

## Prevention

(Upadhyaya and Blackshaw, 2007; Liebman et al., 2001; Ross and Lembi)

**Objectives:** *Students will learn about weed propagule dispersal and methods that can be used to restrict the introduction of weeds into uninfested areas and movement of weeds between infested and uninfested fields.*

**Dispersal:** The manner by which propagules spread or move from the parent plant or population.

### Dispersal by Environmental and Ecological Processes

Some seeds (or fruit) may be adapted for dispersal:

#### Wind dispersed

- Hairs or wings
- Whole plant detaches (tumble weed *Amaranthus albus*), inflorescence detaches (witchgrass *Panicum capillare*).

#### Animal dispersed

- Hairs, spines, hooks that attached to fur (Florida beggarweed *Desmodium tortuosum*, southern sandbur *Cenchrus echinatus*, common cocklebur *Xanthium strumarium*).
- Fleshy fruits ingested by animals such as birds and grazing animals – *Solanum* spp. seeds regurgitated or passed in feces.

#### Water dispersed

- Some seeds or fruit possess structures that enhance buoyancy (curly dock *Rumex crispus*)

#### Explosive dehiscence

- Drying of the fruits results in forceful opening and expulsion of the seeds (yellow wood sorrel *Oxalis stricta*)

#### Eliasomes

- Oil-rich structures on seeds that attract ants (*Fumaria officinalis*).

Most seeds of agricultural weeds are not adapted for dispersal and fall near the parent plant. In the absence of humans dispersal probably by rain splash, runoff, streams; mud clinging to animals, in alimentary canals of birds and mammals.

## **Prevention: Aimed at Limiting Human dispersal**

Scale independent – works well for properties of any size.

Applicable to all stages of crop production: from obtaining farm equipment, seed, water and fertilizers to harvest and processing.

### **Components of prevention strategy:**

- Preventing new infestations
  - Do not bury seed in uninfested areas.
  - Keep uncropped areas free of weeds: Fence rows, fence lines, field corners, roadsides, railroad right-of-ways.
  
- Controlling isolated weed patches
  - Spot-treat small infestations or isolated individual plants - One plant can produce thousands of seeds and thus thousands of new plants.
  
- Preventing seed production (Prevent weeds from reproducing)
  
- Eradication in the case of exotic weeds.

Farmers' focus should not be on weeds that are already widespread on the farm but on excluding weeds that have not yet gained entry to the farm, and avoiding spread of difficult to control species from infested fields to noninfested fields. Concentrate efforts on particular weeds: very competitive ones and those that are not yet a problem or are still very few in numbers.

## Human Dispersal of Weed Seeds and Preventive Methods

Dispersal	Prevention Strategy
Deliberate plant introductions for food, feed, medicinal purposes, fiber, erosion control, aesthetics, and energy.	Laws to limit invasive species. Individual responsibility of property owners and those who develop and commercialize new cultivars.
Weed contaminated crop seed	Laws establishing purity standards for crop seeds; Nb no laws requiring farmers to use commercial seed, purchase certified seed
<p>Dispersal with manure, feed, and transported animals.</p> <p>Seed viability in feces is dependent on the weed species and on the animal species.</p>	<p>Avoid moving infested materials into fields: no weed-infested soil, bedding, hay, straw, or manure. Manure - high temperature composting, anaerobic fermentation, oven drying. Evaluate off farm manure before transport.</p> <p>Do not feed weed (mill) screenings, grain or hay with weed seeds:</p> <ul style="list-style-type: none"> <li>- Destroy viability by grinding, heating or ensiling.</li> </ul> <p>Manage pastures with mowing to prevent weed seed set.</p>
Dispersal with plant parts – Straw of cereals used as packing materials or bedding, transport of raw commodities eg sugarcane. Crop residues used for organic mulches	<p>Cover recently harvested commodities; discarded plant materials from processing plants</p> <p>Grow cover crops to generate mulching materials on farm or obtain from sources known to provide weed-free materials</p>
Dispersal in soil – eg on transplants and nursery stock.	<p>Nurseries must ensure cleanliness of plants for sale, especially planting media.</p> <p>Prevent introduction from nursery stock, sod and turf brought on farm.</p> <p>Plant only weed-free transplants.</p> <p>Ensure new weeds are not introduced</p> <ul style="list-style-type: none"> <li>- in soil, gravel or sand brought on farm</li> </ul>
Dispersal in raw wool	Use inspection and quarantine measures and heat treat or high temperature composting of textile wastes before application to land.
Dispersal by machinery – weeds dispersed during field preparation, cultivation, and harvesting. Tillage implements can move seeds and vegetative propagules of wandering perennials. Most move very short distances, but a few are carried long distances. Combine harvesters move seeds around within and between fields. (Move extensive distance eg with purchase of previously owned machinery.)	<p>Clean equipment between fields</p> <ul style="list-style-type: none"> <li>- so propagules are not moved from field to field on harvesting, mowing, tillage, and earth moving equipment.</li> </ul> <p>Harvest Weed Seed Control - HWSC</p>
Dispersal in irrigation water: seeds of most weeds can survive for several months in fresh water.	<p>Screens should be used to eliminate weed seeds from irrigation water.</p> <p>Controlling weeds on banks of irrigation canals and ditches can decrease weed seeds in the water.</p>