Herbicide action

Farming uses a wide variety of herbicides to control weed pressure. Weeds will steal nutrients from the soil that naturally occur or have been applied to help a crop grow in the field. Farmers want to reduce the number of weeds that grow and compete with their crops. Herbicides, chemicals that control weeds, can be used, but some weeds have developed resistance to some herbicide actions, or the way the herbicide kills the weed.

Herbicide resistance costs U.S. farmers an estimated $2 billion each year in decreased land values, decreased yields and increased input costs (*Herbicide Classification Guide*; Take Action, 2014). There are 11 different weeds that threaten growers because they are resistant to the actions of common herbicides. What does this mean for growers? Decisions need to be made to reduce the impact of the weeds through controlled use of the herbicides to which they are susceptible. How might a farmer know which weeds are resistant and which are susceptible? The *Herbicide Classification Guide* was created by the Soybean Checkoff to help farmers figure that out. Farmers do not use just one herbicide nor one method to fight weed pressure. Other methods include: planting cover crops, changing tillage practices, managing field borders and cleaning equipment before moving to the next field. If using herbicides, farmers try different modes of action to reduce the development of resistance.

Visit this website: http://reader.mediawiremobile.com/USB/issues/107147/viewer?page=1 (electronic booklet titled: “I will know the eleven herbicide-resistant weeds that threaten”). Review the eleven weeds that show resistance and the threats they possess.

Weed	Threats	Resistant to:
Common Waterhemp		
Palmer Amaranth (Pigweed)		
Horseweed (Mare's Tail)		
Giant Ragweed		
Common Ragweed		
Common Lambsquarters		
Kochia		
Italian Ryegrass		
Barnyard Grass		
Johnson Grass		
Giant Foxtail		

Weeds and Herbicide Resistance

Choose a Site of Action that may help to address one of the resistant weeds and determine the timing for using that herbicide to fight that weed.

Site of Action	Description of Action	Weeds that are susceptible	Timing
ACCase Inhibitors (1)	Block the first step in fatty acid synthesis; plants will lack phospholipids to build new cell membranes		
ALS Inhibitors (2)	Inhibit a common enzyme so that leucine, valine and isoleucine are not synthesized by the plant		
Microtubule Inhibitors (3)	Block microtubule polymers from being formed (loss of microtubule structure and function) so cell wall formation is negatively affected		
T1R1 Auxin Receptors (4) (Auxins cause plant cells to elongate.)	Cause abnormal growth leading to plant death		
Photosystem II Inhibitors (5,6,7)	Bind to photosystem II in chloroplast thylakoids to negatively affect the processes and products for transport of chemical energy		
Lipid Synthesis Inhibitor (8)	Inhibits biosynthesis of fatty acids and lipids and affect acetyl-coenzyme A		
EPSP Synthase Inhibitor (9)	Glyphosate depletes the amino acids: tryptophan, tyrosine and phenylalanine		
Glutamine Synthase Inhibitor (10)	Inhibits the enzyme that converts ammonia to glutamine, allowing ammonia to accumulate leading to cell destruction and reducing the pH gradient		
Diterpene Biosynthesis Inhibitor (13)	Inhibits the production of carotenoids		
PPO Inhibitors (14)	Inhibit the production of chlorophyll		

Photosystem I Electron Diverter (22)	Accepts electrons from photosystem I and lead to the formation of hydrogen peroxide that destroy lipid membrane fatty acids and chlorophyll		
HPPD Inhibitors (27)	Give rise to bleaching on new growth due to inhibition of carotenoid synthesis		