University of Nevada Cooperative Extension

Fact Sheet-11-77

# Needs Assessment for Noxious Weeds in Pershing County: Part 1 of 5 – Problem Weeds and Approaches and Methods of Control

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**Introduction**

Located in northwestern Nevada, Pershing County has 135 farms and ranches covering more than 244,249 acres, excluding public lands in BLM-administered grazing allotments. The average farm size is 1,809 acres (2008 USDA Agricultural Census).

Alfalfa hay, alfalfa seed and small grains are the principle crops. Cattle, sheep and goats are the primary livestock species raised in the county. Pershing County is home to Nevada's largest cattle feedlot. Agricultural production for this period (2008) was valued at nearly $63 million, but the economic multiplier effect of this production indicates that total economic impact on the county and state is much greater (Harris et al. 1998).

The local economy is heavily dependent on mining, agriculture and recreation. In addition, several large transportation and utility corridors cross the county. Each of these land uses may facilitate the establishment and spread of noxious and invasive weeds.

Noxious and invasive weeds have the potential to reduce both crop yield and the amount of forage available to livestock on both public and private grazing lands (Duncan and Clark 2005). Substantial reductions in crop and livestock production could reduce the income of agricultural producers. The agricultural multiplier data strongly suggest that reduced agricultural income would have a substantial negative impact in the local economy. Furthermore, noxious weeds can significantly reduce land values. A classic study about the Brooks Ranch in North Dakota found that once noxious weeds heavily infested the ranch, its sale took 13 years and the final price was 60 to 80 percent less per acre than for nearby areas without weeds (Weiser 1997).

In 2006, the University of Nevada CooperativeExtension (UNCE) published the results of a statewide needs assessment about the general research and education needs of agricultural producers (Singletary and Smith 2006). Statewide, 83 percent of respondents stated that weed identification and control methods were a high priority. For Pershing County, 74 percent of the respondents identified weed identification and weed control as a moderately high to high priority. The 2006 survey was too general to identify the specific education and research programs needed by agricultural producers for noxious weeds, and it did not address weed issues on public lands, a significant resource for Nevada's livestock industry. UNCE, therefore, could not develop a well-defined, issue-specific education and research program for weed management.This information shortfall was addressed in 2008 when UNCE conducted a statewide needs assessment for noxious weeds.

The statewide results were published in 2010 in a UNCE Special Publication (Creech et al. 2010). To address differences between Pershing County and Nevada's agricultural producers, issues about noxious and invasive weeds in Pershing County are being presented in a series of five fact sheets focused upon the following themes: 1) problem weeds and the approaches and methods used for their control; 2) problems and obstacles to weed management; 3) the spread, prevention, and detection of weeds; 4) herbicides and the criteria used for their selection and timing of use; and 5) priority research and outreach programs. This fact sheet discusses Pershing

County's problem weeds and the approaches and methods of weed control. Results are compared for agricultural producers from Pershing County, agriculturalists from the remainder of Nevada and from public land weed managers.

**Survey Methods**

A 93-question survey targeted the specific weed management issues faced by Nevada's agricultural producers and public land managers. The survey was sent to all agricultural producers who reported at least $1,000 of annual income from agriculture. The specific methodology employed and initial data analysis is described in detail in the recently published statewide assessment (Creech et al. 2010). Additional data analysis presented in this paper evaluates if the distribution of responses were similar among Pershing County's agricultural producers, Nevada's agricultural producers and public land weed managers. For the reported P-values, the smaller the number, the greater the probability the two distributions are different. The closer the P-value is to 1.0, the greater the probability the two distributions are similar.

**Results**

**Problem Weeds**

Table 1 shows how agricultural producers and public land managers rank the problematic weeds in Nevada. In Pershing County, the most problematic weeds identified by agricultural producers, in descending order, are Russian knapweed , perennial pepperweed (tall whitetop), downy brome (cheatgrass),hoary cress (short whitetop) and foxtail barley.

Nevada agricultural producers also identified hoary cress (short whitetop), downy brome (cheatgrass), perennial pepperweed (tall whitetop), and foxtail barley as four of the top five problematic weeds. However the distribution of the responses for problematic weeds was not very similar (P=0.03) for both groups of agricultural producers.

In comparing the responses of Pershing County agricultural producers prioritization of problematic weeds with Nevada public land managers, again both groups identified the following weeds as problematic, however the percentage of responses to the prioritization of the weeds indicated that there was significant differences between the Pershing County agricultural group and weed managers on public lands (P=0.00).

**Approaches and Methods of Weed Control**

The four basic components of a weed management program are weed prevention, detection, and control, and the establishment of desired vegetation to out-compete weeds and prevent them from invading or re-establishing on a site. Table 2 shows how agricultural producers and public land managers rank approaches and methods of weed control in Nevada. Agricultural producers in both Pershing County and across Nevada, and public land weed managers, all ranked each management approach as important, in roughly the same proportion. There was no statistical difference (P=1.00) in the distribution of their responses.

For methods used to control weeds, there was significant difference in the distribution of responses between agricultural producers in Pershing County and Nevada (Table 2: P=0.16). Pershing County producers preferred the following methods for weed control, in descending order: herbicides, tillage, controlled burning, maintaining crop density or row spacing for weed control and mowing. There was a significant difference in the distribution of responses between both groups of agricultural producers and weed managers on public lands ($P \leq 0.007$).

All three groups of weed managers ranked herbicides as the most important method of weed management. Nevada agricultural producers ranked controlled burning as the second most important method of weed management. Public land weed managers ranked fire considerably lower. Other weed control methods ranked lower by public land weed managers than agricultural producers were mowing, grazing and tillage. The public land managers ranked planting competitive species, selecting planting dates favorable to desired species and using insects to control weeds substantially more important than the agricultural producers.

**Discussion**

The general similarity in the ranking of problematic weeds by agricultural producers in

both Pershing County and Nevada suggests that weed issues on agricultural land in Nevada have more similarities than differences. Two exceptions were Russian knapweed and Russian thistle. Russian knapweed was ranked as the No. 1 problematic weed by Pershing County agricultural producers, as compare to being ranked ninth by Nevada agricultural producers. Russian thistle was ranked the seconded most problematic weed by Nevada agricultural producers, compared to being ranked sixth by the Pershing County producers.

Both groups of agricultural producers and the public land weed managers ranked problematic weeds differently because they manage different types of land and produce different outputs (crops vs. resources). Each group must address invasive noxious weeds but public land weed managers seldom encounter the agronomic weeds associated with field crops. The focus of public land weed managers is toward invasive noxious weeds that affect ecosystem processes and natural resources on the wildlands they manage.

One suite of weeds that affects both agricultural groups and public land weed managers is the deep-rooted perennial weeds. In Pershing County, these include hoary cress, perennial pepperweed and Russian knapweed. These weeds readily invade meadow and riparian systems with seasonally high water tables, and areas with irrigated forage crops, whether they are hayed, pastured or ungrazed.

All three weed management groups applied similar approaches to weed management, which includes scouting for weeds (P=1.00). It is important that all groups are able to identify weeds at an early stage of development in order to determine economic threshold levels, and to insure timely control of problem weeds.

For public land managers, the importance of scouting for weeds reflects the vast acreage they manage (millions of acres per BLM field office), the importance of relatively small and discrete high value resource sites (e.g., riparian areas, springs), and the very limited number of personnel dedicated to weed issues. Many offices have less than one full-time person dedicated to noxious weed issues.

Despite a similar distribution of responses by both agricultural groups for importance rankings for methods of weed control, differences exist between agricultural producers in Pershing County and the rest of Nevada. Pershing County agricultural producers were more likely to rank herbicides as being important. This probably reflects the larger median farm size in Pershing County (345 acres) compared to Nevada (51 acres with many under 9 acres), the abundance of perennial forage crops in Pershing County, and the niche markets that many smaller farms serve.

Agricultural producers in both Pershing County and Nevada, compared to public land weed managers, placed more importance on controlled burning, tillage and crop rotation for weed control. In essence, public land weed managers cannot apply the full suite of weed management tools commonly used in agronomic settings to many wildland situations. This reflects their very high ranking of herbicides as a weed control method.

Both groups of agricultural producers, compared to public land weed managers, placed much less importance upon planting desired species to compete with weeds, selecting planting dates favorable to crops or desired species, and using insects as a biocontrol. This reflects their different management situations. Agricultural producers harvest crops annually and they have better control over vital inputs such as water and nutrients than do public land managers. Agronomic crops often can compete with weeds if agricultural producers use appropriate integrated pest management methods of weed control. Public land weed managers must establish desired wildland species (native or introduced) within narrow windows of opportunity and without the control of many external process and/or inputs of resources. The vast landscapes they manage often are visited irregularly; thus, public land managers placed a higher importance rating for using insects as a method of weed control.

This fact sheet identified problematic weeds in Pershing Count and across the State of Nevada. In addition, it targeted nine specific weed management issues and is being used to prioritize the most important educational and research programs for UNCE faculty. The

results can also be used by other entities charged with weed management to prioritize their activities.

**References**

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**Table 1.** Most problematic weeds on lands managed by agricultural producers (n=746) in Nevada, agricultural producers in Pershing County (n=38), and weed managers on public lands (n=52). The values represent the percentage of respondents who listed the species as one of five most problematic weeds. Weeds listed by the State of Nevada as noxious weeds are shown in bold. Only weeds identified at least 1.8% of the time are included. Weeds are listed in decreasing order of importance for Nevada's agricultural producers.

| Weed Species | | Nevada agricultural producers | | Pershing County agricultural producers | | Weed managers on public land | |
|---|---|---|---|---|---|---|---|
| **Common name** | **Scientific name** | **Rank** | **(%)** | **Rank** | **(%)** | **Rank** | **(%)** |
| **Hoary cress** | ***Cardaria draba*** | **1** | **41.9** | **4** | **36.8** | **1** | **53.3** |
| Russian thistle | *Salsola iberica* | 2 | 40.6 | 6 | 31.6 | | |
| Downy brome | *Bromus tectorum* | 3 | 40.4 | 3 | 39.5 | 5 | 40.0 |
| **Perennial pepperweed** | ***Lepidium latifolium*** | **4** | **39.5** | **2** | **42.1** | **3** | **51.1** |
| Foxtail barley | *Hordeum jubatum* | 5 | 38.7 | 4 | 36.8 | | |
| **Puncturevine** | ***Tribulus terrestris*** | **6** | **36.2** | **8** | **26.3** | | |
| Cocklebur | *Xanthium strumarium* | 7 | 29.1 | 8 | 26.3 | | |
| Winter annual mustards | *Brassica spp.* | 8 | 27.9 | 8 | 26.3 | | |
| **Russian knapweed** | ***Acroptilon repens*** | **9** | **23.5** | **1** | **60.5** | **1** | **53.3** |
| **Canada thistle** | ***Cirsium arvense*** | **10** | **21.6** | **11** | **23.7** | **7** | **31.1** |
| Sandbur | *Cenchrus spp.* | 11 | 19.9 | 15 | 7.9 | | |
| Kochia | *Kochia scoparia* | 12 | 18.3 | 7 | 28.9 | | |
| Bull thistle | *Cirsium vulgare* | 13 | 17.3 | | | 11 | 13.3 |
| **Scotch thistle** | ***Onopordum acanthium*** | **14** | **13.9** | **15** | **7.9** | **6** | **33.3** |
| Field bindweed | *Convolvulus arvensis* | 15 | 12.0 | 12 | 21.1 | | |
| **Leafy spurge** | ***Euphorbia esula*** | **16** | **9.7** | **15** | **7.9** | **8** | **24.4** |
| Curlycup gumweed | *Grindelia squarrosa* | 17 | 8.1 | | | | |
| **Yellow starthistle** | ***Centaurea solstitialis*** | **18** | **7.9** | **14** | **10.5** | **13** | **6.7** |
| Dodder | *Cuscuta spp.* | 19 | 7.4 | 13 | 13.2 | | |
| Redstem filaree | *Erodium cicutarium* | 20 | 6.8 | 19 | 5.3 | | |
| Halogeton | *Halogeton glomeratus* | 21 | 5.9 | 15 | 7.9 | | |
| **Musk thistle** | ***Carduus nutans*** | **22** | **5.5** | | | **10** | **15.6** |
| **Poison hemlock** | ***Conium maculatum*** | **23** | **5.3** | | | | |
| **Saltcedar** | ***Tamarix ramosissima*** | **24** | **4.8** | **19** | **5.3** | **4** | **48.9** |
| **Medusahead** | ***Taeniatherum caput-*** | **25** | **1.9** | **19** | **5.3** | **11** | **13.3** |
| **Dyers woad** | *Isatis tinctoria* | 26 | 1.8 | -- | -- | | |
| **Spotted knapweed** | ***Centaurea biebersteinii*** | | | | | **9** | **17.8** |
| **Diffuse knapweed** | ***Centaurea diffusa*** | | | | | **13** | **6.7** |
| **Camelthorn** | ***Alhagi maurorum*** | | | | | **13** | **6.7** |
| **Dalmatian toadflax** | ***Linaria dalmatica*** | | | | | **14** | **4.4** |

**Table 2**. Methods of weed control on lands managed by Nevada's agricultural producers (n=746), Pershing County's agricultural producers (n=38) and public land weed managers (n=52) in Nevada. The values represent the percentage of respondents who indicated moderate to high importance. Items are sorted in order of decreasing importance to Nevada's agricultural producers.

| | Nevada agricultural producers | | Pershing County agricultural producers | | Weed managers on public lands | |
|---|---|---|---|---|---|---|
| **Approaches to weed management** | **Rank** | **Moderate to High Importance (%)** | **Rank** | **Moderate to High Importance (%)** | **Rank** | **Moderate to High Importance (%)** |
| Prevent weed invasion/spread | 1 | 89.2 | 1 | 92.1 | 1 | 91.5 |
| Control weeds | 2 | 89.1 | 2 | 91.9 | 2 | 89.4 |
| Detect or scout for weeds | 3 | 72.9 | 4 | 75.0 | 2 | 89.4 |
| Establish competitive crops or other plants to exclude weeds; restore disturbed sites | 4 | 62.2 | 3 | 75.7 | 4 | 68.1 |
| **Methods of weed control** | | | | | | |
| Herbicides | 1 | 77.1 | 1 | 91.2 | 1 | 95.7 |
| Controlled burning | 2 | 61.0 | 3 | 69.5 | 9 | 26.1 |
| Hand-weeding | 3 | 57.4 | 7 | 57.1 | 3 | 56.5 |
| Mowing | 4 | 55.7 | 5 | 58.3 | 5 | 37.0 |
| Grazing | 5 | 50.8 | 9 | 52.8 | 8 | 28.3 |
| Tillage | 6 | 47.5 | 2 | 73.5 | 10 | 17.4 |
| Crop/desirable plant density or row spacing for weed suppression | 7 | 41.1 | 4 | 58.8 | 6 | 34.8 |
| Use competitive varieties of crops/desirable plants | 8 | 38.1 | 10 | 45.7 | 2 | 76.1 |
| Irrigation | 9 | 37.0 | 8 | 55.9 | 12 | 8.7 |
| Crop rotation | 10 | 35.6 | 6 | 57.6 | --- | --- |
| Select planting date that favors crops/desirable plants | 11 | 32.1 | 11 | 38.2 | 4 | 54.3 |
| Mulching | 12 | 20.5 | 12 | 23.5 | 11 | 10.9 |
| Insects | 13 | 8.1 | 13 | 12.1 | 7 | 32.6 |
| Microbes (pathogens, bacteria or nematodes) | 14 | 5.6 | 14 | 9.1 | 13 | 4.3 |
| Chaining | --- | --- | --- | --- | 13 | 4.3 |