Utah. One entire lecture devoted to weed prevention in fall 2012. There were 18 students registered for this class.

Crop schools, and related classes.

Master Gardener Class - St. George, UT. 18 people.

Master Gardener Class - Kanab, UT. 14 people.

Crop School - Richfield, UT. 52 people present.

Crop School - Minersville, UT. 41 people.

Utah Hay Symposium - St. George, UT. 140 people.

Utah Hay Symposium - St. George, UT. 180 people (different part of the hay meetings)

N.Utah Fruit Growers Assoc.-Brigham City, UT. 40 people.

Cache County Road Department -Logan, UT. 13 people.

Tri-River Pesticide Class-Grand Junction, CO. 67 people.

Master Gardener Class - Price, UT. 47 people.

Utah Weed Control Association -Richfield, UT. 225 people.

Utah Weed Control Association -Richfield, UT. 225 people (different part of the weed meetings).

Western Society of Weed Science annual meetings - San Diego, CA. 100 people.

Sweetwater County Crops School - Farson, WY. 41 people.

Tooele County Weed School - Tooele, UT. 28 people.

Weed Program – Layton, UT. 19 people.

Lincoln County Weed Program – Afton, WY. 60 people.

Utah Native Plant Society – Logan, UT. 12 people.

Box Elder County Crops School – Corinne, UT. 96 people.

Ranch Biosecurity as a Weed Control Method, Workshops held in Reno, Fallon, Ely, Elko, Winnemucca, and Wellington, NV 450 people

Weeds to Watch Presentations.

Carson City, NV 9 people

Tonopah, NV 3 people

Reno, NV 5 people

Gardnerville, NV 4 people

Battle Mountain, NV 4 people

Ely, NV 4 people

Fallon, NV 26 people

Yerington, NV 20 people

Lovelock, NV 2 people

Winnemucca, NV 4 people

Eureka, NV 7 people

Caliente, NV 6 people

Logandale, NV 10 people

Weed prevention subject Integrated with Managing Agricultural Risk Workshops in Nevada.

Smith Valley, NV 44 people

Yerington, NV 39 people

Douglas Co., NV 27 people

Lovelock, NV 11 people

Winnemucca, NV 12 people

Fernley, NV 17 people

Tonopah, NV 13 people

Caliente, NV 6 people

Washoe, NV 24 people

Fallon, NV 75 people

Integrated with Hands on Activities for Elementary School Kids at the following field days:

Smith Valley, NV 58 students

Washoe County, NV STEM Expo 83 students

Electronic Resources

Weed prevention website: extension.usu.edu/weeds

YouTube videos:

<http://www.youtube.com/playlist?list=PLMnDQoXFVBEalHrvxVh5uif9vHygIFYoM>

Outcomes and impacts:

A weed prevention reference manual was created and entitled “Fortifying Farms and Ranches Against Weed Invasion”. The 36 page full-color publication includes a detailed literature review, a conceptual framework for weed prevention (complete with graphics and photographs), and specific ideas for planning preventive efforts on farms and ranches. The manual has gone through layout and design and is presently in the peer-review process requisite for approval to become a numbered USU Extension publication. This summer, two-thousand copies will then be printed and distributed to every CE and NRCS office in Nevada and Utah. Popular press articles

were published in Progressive Rancher (circulation 10,000 regionally), Nevada Rancher (circ. 2,000 statewide), Nevada farm Bureau Journal (circ. 1,000 statewide), National Cattlemen's Producer Education (circ. 35,000 globally), Western Farmer Stockman (circ. 30,000 regionally), and American Angus Journal (circ. 17,500 globally). A regional peer-reviewed fact sheet was also published by the University of Idaho for inclusion in the Cow-Calf Management Guide - Cattle Producer's Library. The educational program "Fortifying Farms and Ranches Against Weed Invasion" has been integrated into the course curriculum of two college level courses "Forage Production and Pasture Ecology" taught every other year and "Weed Management" that is taught yearly. Team members presented trainings focused on the topic to 2,081 participants of master gardener classes, crop schools, hay symposiums, grower associations, pesticide trainings, State weed control associations. We have delivered the program in California, Colorado, Utah, Nevada and Wyoming in 32 different cities. Formal written evaluations were administered at the end of the majority of these workshops/programs. The evaluation from the pre-conference workshop on weed prevention at the 2013 Utah Hay and Forage Symposium is typical of the impacts reported from our educational program. This event was held in St. George, UT and reached a total of 125 participants, comprised of agricultural producers, crop consultants, CE and NRCS personnel, and others from six western states (Utah, Idaho, Colorado, Arizona, Nevada, and California). Eighty-one attendees completed the survey, including agricultural producers managing 55,700 acres and crop consultants servicing approximately 580,000 acres. Participants were asked to indicate their level of understanding of weed prevention on a scale of 1 to 5 (with 1 being "very little" and 5 being "very much") before and after the workshop. Paired t-tests, using pre-test and post-test scores, indicated that the workshop participants achieved statistically significant immediate knowledge gains (Pre-test mean: 2.84; Post-test mean: 4.22; $P < 0.001$). Ninety-nine percent of participants indicated that they intended to use the information of their farm or ranch (agricultural producers) or in their work (crop advisors, CE and NRCS personnel). Ninety-nine percent of participants also felt that the information from this workshop would improve their (or their clients) profitability. These impacts have the potential to apply to nearly 650,000 acres managed or serviced by the agricultural producers and crop consultants in attendance, not to mention the vast acreage that can be influenced by the CE and NRCS personnel.

A website was created (extension.usu.edu/weeds) to serve as a central clearinghouse for information related to the project. It features links to publications, multi-media content, and other information relevant to weed prevention. To date, 13 YouTube videos on weed prevention have been produced to highlight weed prevention considerations on farms and ranches in the Intermountain West. In their first month online, these videos received approximately 250 views. The website and other electronic materials produced in this project are relatively new, so we will have a better feel for the overall impact of these products based on website hits and information requests in the months and years to come.

In Nevada, the concept of weed prevention led to a series of factsheets (posters) and presentations, with over 500 factsheets distributed and 233 students participating in these educational efforts. The weed prevention program was delivered 33 times as it was repeated across the state due to heightened interest and requests from various groups concerning this important topic. Formal written evaluations administered at the end of these workshops/programs revealed that 80% of respondents felt the workshops were "very useful" to the work they did while 20% found them to be "somewhat useful". Another question asked participants; Following the completion of the program how easy is it for you to have the following weed management questions answered? A) Have a new weed identified? 90% indicated that it was very easy or easy, with 10% reporting very difficult, B)

Assessment of new weed infestations? 100% indicating that it very easy or easy, and C) Create a weed management plan? 100% indicated that it was very easy or easy. When queried what weed related topic would they find most useful for future workshops, the most common answer was cost/benefit analysis of weed prevention/management programs.

Project Outcomes

Project outcomes:

The publication and the educational materials were developed to allow the presentation of the concepts of “Fortifying Farms and Ranches Against Weed Invasion” could be disseminated broadly throughout the West. Connections were made broadly across the region facilitating the exchange of information and educational tools between groups.

Recommendations:

Potential Contributions

The educational materials were used to target different educational groups. By integrating the material into two college courses that are part of most plant scientist’s curriculum, we ensure that students at the university are aware of weed prevention techniques. Presentations at Master Gardener classes, weed control associations, and crops/weed schools will further disseminate in information by passing on the information in their typical roles. Producers were directly targeted for education through the crop schools, symposia, weed meetings, and other programs.

Future Recommendations

In creating the educational materials and teaching on the topic of weed prevention over the past several years, two ideas have been repeatedly reaffirmed. First, weed prevention is becoming more and more critical to the success of weed management programs on agricultural operations. Second, most producers have never given much thought to weed prevention. Adoption of any new way of thinking requires sustained effort and, hopefully, some evidence of early success. It was a joy to watch the light come on in the minds of many attendees at our workshops and later hear about how behavior has changed as a result of that new knowledge. Weed prevention has become a cornerstone for Extension weed management programming at USU and UNR. The increasing importance of weed prevention, coupled with the need for knowledge on the topic many agricultural producers, warrants consideration for expanding educational efforts on weed prevention beyond Nevada and Utah in the future.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or SARE.



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