



Western Range &  
Wildlands Edition  
SPRING 2014

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Did you know that TechLine uses email to send on-line articles on invasive plant management to readers during both summer and winter?

To avoid missing out on timely control recommendations and management tips this summer:

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**LOOK FOR THIS SYMBOL**  
next to articles in  
this issue indicating

post-dated links to articles that will be published this summer; mark your calendar to check <http://techlinenews.com> for these articles after the publication date.

**ABOUT TECHLINE**

TechLine Invasive Plant News aims to provide an objective communication tool for on-the-ground natural resource managers who face common management challenges so they may share the successes of their programs and learn from one another.

Print newsletters are published twice per year and delivered free of charge. This and past issues can be downloaded from [www.techlinenews.com](http://www.techlinenews.com).

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# TechLine

## INVASIVE PLANT NEWS

INNOVATIVE RESEARCH, SUCCESS STORIES, AND TIPS FOR INVASIVE PLANT MANAGERS

*This issue provides quick reference to online resources to help managers meet the demands of a busy field season.*

## GEARING UP FOR SPRING AND SUMMER

### Essential Online Resources To Kick Off Your Field Season

- Selecting And Maintaining Equipment
- Field Crew Training Resources and Opportunities
- Management Planning and Decision-Making
- Prevention and Control
- Mobile Tools and Technology for Invasive Plant Management
- What's New in Weed Science

### New Series To Enhance Understanding Of Herbicides

### Proper Application Timing For Key Species

Find Inspiration:  
Invasive Plant Program Success Stories

Enter Annual  
Sweepstakes Drawing



CELESTINE DUNCAN

# GEARING UP for Spring and Summer

## Essential Online Resources to Kick Off Your Field Season

Invasive plant management involves more than just controlling weeds! Featured in this issue are online resources to help invasive plant managers prepare for a successful field season.



DAVE MARTIN



CATALINA ISLAND CONSERVANCY



FARREL HOOPES



### SELECTING, MAINTAINING & CALIBRATING EQUIPMENT

#### TIPS FOR SELECTING, MAINTAINING, AND CALIBRATING BACKPACK SPRAYERS

Learn key features to consider before purchasing a backpack sprayer, maintenance guidelines, and TechLine reader-reviews of backpack sprayer equipment.

>> <http://bit.ly/sprayerselection>

#### SELECTING ATV OR UTV HERBICIDE SPRAYER PLATFORMS FOR WILDLAND AND NATURAL AREA MANAGEMENT

We asked 10 public and private invasive plant management professionals which ATV and UTV herbicide application platforms they recommend and why. Learn about the equipment they endorse based on experience.

>> <http://bit.ly/atvutvplatform>

#### CALIBRATION GUIDELINES FOR SMALL (BACKPACK) AND LARGE VOLUME (ATV-, TRUCK-MOUNTED BOOM AND BOOMLESS) HERBICIDE SPRAYERS

How do I make the most of my herbicide spot treatments? How much herbicide do I put in my tank? The answers to these questions plus step-by-step procedures for calibrating your large and small volume sprayers are included in this article.

>> <http://bit.ly/techlinecalibration>

#### UNDERSTANDING PERFORMANCE OF YOUR ATV-MOUNTED BOOMLESS SPRAY NOZZLES

A summary of field studies by Robert Woolf and others at Kansas State University to evaluate the effectiveness of spray nozzles on all-terrain vehicles (ATVs).

>> <http://bit.ly/boomless>

*“Applying herbicides responsibly starts with you, the weed control professional.”*



### FIELD CREW TRAINING

#### TURN AROUND, LOOK AROUND

A presentation to use for spring training programs for private, commercial, and government herbicide applicators and staff. The downloadable PDF includes over 40 slides highlighting important guidelines applicators should follow before, during and after herbicide application.

>> <http://bit.ly/turnaroundlookaround>



Visit the **EVENTS AND OPPORTUNITIES** section of <http://techlinenews.com> for more online and in-person training opportunities.



## KEY REFERENCES FOR YOUR MANAGEMENT TOOLBOX

Techline editors recognize agencies, organizations, and individuals who have developed excellent resources to benefit invasive plant managers. The following are resources that support planning, decision-making, prevention and control efforts in managing invasive plants.

### PLANNING AND DECISION-MAKING

#### AN INVASIVE SPECIES ASSESSMENT PROTOCOL

NatureServe 2004

A tool for assessing, categorizing, and listing non-native invasive vascular plants according to their impact on native species and natural biodiversity in a large geographical area.

>> <http://techlinenews.com/articles/assessmentprotocol>

#### ADAPTIVE MANAGEMENT TEMPLATES AND PLANNING EXAMPLES

The Nature Conservancy

The resources on this page help with developing weed management plans, working with volunteer networks, creating useful communications and outreach programs, and more.

>> <http://techlinenews.com/articles/tncmanagementplans>

#### MEASURING AND MONITORING PLANT POPULATIONS

Elzinga et al. 1998

This technical reference describes the role of effective monitoring and provides a step-by-step overview of the entire monitoring process for single plant species.

>> <http://techlinenews.com/articles/blmmonitoring>

#### INVENTORY AND SURVEY METHODS FOR NONINDIGENOUS PLANT SPECIES

Rew and Pokorny 2006

This book provides practical information on inventory and survey methods for sites of any size, staffing level, or budget and will help improve the relevance and accuracy of a nonindigenous plant species management program. Includes color photos, maps, and diagrams.

>> <http://techlinenews.com/articles/cipminventorysurvey>

### PREVENTION AND CONTROL

#### PREVENTING THE SPREAD OF INVASIVE PLANTS: BEST MANAGEMENT PRACTICES FOR LAND MANAGERS

California Invasive Plant Council 2012

This manual presents a set of voluntary guidelines and ready-to-use checklists to help those managing wildlands in California to prevent the accidental spread of terrestrial invasive plants.

>> <http://techlinenews.com/articles/calipcpreventionbmps>

#### WEED CONTROL IN NATURAL AREAS IN THE WESTERN UNITED STATES

UC Davis Weed Research and Information Center 2013

Fifteen authors led by Dr. Joe DiTomaso of UC Davis compiled information on control methods for 340 species in 13 western states, covering rangelands, grasslands, pastures, riparian and aquatic areas.

>> <http://techlinenews.com/articles/ucdaviscontrolhandbook>



If you have developed a publication, guide, plan, training course, or other resource that would benefit other land managers, please share! We will feature your resource in the [RESOURCES AND LINKS](#) section of <http://techlinenews.com>



## POPULAR DOWNLOADS

[WWW.TECHLINENEWS.COM](http://WWW.TECHLINENEWS.COM)



**INVASIVE PLANT MANAGEMENT WITH MILESTONE® AND OTHER HERBICIDES**

>> <http://bit.ly/milestoneguide>



**WOODY PLANT CONTROL IN NORTHERN PRAIRIES**

>> <http://bit.ly/woodyplantcontrol>



**SALT CEDAR AND RUSSIAN OLIVE MANAGEMENT**

>> <http://bit.ly/scro2011>



**NATIVE FORB AND SHRUB TOLERANCE TO MILESTONE® HERBICIDE**

>> [http://bit.ly/techline\\_tolerance](http://bit.ly/techline_tolerance)

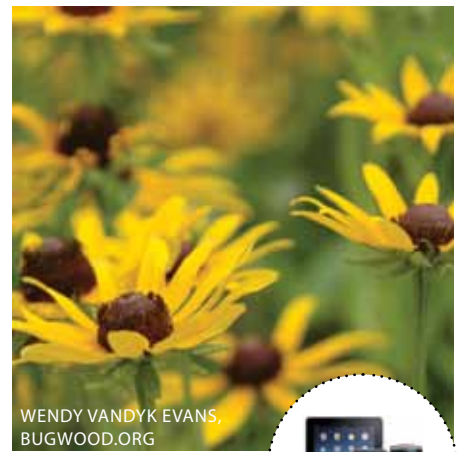
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ROD LYM



ROD LYM



WENDY VANDYK EVANS,  
BUGWOOD.ORG



## WHAT'S NEW IN WEED SCIENCE

New, innovative, and proven science-based information provides a solid foundation for making management decisions. The following are recent journal articles exploring management strategies, control methods, and impacts on non-target species.

### EVALUATING ALTERNATIVE WEED MANAGEMENT STRATEGIES FOR THREE MONTANA LANDSCAPES

*Frid et al. 2013. Invasive Plant Science and Management: January-March, Vol. 6:48-59.*

Models of invasive plant spread and control provide a useful way to assess the performance of alternative management strategies and budget levels across broad temporal and spatial scales.

>> <http://techlinenews.com/articles/frid-2013-ipsm>

### HAND PULLING FOLLOWING MOWING AND HERBICIDE TREATMENTS INCREASES CONTROL OF SPOTTED KNAPWEED (*CENTAUREA STOEBE*)

*MacDonald et al. 2013, Invasive Plant Science and Management: October-December, Vol 6:470-479*

The interactive effects of mowing, herbicides, hand pulling and burning on spotted knapweed were studied in western Michigan.

>> <http://techlinenews.com/articles/macdonald-2013-ipsm>

### EFFECT OF AMINOPYRALID ON DESIRABLE FORB SPECIES

*Mikkelsen and Lym. 2013, Invasive Plant Science and Management: January-March, Vol. 6:30-35.*

A greenhouse study was initiated to evaluate the tolerance of nine native prairie forbs to fall-applied aminopyralid (Milestone® herbicide).

>> <http://techlinenews.com/articles/mikkelsen-2013-ipsm>

Explore more articles like these in the **RESEARCH AND TECHNOLOGY** section of <http://techlinenews.com>

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## MOBILE TOOLS & TECHNOLOGY

### YOU CAN TAKE IT WITH YOU: TECHLINE ON THE GO

Did you know you can take TechLine and all its handy tools and information wherever you go? Your handheld mobile device can be used to display, share, and organize your favorite TechLine articles and publications on the go.

>> <http://bit.ly/techlineonthego>

### APPS AIDING HERBICIDE APPLICATION AND EARLY DETECTION EFFORTS

Try two simple mobile device applications (apps) designed to help with calculating tank mixes and logging spray records.

>> <http://bit.ly/applicationapps>

Species identification, information about biology and ecology, distribution and location, management recommendations, sprayer calibration and mixing, application records, perimeter mapping...There's an App for that.

>> <http://bit.ly/edrapps>

Explore more articles like these in the **TIPS AND TOOLS** section of <http://techlinenews.com>

— NEW SERIES —



## Understanding Herbicides

*Articles exploring the science and skill behind effective herbicide use.*

With spring just around the corner, now is the time to improve your skills and expand your understanding of the science behind selecting, applying, and assessing the effects of herbicides. TechLine's new series on "Understanding Herbicides" aims to provide invasive plant managers with tips and resources to do just that.

### 1. EFFECTIVE HERBICIDE USE STARTS WITH THE LABEL 2/2014

Highlights the importance of reading AND understanding the herbicide product label.

>> <http://bit.ly/understandinglabels>

### 2. INTRODUCTION TO HERBICIDE FORMULATIONS 3/2014

Provides a basic overview of the different types of herbicide formulations and their advantages and disadvantages in terms of effectiveness and ease of use.

>> <http://bit.ly/herbicideformulations>

### 3. NEW! FACTORS AFFECTING HERBICIDE PERFORMANCE 4/2014

>> <http://bit.ly/herbicideperformance>

### 4. SURFACTANTS AND ADJUVANTS COMING 5/2014



Coming in May!

>> <http://bit.ly/adjuvants>



# Factors Affecting Herbicide Performance

Herbicides must overcome biological and environmental barriers to control a target plant. Read this full article online to learn about the general processes by which herbicides control invasive plants and environmental factors that can influence herbicide performance.

#### You will learn how:

- Herbicides are taken up (absorbed) and moved (translocated) by plants.
- Herbicide mode of action can be an important factor in selecting the proper herbicide to meet your management objectives.
- Environmental conditions before, during, and after herbicide application influence absorption and translocation within the plant.
- High and low temperature extremes can affect plant metabolism and reduce effectiveness of herbicides.
- Sunlight can either increase translocation and action of herbicides, or degrade herbicides on the leaf or soil surface.
- Rain following application may or may not affect results depending on how rapidly an herbicide is absorbed.
- Foliar area and leaf surface characteristics influence herbicide interception and absorption.
- Effectiveness of herbicide treatments can be evaluated.

#### READ FULL ARTICLE AT:

>> <http://bit.ly/herbicideperformance>



For more articles like these, visit the **HERBICIDE INFORMATION** page at <http://techlinenews.com>

- Technical Facts and Answers to Frequently Asked Questions About Milestone® Herbicide
- Answers to Frequently Asked Questions About Control of Saltcedar and Russian Olive with Garlon® 3A and Garlon 4 Ultra
- Herbicide Selectivity in Invasive Plant Management
- Aminopyralid Technical Fact Sheet
- Labels, MSDS and Additional Information

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# PROPER APPLICATION TIMING MAXIMIZES INVASIVE PLANT CONTROL

**SPRING AND EARLY SUMMER** can be excellent times to control actively growing invasive plants with herbicides. Applying herbicides to the target plant at the optimum growth stage is important to maximize control. The following guidelines provide information on the best application timing and rate to control key invasive plants.



## CANADA THISTLE (*CIRSIUM ARVENSE*)

Late spring and early summer applications of Milestone® on Canada thistle should be made after all plants have emerged and basal leaves are expanded. It is better to wait until some of the plants are at the bud growth stage to be sure that all plants are emerged before applying Milestone at 5 to 7 fluid ounces per acre (fl oz/A). Use the 7 fl oz/A rate at later growth stages.

>> <http://bit.ly/canadathistle>



## SPOTTED AND DIFFUSE KNAPWEED (*CENTAUREA STOEBE* AND *C. DIFFUSA*)

Milestone at 5 to 7 fl oz/A may be applied any time during the growing season when plants are actively growing. Applications made during the late bud to bloom stage will not stop seed production the year of treatment.

>> <http://bit.ly/spottedknapweed>



## RUSSIAN KNAPWEED (*ACROPTILON REPENS*)

Applications of Milestone at 5 to 7 fl oz/A should be delayed until Russian knapweed has bolted and is in the early bud to flower growth stage; applications can be made through the fall. It is important to remember that herbicide efficacy symptoms do not always show on Russian knapweed the season the treatment is made.

>> <http://bit.ly/russianknapweed>



## LEAFY SPURGE (*EUPHORBIA ESULA*)

The optimum time to treat leafy spurge with most herbicides is at the true flower growth stage, which is after the yellow bract is formed (late spring to early summer). Apply Tordon® 22K alone at 1 to 2 quarts of product per acre (qt/A) at true flower. When applying Tordon 22K at rates less than 1 qt/A add 2,4-D at 1 qt/A (1 lb ae/A). The addition of OverDrive herbicide at 4 oz/A may improve leafy spurge control by up to 20%. For suppression of leafy spurge on sensitive sites apply a tank mix of 7 fl oz/A Milestone® plus 1 qt/A 2,4-D plus 4 oz/A of OverDrive.

>> <http://bit.ly/leafyspurge>



## BIENNIAL THISTLES

- BULL THISTLE (*CIRSIUM VULGARE*)
- MUSK THISTLE (*CARDUUS NUTANS*)
- PLUMELESS THISTLE (*CARDUUS ACANTHOIDES*)

Milestone at 3 to 5 fl oz/A can be applied in spring and early summer from rosette to early flower growth stage. Use the 5 fluid ounce rate at the late bolt to early flower growth stage.

>> <http://bit.ly/biennialthistle>



## KNOTWEEDS (*FALLOPIA* spp.)

Preventing knotweed establishment is the highest priority for management. Once established, eradication is extremely difficult. Optimum suppression of invasive knotweeds with Milestone herbicide at 9 to 14 fl oz/A is obtained when applications are made to plants that are at least 3 to 4 feet tall. On Bohemian knotweed, total application volume of 100 gallons per acre or greater increased control. Multiple applications will be necessary to provide long-term control.

>> <http://bit.ly/knotweeds>



Explore more articles like these by clicking the **CONTROL RECOMMENDATIONS** category at <http://techlinenews.com>

- Invasive Plant Management with Milestone and Other Herbicides: A Practical Guide for Natural Area Managers  
>> <http://bit.ly/milestoneguide>
- Coming this SUMMER, more control recommendations for key species. Make sure your email subscription is up to date!  
>> <http://techlinenews.com/subscribe>

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## INVASIVE PLANT MANAGEMENT SUCCESS STORIES

**SOMETIMES MANAGING INVASIVE PLANTS IS STRAIGHTFORWARD;** but managers are often faced with unique biological, environmental, topographical, social, or tactical challenges. Merging good science with practical on-the-ground application sometimes demands a creative approach.

The following articles from past TechLine issues showcase inspiring stories about invasive plant managers in the western United States who are thinking outside the box. **Learn from their innovative strategies, partnerships, management methods, and technology to help solve common and unique invasive plant problems.**

### STILL INSPIRING: FROM THE SUCCESS STORY ARCHIVES



#### BIGHORN SHEEP AND ELK HABITAT ENHANCEMENT PROJECT

AUGUST 2010

Stucky Ridge, a series of grassy, wind-blown benches and timbered gulches is located near Anaconda in southwestern Montana. When infestations of Spotted knapweed (*Centaurea stoebe*) and other invasive weeds threatened big game habitat in the area, a partnership was formed between federal, state, and county agencies, and private organizations. Partners agreed to cooperate on a five-year, large-scale habitat enhancement project, focusing treatments to protect areas not infested by noxious weeds and shifting vegetation toward the native bunchgrass community.

>> <http://bit.ly/stuckyridge>



#### COLLABORATION & OUTREACH CREATES SUCCESSFUL INVASIVE PLANT PROGRAM

APRIL 2010

A mutually beneficial partnership between weed scientists at Colorado State University and Larimer County Noxious Weed Program is a powerful tool for building local and state-wide support for invasive plant management. The University offers the county expertise and guidance to develop the most accurate management recommendations for invasive plants, and the county weed district helps university weed scientists locate research sites and facilitate field research. Read more about Larimer County Weed District's cooperative projects on biological control of invasive plants, herbicide field trials and research on degraded site rehabilitation.

>> <http://bit.ly/larimercollaboration>



#### PARTNERSHIPS PROVIDE SOLUTIONS TO INVASIVE PLANT MANAGEMENT

APRIL 2011

Located on the southeast flank of the Uinta Mountains, Dinosaur National Monument encompasses over 210,000 acres on the Colorado and Utah border. The invasive plant management program for the Monument is built upon strong partnerships formed with volunteers and Utah State University Weed Science Program. Weed inventory data were used as a basis for developing the Dinosaur National Monument Invasive Plant Management Plan. Utilizing time-repeated weed inventory data, managers evaluated the effects of applied management on targeted weed species, and compared changes in weed populations between treated and non-treated areas.

>> <http://bit.ly/dinosaurnationalmonument>  
(Research update available!)



Read more articles like these by clicking on the **SUCCESS STORIES** category at <http://techlinenews.com>

Download print-friendly PDFs of individual articles or full newsletter issues. Past hardcopy newsletter issues are available on a limited basis.

### COMING THIS FALL



#### CONSERVATION PRACTICE ENHANCES HABITAT FOR EASTERN COLLARD LIZARD

TechLine's "Fall Journal 2014" will highlight more invasive plant management success stories and fall management tips, and is delivered in both print and electronic formats in late summer (August 2014).



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## Tell Us How We're Doing

**Help TechLine Invasive Plant News editors give you the information you need to improve your weed management program!**

Your feedback about TechLine materials is important to us and will help us develop information that is accurate, timely, and relevant to you.

**Kindly submit your survey by 6/1/2014.**

>> <http://bit.ly/techlinesurvey2014>

### **INCREASE YOUR CHANCES TO WIN!**

Answer one or more TechLine survey for the opportunity to enter an annual drawing for a \$200 prize. Your name is entered into the drawing EACH TIME you complete a survey.

Surveys remain open indefinitely, so feel free to complete as many as you wish. One response per survey is eligible for annual prize drawings. Drawing is held in January.

Visit the **SURVEYS** section of <http://techlinenews.com> to access all surveys.



### **CALIFORNIA AG COMMISSIONER WINS \$200 GIVEAWAY**

**Congratulations to MARC LEA for being randomly selected from a pool of respondents to TechLine's monthly surveys.**

After consulting two TechLine articles on selecting backpack sprayers and reader reviews, Marc selected a new backpack sprayer to help with his invasive plant management program.

Marc is a Deputy Agricultural Commissioner with the San Luis Obispo Department of Agriculture where he supervises a number of different program areas, including the noxious weed control program. He has coordinated the San Luis Obispo County Weed Management Area since the organization's inception in 2000. Congratulations, Marc -- and thanks to other readers who responded to our monthly surveys.

## Are You Missing Out?

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