USDA

United States Department of Agriculture

Herbaceous Weed Control

Iowa Job Sheet

Natural Resources Conservation Service
Des Moines, Iowa

Iowa Conservation Practice 315
September 2016

Definition

Herbaceous weed management includes the removal or control of undesirable herbaceous (non-woody) plants including invasive, noxious and prohibited species.

Invasive species are a species of plant that has been introduced or moved by human activities to a location where they did not naturally occur. Invasive species may pose economic, environmental or human health concerns.

Garlic Mustard

Leafy Spurge

Purpose

This activity will encourage the control of herbaceous plants including those that are invasive and noxious in non-cropland areas, including grazing lands and pastures. Controlling these plants will enhance accessibility, quantity and quality of forage and/or browse, restore or release native or desired plant communities and wildlife habitats, protect soil and control erosion and protect property from wildfires.

Conditions Where Practice Applies

Use this activity on all non-cropland areas where removal or control of herbaceous plants is desired.

General Specifications

Before initiating an herbaceous weed control treatment, it is important to identify the target plant species and populations as well as any non-target plants that are to be maintained in the stand.

Understanding the physiology of both target and non-target plants is important in determining the treatment timing and method(s). If possible, avoid treatments when non-target species are susceptible to damage. This is particularly important when managing for diverse natural plant communities, i.e. areas with a high density of native forb species.

Effective treatment methods include mechanical (cutting or specialized machinery), chemical, manual (pulling by hand), biological, and prescribed burning. The best results are often achieved by using a combination of methods, such as (cutting + herbicide application) or (cutting + herbicide application + prescribed burning). If using prescribed fire as a management tool, follow an approved burn plan.

Operation

Areas where control measures have been taken will be monitored annually to determine if re-introduction of the species into the site has occurred. Any re-growth of the targeted undesirable species into the treated area(s) will be controlled with follow-up treatments.

The operator will develop a safety plan for individuals exposed to chemicals, including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control

center. The National Pesticide Information Center (NPIC) telephone number in Corvallis, Oregon, may also be given for non-emergency information: **1-800-858-7384**

Monday to Friday

8:30 a.m. to 6:30 p.m. Central Standard Time

The national Chemical Transportation Emergency Center (CHEMTRAC) telephone number is: 1-800-424-9300.

- Follow label requirements for mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, and reservoirs.
- Post signs, according to label directions and/or federal, state, tribal, and local laws, around fields that have been treated. Follow restricted entry intervals.
- Dispose of herbicide and herbicide containers in accordance with label directions and adhere to federal, state, tribal, and local regulations.
- Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). MSDS and herbicide labels may be accessed on the Internet at: http://www.greenbook.net/.
- Calibrate application equipment according to recommendations before each seasonal use and with each major chemical and site change.
- Replace worn nozzle tips, cracked hoses, and faulty gauges on spray equipment.
- Maintain records of plant management for at least two years. Herbicide application records shall be in accordance with USDA Agricultural Marketing Service's Pesticide Recordkeeping Program and state-specific requirements.

Maintenance

Following initial application, some regrowth, resprouting, or reoccurrence of herbaceous weeds may be expected. Spot treatment of individual plants or areas needing re-treatment should be completed as needed when weed vegetation is most vulnerable to desired treatment procedures.

Review and update the plan periodically in order to incorporate new IPM technology; response to grazing management and complex weed population changes; and avoid the development of weed resistance to herbicide chemicals.

Specifications

Site-specific requirements are listed on the specifications sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide and the Herbaceous Weed Control practice standard (315).

Prepare plans and specifications for each field or treatment unit according to the criteria included in this standard. At a minimum, a herbaceous weed control practice plan shall include:

1. Goals and objectives statement.
2. Plan map and soil map for the site.
3. Pre-treatment cover or density of the target plant(s) and the planned post-treatment cover or density and desired efficacy.
4. Maps, drawings, and/or narratives detailing or identifying areas to be treated, pattern of treatment (if applicable), and areas that will not be disturbed.
5. A monitoring plan that identifies what shall be measured (including timing and frequency) and the changes in the plant community (compare with objectives) that will be achieved.

PLANS AND SPECIFICATIONS - HERBACEOUS WEEDS IN NON-CROPLAND

General Recommendations and Guidance: (Provide detailed, site-specific information as needed)

Disposal: If needed, plan how treated material will be disposed before beginning any treatment methods. With cutting applications, plant material without mature seeds can be left on site with little to no chance of adding to the seed bank. If seeds are present destroy plant material by burning or bag and remove from site for disposal. With pulling methods, ensure all roots are exposed and not in contact with the soil surface to prevent re-rooting.

If O&M includes prescribed burning, consider methods to reduce fuel loads such as piling debris for burning when there is snow cover on the ground or shortly after a rain event. For natural community restoration, do not use heavy equipment to push and pile the treated material.

Recommendations for disposal of treated material:

Herbicides: If herbicides are used, follow label rates, directions, and manufacturer recommendations. Use the current version of Win-PST to determine Soil/Pesticide Interaction Hazard Ratings. Each Hazard Rating category will have an associated minimum Mitigation Index Score Level that must be attained. Use the current Iowa Integrated Pest Management (IPM) conservation practice standard (Code 595) to determine if planned conservation practices provide an adequate level of mitigation. Use Appendix Table 2 in the Iowa Agronomy Technical Note 37: "Pest Management in the Conservation Planning Process" to select additional IPM techniques if planned conservation practices are not adequate. Be sure to apply herbicide when the target plant is most susceptible to the chemical and the chosen treatment method. When choosing herbicides, review leaching, runoff potential, setback requirements, persistence, and toxicity ratings of chemical formulations. Adhere to all application setbacks directed by chemical label for use in proximity to water bodies and other environmentally sensitive areas. Mention of trade names for plant control chemicals is not an endorsement for a particular product.

Biological Control: Sheep and/or goats can be used as an ecologically sound and economically viable alternative for biological brush control, especially if combined with other treatment methods. Site specific grazing plans will need to be developed that lists target species to control, owner's objectives, number and type of grazing animal to be used as well as timing, duration and frequency of each grazing event. Refer to Iowa Job Sheet: Brush Management with Goats.

Attach a map or aerial photo that shows:

- Unit Boundaries (Field or Stand)
- Treatment Area (If Different than Unit)
- Planned Treatment Year (If Applicable)
- Location & Description of Sensitive Resources
- Location & Description of Setbacks

Description of each Unit (field or stand) that requires control

Unit Number	Unit Acres	Undesirable target plant specie(s) to be controlled	Average % Canopy Cover	Current land use and dominant desirable species

Goal and Objective: _____

Schedule of Treatments

Unit Number	Average % Canopy Cover[1]	Treatment (Year)	Treatment (Number)	Target Specie(s) to be Controlled	Treatment Method(s) (Cutting, Chemical, Prescribed Burning, Pulling, etc.)[2]	Timing of Treatment(s) or Plant Growth Stage for Best Effective Control
Example Unit 1	*75%*	*2012*	*1*	*Serecia Lespezeda*	*Chemical - Broadcast or blanket foliar chemical treatment across entire area.*	*June - Sept., after stem has breached, but prior to seed development*
Example Unit 2	*30% regrowth*	*2013*	*2*	*Same*	*Mechanical - Brush hog treatment area*	*Late June to early July, depending on regrowth, but prior to seed development*
Example Unit 3	*30% regrowth*	*2013*	*3*	*Same*	*Chemical - Spot spray, foliar application*	*Allow adequate regrowth after mechanical treatment and spray prior to seed development*

1. *Average % Canopy Cover (for the Unit) of target specie(s) will be used to determine level of the infestation within the treatment unit boundary. Estimate the average % cover over the entire treatment unit. The Optional Worksheet for determining % Canopy Cover of Target Species may be used for an inventory procedure. Treatment will be needed over the entire area of infestation regardless of percent cover of the target species in different areas of the unit.*
2. *Include specific application method(s), equipment type, herbicide type and rate, and timing of application(s). Provide reference documentation if methods, herbicide rate, and timing are provided through an alternative fact sheet, management plan, information sheet, study result, or other credible alternate source which is specific for control of the target species.*

Additional Specifications and Post-Treatment Goals:

I certify that the above information meets NRCS specifications and design and installation.

NRCS Signature _____ Date _____

I certify that this practice has been installed according to the Standards and Specifications.

Producer _____ Date _____

E. Line Intercept Method

1. *General Description* The Line Intercept method consists of horizontal, linear measurements of plant intercepts along the course of a line (tape). It is designed for measuring grass or grass-like plants, forbs, shrubs, and trees. The following vegetation attributes are monitored with this method:

   - Foliar and basal cover
   - Composition (by cover)

   It is important to establish a photo plot (see Section V.A) and take both close-up and general view photographs. This allows the portrayal of resource values and conditions and furnishes visual evidence of vegetation and soil changes over time.

2. *Areas of Use* This method is ideally suited for semiarid bunchgrass-shrub vegetation types.

3. *Advantages and Limitations* The Line Intercept method is best suited where the boundaries of plant growth are relatively easy to determine. It can be adapted to sampling varying densities and types of vegetation. It is not well adapted, however, for estimating cover on single-stemmed species, dense grassland situations, litter, or gravel less than 1/2 inch in diameter. It is best suited to estimating cover on shrubs.

4. *Equipment* The following equipment is needed (see also the equipment listed in Section V.A, page 31, for the establishment of the photo plot):

   - Study Location and Documentation Data form (see Appendix A)
   - Line Intercept form (see Illustration 12)
   - Hammer
   - Permanent yellow or orange spray paint
   - Two stakes: 3/4 - or 1-inch angle iron not less than 16 inches long.
   - Two tapes: 100- or 200-foot, delineated in tenths and hundredths, or a metric tape of the desired length
   - Compass
   - Steel post and driver

5. *Training* A minimum of training is needed to make sure the examiners understand how to lay out baselines and transects and how to make the measurements. The examiner must also be able to identify the plant species.

6. *Establishing Studies* Careful establishment of studies is a critical element in obtaining meaningful data (see Section III).

   a Site Selection The most important factor in obtaining usable data is selecting representative areas (critical or key areas) in which to run the study (see Section II.D). Study sites should be located within a single plant community within a single ecological site. Transects and sampling points need to be randomly located within the critical or key areas (see Section III).

b Pilot Studies Collect data on several pilot studies to determine the number of samples (transects or observation points) and the number and size of quadrats needed to collect a statistically valid sample (see Section III.B.8).

c Number of Transects Establish the minimum number of transects to achieve the desired level of precision for the key species in each study site (see Section III.B).

d Length of Transect The length of a transect is based on the density and homogeneity of the vegetation. If the vegetation is sparse, a longer transect is needed. Transects may be any length (eg. 100 feet, 200 feet, or even longer).

e Study Layout Line Intercept data can be collected using either the baseline or linear study design described in Section III.A.2 beginning on page 8. The baseline technique is the recommended study design.

(1) The study location stake is placed at the beginning of the baseline. After determining the bearing of the study, a stake is placed at the end of the baseline. Transects are run perpendicular to and at random distances along the baseline. Transect location stakes are placed at the beginning and end of each transect. The distance between the stakes dependents on the length of the transect. The height of the stakes depends on the height of the vegetation. (Directions for randomly selecting the location of transects to be run off of a baseline using random number tables are given in Appendix D).

Transect location stakes may be left in place as permanent markers or removed at the conclusion of the study. Permanently marking transects will result in greater power to detect change.

(2) Stretch the transect tapes between stakes as close to the ground as possible, with the zero point of the tape aligned on the baseline (the beginning point of the transect). Do not allow vegetation to deflect the alignment of the tape.

f Reference Post or Point Permanently mark the location of each study with a reference post and a study location stake (see beginning of Section III).

g Study Identification Number studies for proper identification to ensure that the data collected can be positively associated with specific sites on the ground. (see Appendix B).

h Study Documentation Document pertinent information concerning the study on the Study Location and Documentation Data form (see beginning of Section III and Appendix A).

7. *Taking Photographs* The directions for establishing photo plots and for taking close-up and general view photographs are given in Section V.A.

8. *Sampling Process* In addition to collecting the specific studies data, general observations should be made of the study sites (see Section II.F).

Proceed down the tape stretched along the transect line and measure the horizontal linear length of each plant that intercepts the line. Measure grasses and grass-like

plants, along with rosette-forming plants, at ground level. For forbs, shrubs, and trees, measure the vertical projection of the foliar cover intercepting one side of the tape. Be sure not to inadvertently move the tape to include or exclude certain plants. If the measurements are made in 10ths and 100ths of feet, the totals are easily converted to percentages. The measurements are recorded by species on the Line Intercept form (Illustration 12).

9. *Calculations* Make the calculations and record the results on the Line Intercept form (see Illustration 12).

a Cover

(1) Calculate the percent cover of each plant species by totaling the intercept measurements for all individuals of that species along the transect line and convert this total to a percent.

(2) Where the measurements are made in 10ths and 100ths of feet along a 100-foot transect, the totals for each species are the cover percentages.

(3) Calculate the total cover measured on the transect by adding the cover percentages for all the species. This total could exceed 100% if the intercepts of overlapping canopies are recorded.

b Composition With this method, species composition is based on the percent cover of each species. Calculate percent composition by dividing the percent cover for each plant species by the total cover for all plant species.

10. *Data Analysis* It is important to realize that each transect is a single sampling unit. For trend analysis permanent sampling units are suggested. If permanent transects are monitored, use the appropriate paired analysis technique. Use either a paired t-test or the nonparametric Wilcoxon signed rank test when testing for change between years. When comparing more than two sampling periods, use repeated measures ANOVA. If the transects are not permanently marked, use the appropriate nonpaired test.

11. *References*

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Buckner, D.L. 1985. Point-Intercept Sampling in Revegetation Studies: Maximizing Objectivity and Repeatability. Paper presented at American Society for Surface Mining and Reclamation Meeting, Denver, CO. 1985.

Canfield, R.H. 1941. Application of the line interception method in sampling range vegetation. J. Forestry 39:388-394.

Canfield, R.H. 1944. Measurement of grazing use by the line intercept Method. Jour. For. 42(3):192-194

Hanley, Thomas A. 1978. A comparison of the line-interception and quadrat estimation methods of determining shrub canopy coverage. J. Range Manage. 31:60-62.

Kinsinger, Floyd E., Richard E. Eckert, and Pat 0. Currie. 1960. A comparison of the line-interception, variable-plot, and loop methods as used to measure shrub-crown cover. J. Range Manage. 13:17-21.

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Line Intercept

Page ____ of ____

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Line Length	Transect Location

NOTES (Use other side or another page, if necessary)	Grass Species							Forb Species						Shrub Species					NOTES
																			Totals
Totals																			
% Cover																			
% Comp																			100%

Illustration 12

Line Intercept

Page 1 of 1

Study Number	Date	Examiner	Allotment Name & Number	Pasture
12N-37W-19-03	10/3/95	Jack Straw	Cow Gulch 20111	

Line Length: 100 feet

Transect Location: 3 miles east of Potter's Corral on north side of road.

NOTES (Use other side or another page, if necessary)	Grass Species							Forb Species						Shrub Species					NOTES
	BOCU	BOGR2	BOHI2	KOCR	SIHY			HYRI	PSORA	COWR2				CEGR	JUNIP				
100 ft. tape	.42	.10	.32	.11	.06			.52	2.04	.55				3.40	.06				
	.20	.02	.25	.02	.02			.46	1.32	.22				.13	2.13				
	.26	.03	.05	.12	.02			1.47	.59					4.90	.07				
	.03	.01		.08	.04			.28	3.30					.72	.02				
	.17	.10			.05			.80	.07					.14					
	.26	.29			.26			.05						1.02					
	.22	.24			.04														
	.22	.14			.03														
	.34	.10			.01														
	.32	.17			.19														
	.02	.12			.02														
	.02	.18			.35														
	.10	.13																	
	.02	.14																	
	.16	.04																	
	.18	.16																	
	.10	.05																	
	.14	.27																	
	.06	.03																	
	.03	.46																	
	.04	.07																	
	.10	.38																	
	.02	.12																	
	.03	.10																	
	.02	.11																	
	.16	.03																	
		.36																	
		.68																	
																			Totals
Totals	3.64	4.63	.62	.33	1.09			3.58	7.32	.77				10.31	2.28				
% Cover	4	5	1	0	1			4	7	1				10	2				
% Comp	11	14	3	—	3			11	20	3				29	6				100%

Illustration 12