Site preparation

Good site preparation is the single most important factor for the success of habitat restoration once you have matched the appropriate habitat to the site. If site analysis has identified unwanted vegetation, removing it is a crucial first step. Methods to remove vegetation include pulling, cultivating, smothering, herbiciding, burning, sod removal and/or the use of a cover crop. The existing vegetation, soil conditions, topography, time and cost determine which method or combination of methods will work best for the site.

Educational note: Students can do a seed bank study to see what seeds are in the soil, to predict potential weed problems. The types of potential weeds will indicate further site preparation needed. Many non-native weeds were brought to this country for food or medicinal uses and can be studied as part of an ethno-botany activity.

Methods for removing existing vegetation

Trees/shrubs: Remove species that do not fit with the habitat you are restoring. This would include any non-native species. It might also include native species that are not appropriate for the conditions you want to create. For instance poplar species, sumac, prickly ash and other native species might be too aggressive if you are trying to restore an open grassland or savanna community.

<u>Techniques to remove undesired woody species:</u>

1. Shrubs can be pulled using weed wrenches or the "tug a suckle" technique. Weed wrenches use leverage to pull the shrubs. Tug a suckle involves using ½ inch diameter ropes 20 feet long with carabineers attached at one end and knots tied into the rope for the tuggers to hold onto. Groups of students can pull the shrubs from the ground with either technique.

   Disadvantage: soil is disturbed and needs to be smoothed out and planted.
2. Cut down trees and shrubs; treat the stumps of re-sprouting species with herbicide.

   Disadvantage: this technique does not work at all times of year, for instance when sap is rising. Follow manufacturer's label precisely.
3. Trees can be killed without using herbicides by girdling. Girdle the trees by removing the new living layer (phloem) in a band at least a half inch wide all the way around the trunk. This method can be used from spring to early summer by inserting a broad flat blade just under the phloem layer and "popping" off the bark.

Ground layer: Techniques to remove vegetation and prepare the planting bed

1. Cultivation -- Plowing, tilling, rototilling or scarifying:

Purposes:

1. To kill weeds and their germinating seeds.
2. Breaks up the soil to get a good seed to soil contact.

Steps:

1. Rototill or plow to a depth of 6 - 8".
2. Wait 2 weeks. Till again (depth of 4") to turn over the new growth.
3. Wait another 2 weeks. Shallow till, (depth of 1- 2"), to turn over existing plants and to prepare a smooth seed bed.
4. Plant.

OR:

1. Rototill.
2. Wait 2 to 4 weeks.
3. Spray with an herbicide. Wait two weeks. (See the herbicide section for more information.)
4. As an alternative to spraying at this point, you could cover the area with mulch.
5. Plant seeds and lightly rake into contact with the soil, or place plants.

If there are rhizomatous, perennial weeds such as kikuyugrass:

1. Till for one entire growing season. Keep tilling for intervals of about 2 - 3 weeks. kikuyugrass will increase in density if given more time between cultivations.

Disadvantages:

- If weeds are a significant problem; 4 - 6 tillings may be required.
- Multiple tillage might ruin the soil structure. It destroys air pockets and tilth, can create a plow pan in soils with clay content, could cause erosion, and brings up weed seed.
- Tillage is not recommended for erosion prone sites.
- Existing native plants on the site will be destroyed.
- Tilling is not useful in woodland sites because of potential damage to woody plant roots.

2. Herbicide Treatment:

If an herbicide treatment is chosen, use a low toxicity, non-persistent herbicide such as Round-up, Kleenup, Ranger; for wet areas use Rodeo. Follow manufacture's instructions carefully.

Steps for old field vegetation removal:

1. Burn or mow to remove heavy duff and/or last year's growth. This will encourage new growth. Herbicide is most effective when sprayed on green, growing vegetation.
2. Spray herbicide on the vegetation when it is 6 to 8" tall.
3. Wait two weeks. Spray herbicide again if there are still green plants.
4. Wait two weeks. If the vegetation is still green, spray a third time then wait two more weeks.
5. Plant seed or plants.
6. If seed is planted, rake it shallowly into contact with the soil

Steps for lawn areas:

1. When the grass is green and actively growing spray with an herbicide.
2. Wait two weeks. Herbicide again if needed-- Spot spray green areas if needed, then wait before planting.
3. If the lawn is completely brown scarify the soil and plant.

Advantages:

- Herbicides are effective at weed removal.
- Herbicides can be used for erosion prone sites or areas difficult to get equipment into because of wet soils, steep slopes or other obstacles.

Disadvantages:

- Herbicides may kill soil microbes or cause other environmental problems.
- School districts may restrict the use of herbicides.
- A licensed applicator may be required to spray the site.

3. No till:

This method was once considered incorrect for site preparation.

Steps:

1. Burn off existing groundlayer then plant desired species.

Disadvantages:

- Burning doesn't destroy all the weeds.
- Burning is not popular with the local community.
- It's ineffective on aggressive perennial weeds

4. Smothering or Mulching:

Materials to use for mulching:

1. Newspapers (6 -12 sheets thick) and wood chips. Newspaper breaks down quickly in high moisture.
2. Black Plastic. The plastic conducts heat and fries everything so it does a good job of destroying perennial weeds. Water doesn't filter through though so soil microbes can be affected. It does break down and is unsightly. For a nicer appearance cover with wood chips.
3. Clear plastic. It stimulates growth then bakes the plants. This requires extra plastic to expand as the weeds grow before they are killed by the intensity of the sunlight.
4. Permeable landscape fabric. The fabric doesn't alter water drainage. The vegetation decays underneath creating a friable soil. Landscape fabric is reusable and will last about five years. Cover with wood chips. It can be expensive, especially for a large area.
5. Discarded woven-back carpeting placed upside down.

Steps:

1. Lay mulching material over restoration site.
2. Keep site covered for one growing year.
3. Shallow till to prepare a smooth seed bed. Plant.

Advantages:

- Works well on steep slopes.

- Site preparation is a one time labor event that involves students.
- The wood chips can be used for trails.

Disadvantages:

- Impractical for large areas.
- Takes a full year to smother the weeds.
- It can be expensive.
- It can be unsightly.
- Smothering does not always kill weed seeds so might be best used in combination with other methods. One possible combination is to smother existing vegetation. Remove material used for smothering and allow weed seeds to germinate. Either smother again or till to kill the sprouts.

5. Sod Removal:

Sod removal is a quick way to prepare a lawn for planting.

Steps:

1. Remove the top three inches of grass and soil with a sod-cutter.
2. Plant.

Advantages:

- A site is prepared in a short period of time.
- Sod removal creates a nearly weed-free seed bed.

Disadvantages:

- A sod cutter may compact the soil. If necessary, aerate soil before planting.
- Cutting sod only works well on healthy lawns with few perennial weeds.
- A sod cutter will need to be rented or borrowed.

6. Cover Crop:

A cover crop (or nurse crop) competes with the weeds and holds the soil.

Steps:

1. Till then plant annual oats or rye at a rate of 128 lbs. per acre.
2. Till in the cover crop while it is green, or at least before it sets seed.
3. Repeat to ensure weed removal or proceed with planting desired native species.

Advantages:

- Helps control serious weed problems.
- Covers a steep slope to lessen the chance of erosion.
- Adds organic material to the soil.
- The soil will not be left bare for long since the cover crop seeds germinate quickly.
- A cover crop can be planted if a project is delayed or if the time of year isn't right for planting native species.

Disadvantages:

- Cover crops are an added cost.
- Timing is important. Area must be tilled before the cover crop sets seed.