



I. Integrated Weed Management Programs

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Integrated Weed Management (IWM)

Integrated weed management (IWM) is a systems approach to management of undesirable plants. IWM is defined in the Federal Noxious Weed Act as a “system for the planning and implementation of a program, using an interdisciplinary approach, to select a method for containing or controlling an undesirable plant species or group of species using all available methods, including — education; prevention; physical or mechanical methods; biological control agents; herbicide methods; cultural methods; and general land management practices.” It is a multidisciplinary, ecological approach to managing unwanted plant species - weeds.

Integrated weed management involves the use of the best control techniques described for the target weed species in a planned, coordinated program to limit the impact and spread of the weed. The control methods selected should be determined by the control objectives for the land, the effectiveness of the control technique on the target species, environmental factors, land use, economics, policy and legal restrictions, practical, economical, safe, and the extent and nature of the weed infestation.

- A. IWM programs involve the use of the best adapted control techniques in a well-planned, coordinated, and organized strategy to reduce the impact of weeds.

Inventory, detection and mapping are the first phases of any integrated weed management program. The second phase includes prioritizing weed problems and choosing and strategically implementing control techniques for a particular weed management area. The third phase is adopting proper land management practices as a portion of the integrated program.

The key components of any successful weed management program are sustained effort, constant evaluation, and the adoption of improved strategies.

- B. Integrated weed management includes preventing encroachment into land that is not infested, detecting and eradicating new weed introductions, containing large-scale infestations using an integrated approach, and, often, revegetation.
 - 1. Preventing weed encroachment — Preventing the introduction of rangeland weeds is the most practical and cost-effective method for their management. (See Section IV.)

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2. Detecting and eradicating new introductions — Early detection and systematic eradication of weed introductions are central to integrated weed management. (*See Section IV.*)
3. Containing large-scale infestations — Containment programs restricts the spread of large-scale weed infestations. Studies have shown that containing weed infestations which are too large to eradicate is cost effective because it preserves neighboring uninfested land and enhances the success of future large-scale control programs. Containing a large-scale infestation requires using preventive techniques and applying treatments on the border of weed infestations to stop the advancing front of weed encroachment.
4. Large-scale weed control.
 - a. Selection and application of weed control techniques in large-scale control programs depends on the specific circumstances for each portion of the management unit.
 - b. Initially, large-scale weed control should focus on range sites with an understory of residual grasses and the highest potential productivity. Suppressed grasses have the greatest chance of reestablishing dominance on these sites. These areas must be spot treated each year to ensure control and minimize reinvasion. In most cases, some percentage of the management unit will require control measures that are repeatedly applied until the weed seed bank and root reserves are exhausted. Control methods used must be based on the biology of the weed.
 - c. Next, control efforts should focus on the sites adjacent to those initially treated to minimize reintroduction of the weeds. Usually, large-scale control is most effectively applied from the outside of the weed management unit inward toward its center.

II. Integrated Weed Control Techniques

An accurate assessment of the target infestation will help determine the most appropriate control techniques for the weed species. All control options have some limitations. If complete eradication of a weed is necessary, biocontrol agents are not be a good choice. If soils preclude use of a herbicide, mechanical or biological control may be better choices. (*See Appendix 10.*)

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Collect current control recommendations and Extension publications for each target weed in your WMA and include them with your written management plan.

- A. Cultural Control.
 - 1. Prevention.
 - a. Adopt available preventive measures, such as quarantine and closure, to reduce the spread of the weed infestation.
 - b. Determine if policy and laws allow for the use of all preventive measures, including local quarantine and closure.
 - c. If past management activities have allowed the introduction and spread of noxious weeds, determine how to change management when selecting a treatment method.
 - 2. Livestock manipulation.
 - a. Determine if changes in livestock grazing will effect the target weeds.
 - 1) Reduced grazing may allow for increased competition from beneficial vegetation or allow more seeds to be disseminated.
 - 2) Increased grazing may reduce beneficial vegetation or may be used to reduce weed seed source.
 - b. Determine changes in movement or type of livestock to reduce or contain the infestation due to movement of weed seeds on or in the animals.
 - c. Determine if containing livestock in a weed free area prior to introduction to the area would prevent new infestations.
 - 3. Wildlife manipulation.
 - a. Determine if wildlife or wildlife feeding programs can be managed to reduce weed infestations.
 - b. Determine the feasibility of changes in wildlife movement to reduce or contain the infestation due to movement of weed seeds on or in the animals.
 - 4. Revegetation/Competitive Plantings.
 - a. Determine if existing vegetation is adequate for proper restoration or if reseeding is necessary.
 - b. Determine if the topography and soil types allow for effective establishment of competitive species.
 - c. Select competitive plant species that will reduce the spread of noxious weeds.

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- d. Consider how soil disturbance activities will affect the spread of weeds.
- 5. Public Use.
 - a. Determine the most feasible land use to reduce and prevent weed infestations.
 - b. Determine if specific public awareness programs could reduce the infestation or control the spread of weeds.
 - c. Determine if exclusion is a possibility and how it would affect the weed infestation.
- B. Physical/Mechanical Control.
 - 1. Manual control.
 - a. Determine whether hoeing or “grubbing” will reduce (or increase) the infestation.
 - b. Determine whether hand pulling of the weeds reduces the seed source or plant population.
 - 2. Mechanical control.
 - a. Evaluate the terrain for mowing and determine whether it is an acceptable option for control of the spread of weeds.
 - b. Evaluate cultivation and other conventional farming practices that could be utilized and determined to be cost effective.
 - 3. Prescribed burning.
 - a. Evaluate if a prescribed burn program will effectively enhance other control methods.
 - b. Determine the long term effect of burning on target and nontarget species.
 - c. Determine if policy and laws allow prescribed burning.
 - d. Determine whether the terrain and vegetative cover allows for a prescribed burn program.
- C. Biological Control.
 - 1. Natural competition.
 - a. Determine whether there are naturally occurring agents within the ecosystem which can reduce the weed infestation.
 - b. Determine which elements affect naturally occurring control agents.
 - 1) Determine whether these elements can be modified to reduce the negative affect on these agents.

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- 2) Determine whether these elements can be enhanced to increase the effectiveness of these agents on the weed infestation.
2. Introduced competition.
 - a. Determine whether biological control agents can be introduced into the ecosystem to reduce the level of infestation.
 - b. Determine which introduced biological agents provide an acceptable control method for this infestation.
 - c. Determine whether the introduced biological agent can survive in the environment of the treatment area.
 - d. Determine whether policy and laws allow for the introduction of biological control agents.
 - e. Determine whether policy and laws allow for introduction and grazing of livestock as a biological control measure.
- D. Herbicide Control.
 1. Determine the effectiveness of the herbicides to control the infestation.
 2. Determine whether the herbicide is labeled for:
 - a. Use on the target weed.
 - b. Use on the infested site (consider nontarget plants, soil type, ground water location, topography, climate, state labeling, etc.).
 3. Determine the most effective and cost efficient application techniques and equipment.
 4. Determine whether properly trained and certified personnel are available to apply the herbicides.
 5. Determine if fertilization alone or in combination with herbicides will enhance weed control.

Remember, it is the use of the above options in combination that results in the most successful weed management. IWM is based on the knowledge that combined tactics for weed management are more effective than a single tactic.