

Planning Criteria Checklist for PAMS Strategies

Select all techniques that apply from the following categories of Landuse, Before Planting, Growing Season, Monitoring, and Suppression, as well as conservation practices being utilized. Information contained in this document is condensed from 190-TN-AGR-5, *Pest Management in the Conservation Planning Process*.

Producer Name:

Date:

Tract(s):

Field(s):

Prevention/Avoidance:

Prevention and avoidance techniques are key components of an effective integrated pest management (IPM) plan. These are the first line of defense against pests. The perfect time to review and select prevention or avoidance techniques is before the crop year begins. Techniques already in use can often be expanded or improved upon.

Landuse Techniques (check all that apply either as existing or planned):

Existing (Ext)	Planned (Pln)	IPM Techniques ^{1,2}	Short Description
		1. Avoid poor producing areas	Take poor performing areas out of production, consider replacing with beneficial habitat.
		2. Banker plants	Banker plants supply an alternate habitat to support beneficial insects that are natural enemies of crop pests.
		3. Beetle banks	Beetle banks provide habitat for insects that consume weed seed.
		4. Conservation buffers	Conservation buffers are small strips of land in permanent vegetation that address specific conservation benefits.
		5. Insectary strips	Insectary strips provide supplemental nectar, pollen, and habitat to improve the survival of natural enemies.
		6. Refuge	A refuge is an area of non-Bt crop that has been planted to maintain a population of insects susceptible to <i>Bacillus thuringiensis</i> . Can be used for insect resistance management with chemical pesticides.
		7. Trap crops	Growing plants to attract pests away from crops. Trap crops can sometimes be treated with pesticides (if economical) to reduce pest populations without spraying the primary crop.
		Other Landuse techniques:	

¹ Additional information on pest management mitigation techniques can be obtained from Extension and other pest management publications including IPM Guidelines and Crop Profiles, pest management consultants, and pesticide labels. ²

²The pesticide label is the law. All pesticide label specifications must be carefully followed, including required mitigation. Additional mitigation may be needed to meet NRCS pest management requirements for identified resource concerns.

Before Planting Techniques

IPM Techniques ^{1,2} Ext. Pln.	Short Description
8. Air flow in the crop canopy	Impacts many pests and plant diseases. Balance with row spacing for weed control.
9. Allelopathic plants	Allelopathy is a biological phenomenon where one plant inhibits the growth of another. Can suppress certain weeds.
10. Alternate host reduction	Locate and manage alternate hosts for pests and pathogens to control populations across crop cycles.
11. Cultivars locally adapted	Using crop varieties with genetic resistance to specific diseases or pests.
12. Polyculture	More than one plant species is grown at the same time on the same field to mimic the diversity of natural ecosystems.
13. Seed varieties pest tolerance	By selecting a variety of seeds with strong traits against the major disease or pest of concern in crop, reduces the chance that disease or pest will be problematic.
14. Sequence crops	Growing crops one after the other within the same crop year, one crop being sown after the harvest of the other.
15. Soil health management	Optimize soil conditions for moisture and nutrient availability, soilborne pest/disease resilience, and overall crop health by following core management principles of soil health: 1) minimize disturbance, 2) maximize soil cover, 3) maximize biodiversity, and 4) maximize presence of living roots.
Other Before Planting Techniques:	

Growing Season Techniques

IPM Techniques ^{3,4} Ext. Pln.	Short Description
16. Soil occultation	Uses opaque coverings (e.g., plastic) to trap heat and moisture, which encourages weed seed germination and plant growth but then, by blocking access to water and heating up the soil, eventually kills the weeds underneath.
17. Soil solarization	Uses clear coverings. A method of covering the ground and using the sun's power to heat the soil and reduce soilborne disease or weed growth.
18. Stale seedbed	Allowing weed seeds just below the soil surface to germinate so they can be killed prior to planting the cash crop. May be used in conjunction with soil occultation.
19. Timing of planting or harvest	Adjusting your planting/harvest date to avoid pest/disease pressure.
20. Barrier exclusion	Providing a physical barrier between crop and pest (e.g., floating row covers, sized netting/screens, fruit bagging, kaolin clay dust).

³ Additional information on pest management mitigation techniques can be obtained from Extension and other pest management publications including IPM Guidelines and Crop Profiles, pest management consultants, and pesticide labels

⁴ The pesticide label is the law. All pesticide label specifications must be carefully followed, including required mitigation. Additional mitigation may be needed to meet NRCS pest management requirements for identified resource concerns.

IPM Techniques ^{3,4} Ext. Pln.	Short Description
21. Equipment sanitation	Removing all soil and debris from field equipment before problem pests can leave one field and enter another.
22. Field sanitation	Avoid providing harborage for pests to bridge to next crop. May include management of residue, cover crop biomass, unharvested crop (e.g., mummy nuts in nut orchards, culled fruit, or fruit drop).
23. Mating disruption	Artificial sources of pheromone are placed in an area so that male pests are prevented from effective mating activity and the volume of viable eggs is reduced.
24. Natural enemies	Insects that kill, decrease the reproductive potential of, or otherwise reduce the numbers of another insect or pest. Can include conservation of existing beneficial/natural enemy populations or intentional/inundative releases of natural enemies.
25. Nurse crops	A nurse crop is usually an annual crop planted together with a slow-establishing crop (often a perennial) to assist in establishing the slower-to-establish crop.
26. Shallow cultivation	Minimizing depth of soil disturbance to maintain soil health benefits.
27. Weed seed bank reduction	Prevent weeds from producing seed. Weed seed bank will be depleted in about 5 years if no additional seeds are added.
28. Dust management	Controlling or minimizing dust on crops to reduce diseases and pest issues.
Other Growing Season Techniques:	

Conservation Practices

IPM and NRCS Conservation Practices Ext. Pln.	Short Description
29. Conservation Crop Rotation (328)	Including non-host crop or pest/disease-suppressive crop in rotation may reduce pest/disease pressure and need for suppression strategies. Where pesticides are used, this may also increase ability to rotate pesticide modes of action to manage for pesticide resistance.
30. Cover Crop (340)	Plants established for seasonal vegetative cover. May help break disease/pest cycles, reduce weed growth, and enhance nutrient/soil moisture management for overall crop health and resilience.
31. Field Border (386)	Strips of permanent vegetation established on one or more sides of a field. May support beneficial insects.
32. Forage Harvest Management (511)	Timely harvesting reduces the need for pesticides by harvesting the forage before pest populations exceed a threshold value. Early harvesting may only delay the application of the pesticide rather than avoiding it.
33. Irrigation Water Management (449)	Irrigation scheduling optimizes plant health and soil moisture management, both of which can help reduce the chances of disease development in crops.
34. Nutrient Management (590)	Healthy, vigorous plants that grow quickly are better able to withstand some pest injury.
35. Mulching (484)	Placing (or planting) a protective layer of material on top of the soil. Increases infiltration, reduces soil erosion, and may reduce pesticide use.

IPM and NRCS Conservation Practices Ext. Pln.	Short Description
36. Prescribed Grazing (528)	Managing the pasture for even grazing activity and maintenance of adequate residual dry matter to maintain desired plant community without need for chemical suppression.
37. Strip Cropping (585)	Partitioning a field into strips which are alternated in a crop rotation system.

Monitoring:

Monitoring is essential to any IPM plan but is too broad a subject to thoroughly describe here. The Extension Service of the University of Missouri has provided an *Introduction to Crop Scouting*. To view the document paste this URL into a web browser: <https://extension.missouri.edu/publications/ipm1006>.

Pests of concern will be the focus from week to week, including (check all that apply):

Ext. Pln.	Weeds: Correct identification is important. Record the size and amount present. The earlier you can identify weeds, the more effective and diverse your management options will be. You may want to enroll in a class or school to become proficient in naming weeds when they are only in the cotyledon stage.
	Insects: include both pests and beneficial insects, as well as the name of the insect and estimated population per plant or percent defoliation of the crop. Note the life stage of the pest where relevant. Each insect pest usually has an economic threshold that is either population or defoliation dependent and can found by consulting a University of Missouri Extension specialist.
	Disease: Early disease pressure can be difficult to notice. Check for plants that show signs of stunting, lesions, discoloration, yellowing, and senescence. Get a laboratory diagnosis if you are unsure of the correct identification of the disease.

Suppression:

Suppression activities could include mechanical/physical, biological, chemical, and/or cultural methods to reduce pest populations or the impacts. Check all that apply:

Ext. Pln.	Mechanical/Physical: Pest suppression the uses physical methods to reduce a pest population or its impacts. Mechanical suppression methods include cultivation, hoeing, hand weeding, mowing, pruning, root plowing, roller chopping, vacuuming, and physical barriers. Mechanical pest suppression is an activity in the PAMS approach to IPM. Cultural and mechanical/physical suppression activities may overlap.
	Biological: The process of conserving, augmenting, managing, or introducing beneficial living organisms to reduce pest population or it impacts. It includes the use of insects, nematodes, mites, plant pathogens, vertebrates (including herbivores), and other living organisms. It may include targeted grazing and cover crops. Biological pest suppression is an activity in the PAMS approach to IPM.
	Chemical: The use of pesticides such as herbicides, insecticides, or fungicides to reduce a pest population or its impacts. Chemical pest suppression is an activity in the PAMS approach to IPM. When pesticides are repeatedly applied in the same area and the same pests, pesticide resistance can be a concern. See following pages.
	Cultural: The use of practices other than chemical or biological suppressions to reduce pest population or its impacts. It includes practices and activities such as narrow row spacing or optimized in-row populations, alternative tillage approaches such as no-till or strip-till, cover crops or mulches, and using crops with allelopathic potential.

Resistance Management

Pesticide resistance is when a pest population becomes less susceptible to a pesticide that was previously effective at controlling it. This can happen when pesticides are repeatedly applied in the same area and target the same pests, especially if they have the same mode of action (MOA). This series of tables list pest management techniques that have the potential to slow the rate of pesticides developing resistance. These techniques and practices do not always have a direct and quantifiable mitigation value. Their efficacy will depend on site-specific conditions.

Table B. Strategies to Reduce Pesticide Resistance.

Pre-Season Strategies	
Ext.	Pln.
	MØ Acquisition of knowledge and skills to manage pesticide resistance by: ○ Attending educational meetings to obtain the latest information in development of sound pest management programs. OR ○ Promote communication regarding pesticide resistance, by hosting a field day or community meeting to discuss pesticide resistance issues in their community.
	2. Diversify the current crop rotation to add different crop types to disrupt the host plant/pest cycle and use of the same pesticide MOA season after season.
	3. Add cover crops to the crop rotation or consider use of nurse crops and intercropping of crops to be competitive with weeds thereby reducing weed pressure in the cash cropland weed seed development or as host crops for beneficial insects.
	4. Use grazing and/or browsing animals when applicable, to reduce weed populations.
	Other Pre-Season Strategies:

Planting Strategies	
Ext.	Pln.
	5. Plant certified (or tested by a certified lab) weed-free crop, cover crop, or pollinator habitat seed to reduce introduction of new weed pests.
	6. Use pre-emergence herbicides with soil residual activity, with different mechanisms of activity MOA on target weed species.
	7. Plant crops with stacked traits to maximize the diversity of available pest management tools a crop with Bt (bacillus thuringiensis) and herbicide resistance traits.
	Other Planting Strategies:

Growing Season Strategies	
Ext.	Pln.
8.	Managing the crop according to recommendations from local extension experts or crop consultants (i.e., Certified Crop Advisors) to promote overall crop vigor, resilience, and competitiveness.
9.	Scouting prior to pesticide application to correctly identify the target pest and to determine if economic thresholds or estimates of crop damage are met before applying pesticides.
10.	Time pesticide applications treatment or other PAMS activity when the most susceptible life cycle stage of the target pest(s) is present to maximize the efficacy for the treatment selected.
11.	Methods of monitoring include use of monitoring traps to indicate adult emergence, real time data feeds from monitoring systems, or using weather or vegetation growth models that predict conditions conducive to pest development.
12.	Perform in-field follow-up after pesticide application determine and document whether the applied pesticide provided effective control of the target pests.
13.	Use of cultural, mechanical or biological pest management strategies such as, tillage, mowing, flaming, roller crimping, etc.
Other Growing Season Strategies:	

Harvesting Strategies	
Ext.	Pln.
14.	Manage the soil seedbank by reducing weed seed inputs through use of harvest weed seed destruction equipment i.e., combine weed seed grinding.
15.	Manage the field environment (including soils) to lessen the probability of weed establishment, enhance weed seed decay, and promote weed seed predation (e.g., maintaining habitat refuges, delaying postharvest tillage, etc.).
Other Harvesting Strategies:	

Producer Signature:

Date:

Planner Signature:

Date:

ESJAA Level or TSP #: