Basic principles of weed management

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Weed science

- Weed science is the scientific disciple that studies plants that interfere with human activity
- Areas of study
  - Basic biological and ecological investigations
  - Design of practical methods of managing weeds in the environment
Weed management

• Overall goal of weed management
  – Design the most appropriate methods in a variety of situations that ensure a sustainable ecological system and a minimum influence of nuisance weeds

• What is a weed?
  – Plant growing where it is not desired
  – Plant out of place
Weeds

• Weeds are classified as pests
  – Included with insects, plant diseases, nematodes, and rodents
• *Pesticide* – chemical used to control a pest
• *Herbicide* – chemical used specifically for weed control
Why control weeds?

- To reduce competition for light, moisture, nutrients, and space
- Weeds reduce yield and quality
- Weeds produce leachates (allelochemicals) that may be detrimental to the crop
- Weeds serve as hosts for diseases and insects
- Increase production and processing costs
- Decreased land value and crop choice
- Weeds are human hazards and aesthetically unpleasing
Types of weed management

**Prevention**
- Stopping weed species from contaminating an area
- Most practical means of controlling weeds
- Accomplished by
  - Making sure new weed seeds are not carried onto a farm in contaminated crop seeds, feed, or machinery
  - Preventing weeds from going to seed
  - Preventing spread of perennial weeds that reproduce vegetatively
- If properly employed, can greatly reduce weed problems
Types of weed management

• **Control**
  – Process of limiting weed infestations and minimizing competition
  – In crops, weeds are limited to have minimal effect on crop growth and yield
  – Degree of control is a matter of economics, balance between cost of control and crop yield loss
  – Used only after the problem exits; it is not prevention
Types of weed management

• **Eradication**
  – Complete elimination of all living plants including their vegetative propagules and seeds
  – More difficult than prevention and control
  – Justified only for the elimination of serious weeds in a limited area
    • Perennial weed in a small area of a field
Important!

• In weed science, prevention is better than control, but control is required because weeds arrive without notice and are present before they are prevented.

• Prevention and eradication require long-term thinking and planning.
Methods of weed control

• Mechanical/physical
  – Hand-pulling, hand-hoeing, tillage, mowing, flooding, mulching, burning

• Cultural
  – Crop competition, crop rotation, crop varieties, fertility manipulation, planting date, plant population and spacing

• Biological
  – Insects, pathogens, herbivores

• Chemical
  – Herbicides
    • Preplant, preplant incorporated, preemergence, postemergence
Integrated Weed Management

• Development of a weed management program using a combination of preventive, cultural, mechanical, and chemical practices

• Applying the principles of IWM
  – Minimize overall economic impact of weeds
  – Reduce herbicide use
  – Provide optimum economic returns

• Development of IWM program is based on a few general rules that can be used in any farm
Prevent weeds before they start

• Best method of weed control is to keep weeds out of the field
  – Field sanitation – practices that prevent weeds from entering or spreading across your field
  – Planting certified seed is a good starting point to reduce weeds
  – Control of volunteer weeds along field edges and ditches
  – Cleaning equipment before moving from field to field
Help the crop compete against weeds

• Several things can be done to give the crop an advantage over weeds
  − Fertilizer placement – placing the fertilizer where the crop, but not weeds, has access allows the crop to be more competitive
    • Banding reduces competitiveness and population density of weeds
  − Competitive crop varieties
    • Taller varieties close the canopy more completely than shorter types, which helps shade weeds
Keep weeds of balance

• Don’t give them a chance to adopt
  – Crop rotation – rotating crops with different life cycles will help prevent weeds from adapting
  – Rotating crops allows rotating herbicide practices
Making a spray decision

• Scout your field to assess the type and number of weeds to help determine spray operation

• Consider timing of weed emergence relative to the crop growth stage – use the concepts of CPWC and economic thresholds
  • CPWC – period in the crop growth cycle when weeds must be controlled to prevent yield losses
  • Economic threshold – is the level of weed infestation at which the cost of weed control equals the increased return on the crop yield

• Cost of delaying weed control
What constitutes an effective weed control program?

- Identify the problem
- Select proper control measure(s)
- Implement the program
Chemical weed control

• Do it right
  – Proper herbicide(s)
  – Proper herbicide rate
  – Proper placement of material
  – Proper time of application
  – Proper manner of application

• READ THE HERBICIDE LABEL
 IT’S THE LAW
Thank you

Questions