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OREGON TILTH

Common NRCS Practices Related to Pest Management on Organic Farms

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Purpose

Pest (insects, diseases, weeds, etc.) management on organic and transitioning farms requires a holistic approach. It relies primarily on the adoption of prevention and avoidance techniques with cultural and mechanical suppression techniques as the first choice for suppression and organic pesticides as a last resort. The purpose of this document is to demonstrate how certain NRCS practices that have primary resource protection benefits can also have significant Integrated Pest Management (IPM) benefits to organic producers. This document discusses practice purposes that might be used to support a client's pest management activities. While pest management itself might explicitly serve a production purpose, when adopted, many of the NRCS practices below serve to reduce chemical usage and impacts and provide numerous ecosystem services on organic and non-organic operations alike.

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Figure 1. (on front cover) A vetch and oat cover crop in Oregon provides habitat for a predatory lady beetle.

Figure 2. Mulching for weed control on an organic farm.

Relevant National Organic Program (NOP) Regulations

The entire National Organic Program (NOP) standards, as well as lists of approved and prohibited materials and other information can be found at www.ams.usda.gov/AMSv1.0/nop

Section 205.206 Crop Pest, Weed, and Disease Management Practice Standard

(a) The producer must use management practices to prevent crop pests, weeds, and diseases including but not limited to:

(1) Crop rotation and soil and crop nutrient management practices, as provided for in 205.203 and 205.205;

(2) Sanitation measures to remove disease vectors, weed seeds, and habitat for pest organisms; and

(3) Cultural practices that enhance crop health, including selection of plant species and varieties with regard to suitability to site-specific conditions and resistance to prevalent pests, weeds, and diseases.

(b) Pest problems may be controlled through mechanical or physical methods including but not limited to:

(1) Augmentation or introduction of predators or parasites of the pest species;

(2) Development of habitat for natural enemies of pests;

(3) Nonsynthetic controls such as lures, traps, and repellents.

(c) Weed problems may be controlled through:

(1) Mulching with fully biodegradable materials;

(2) Mowing;

(3) Livestock grazing;

(4) Hand weeding and mechanical cultivation;

(5) Flame, heat, or electrical means; or

(6) Plastic or other synthetic mulches: Provided, That, they are removed from the field at the end of the growing or harvest season.

(d) Disease problems may be controlled through:

(1) Management practices which suppress the spread of disease organisms; or

(2) Application of nonsynthetic biological, botanical, or mineral inputs.

(e) When the practices provided for in paragraphs (a) through (d) of this section are insufficient to prevent or control crop pests, weeds, and diseases, a biological or botanical substance or a substance included on the National List of synthetic substances allowed for use in organic crop production may be applied to prevent, suppress, or control pests, weeds, or diseases: Provided, That, the conditions for using the substance are documented in the organic system plan.

USDA-NRCS Practices

This section identifies NRCS practices that can directly or indirectly support IPM. Only the most relevant purposes, taken from the NRCS national standards, have been identified for use of these practices to meet the secondary purpose of IPM. Many of these practices have related USDA NOP regulations and their adoption or related changes in management must first be approved by the client's organic certifier.

	Relevant NRCS Purposes	IPM Impacts & Considerations
Integrated Pest Management (595) - January 2010	Prevent or mitigate off-site pesticide risks to water quality from leaching, solution runoff and adsorbed runoff losses.	➢ Protect off-site ground nesting bee habitat.
	Prevent or mitigate off-site pesticide risks to soil, water, air, plants, animals and humans from drift and volatilization losses.	➢ Protect off-site beneficial insects.
	Prevent or mitigate on-site pesticide risks to pollinators and other beneficial species through direct contact.	➢ Protect on-site beneficial insects and pollinator services.
	Note: While defined as "a site specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies", the NRCS 595 practice purposes ALL clearly state that this practice is to either "prevent or mitigate" a risk associated with a pest suppression technique, be it chemical, mechanical or biological. **The intent of 595 is to reduce the impacts of identified risks to natural resources, not to simply provide a vehicle for managing pests. When a risk has been identified and is not sufficiently mitigated, the 595 supports the grower in adopting an IPM system that incorporates mitigation.** 595 relies almost entirely on land-grant university IPM techniques to prevent or mitigate identified hazards to natural resources and often times includes prevention and avoidance techniques. The NRCS published Agronomy Technical Note 5 provides some clarification of how to identify and mitigate for pest suppression risks with or without the NRCS 595 practice. It includes many of the mitigation techniques that planners might use in developing a 595 mitigation plan. Since 595 focuses on the risks posed by pest suppression techniques, it may seem that this practice may not apply to organic agriculture. However, there are materials allowed in organic production that can pose significant risks to natural resources such as pyrethrums to fish and azadirachtin and spinosad to bees. When clients consider the use of such materials, the planner must mitigate or prevent the risks associated with these materials if insufficient mitigation exists. When the risk to resources is associated with mechanical tillage (as is the case for weed management) the planner is directed to other more appropriate practices that address tillage impacts such as the Conservation Crop Rotation or any of the Residue and Tillage Management practices.	
Nutrient Management (590) - January 2012	To budget, supply, and conserve nutrients for plant production.	➢ Ensure nutrients are applied in appropriate amounts to avoid issues caused by over and under-fertilization. Vigorous plants are better able to withstand pests while over fertilization has been associated with large increases in numbers of aphids and mites[i]. ➢ Organic fertilizers tend to be slow-release in nature and are less likely to promote quick weed growth.
	To maintain or improve the physical, chemical, and biological condition of soil.	➢ Healthy soils grow healthy plants that have a higher tolerance to pest pressure. ➢ Soils high in organic matter tend to harbor larger populations of beneficial insects, microbes, and fungi but some pests are attracted to soils high in undecomposed organic matter. ➢ Manures and composts should be carefully screened for the presence of weed seeds or any other potential soil contaminants. ➢ Improved soil quality increases the effectiveness and ease of cultivation.
Cover Crop (340) - May 2011	Increase soil organic matter content	➢ Build healthy soils, See Nutrient Management above.
	Increase biodiversity	➢ Provide habitat and nectar for predatory insects to help support biological control. Allow a higher portion of the cover crop to flower than when managed for nitrogen purpose alone. ➢ Create a break in the rotation that does not host the problem pest.
	Suppress weeds	➢ Cover crops suppress weeds through direct competition and allelopathy[ii]. See eOrganic, 'Cover Cropping in Organic Farming

	Relevant NRCS Purposes	IPM Impacts & Considerations
Cover Crop (340) - May 2011 (continued)	Suppress weeds (continued)	Systems'[iii] for more information on specific cover crop types, seeds and sourcing, estimating nitrogen, video clips, and webinars. ➢ 'Smother cropping' is a technique used to apply intense cover crop competition by using higher seeding rates (1.5-3X) and quick growing crops like buckwheat or sudan[iv,v,vi]).
	Manage soil moisture	➢ Soil moisture has a large impact on soilborne diseases.
	Notes: A number of cover crops have specific interactions with pests. The following are some examples taken from 'Crop Rotations on Organic Farms: A Planning Manual' by Mohler et al., 2009: ➢ Brassica cover crop residues suppress aphanomyces root rot of pea. ➢ Onion thrips may be a problem when they are preceded by grains. ➢ Clovers before lettuce increases tarnished plant bug. ➢ Rye suppresses black root rot. ➢ High-biomass cover crops such as barley or rye increase populations of centipedes, predator mites, and other important predators. ➢ Sorghum-sudan reduces southern root-knot nematode populations in subsequent vegetable crops. ➢ White sweet clover is an important host in which yellow bean mosaic virus 2 overwinters. It can also infect also broad bean, soybean, and other clovers. ➢ Hairy vetch is a good host for northern root-knot nematode. ➢ Brassica cover crops can be used as biofumigants against soilborne diseases. **Caution:** When allowed to go to seed, many cover crops can become weeds. Additionally, long-season cover crops can be less competitive and become weed infested.	
Mulching (484)- Draft- March 2013	Improve soil health	➢ See Nutrient Management above. ➢ Mulches reduce splashing from irrigation and rain and can decrease soilborne diseases. ➢ Mulches can provide habitat for predatory insects like ground beetles, lady beetles, and lacewings[vii]. ➢ Reflective mulch repels thrips and aphids and can reduce the incidence of insect transmitted virus diseases in vegetable crops[vii].
	Suppress weed growth	➢ Only weed seeds in the top 2" of soil tend to germinate. A thick mulch reduces weed seed germination.
	Caution: Mulches can also provide habitat for pests and disease. Care should be taken if producers are struggling with slugs or have pests that favor high organic matter environments. Organic materials should be thoroughly checked to ensure they are free of weeds and weed seeds. Additionally, the use of mulches can impact ground nesting bee habitat.	
Conservation Crop Rotation (328)- May 2011	Improve soil quality. Manage the balance of plant nutrients.	➢ Support and build healthy soils, see Nutrient Management above.
	Provide food and cover for wildlife, including pollinator forage, cover, and nesting	➢ Predatory insects will help support biological control. ➢ Perennial crops and grasses provide habitat for ground dwelling predators including insects, mice, snakes, etc.
	Manage plant pests (weeds, insects, and diseases).	➢ See notes and reference below.
	Notes: The following are some examples taken from 'Crop Rotations on Organic Farms: A Planning Manual' by Mohler et al., 2009: ➢ Clubroot declines more quickly when tomato, cucumber, snap beans, or buckwheat is grown. ➢ Due to cultivation and competitiveness, potato cleans up weeds prior to carrots, which are poor competitors and hard to weed. ➢ Broccoli residue reduces the severity of verticillium wilt in subsequent strawberry crops. ➢ Use of grain crops or corn in rotation with beans can reduce root rots, in rotations with Brassicas, they can decrease white mold. ➢ Carrot root dieback can be severe after alfalfa.	

Notes: Systems with less soil disturbance have mixed results regarding pests. They tend to harbor more soil dwelling predatory insects but can conversely harbor more pests. Reduced till practices have the added benefit of not disrupting soil layers and therefore not bringing new weed seeds to the surface but tillage can also be a useful tool for killing annuals and reducing perennial weeds. It can be a very effective technique for decreasing weed germination and emergence but in systems with high weed pressure it can prove problematic. Crop residues can also serve as overwintering habitat for a number of pests including: corn borers, onion maggot, leaf miner, squash vine borer, and some fungal and bacterial pathogens.

Related Considerations

Beneficial Insect Habitat

Attracting beneficial insects to the farm helps manage pests though biological control. Areas that provide nectar and shelter through the planting of perennial vegetation can serve this purpose. Undisturbed areas, including raised 'beetle banks', can provide overwinter refuge for ground dwelling predatory insects and parasitoids. Some of the more common NRCS Practices that can serve this purpose are: Critical Area Planting (342), Hedgerows (422), Field Borders (386), Tree/Shrub Establishment (612), Riparian Forest Buffer (391), Windbreak/Shelterbelt (380, 650), and Conservation Cover (327). For more information, see 'Conservation Buffers in Organic Systems: Western State Implementation Guide' listed in References.

Pesticide Drift

Multiple controls must be in place on an organic farm to prevent contamination from prohibited materials. In addition to preventing the application of the material itself, pesticides can also disrupt the natural balance of insect predators and pests. Several practices can be designed to capture or intercept pesticide drift from neighboring fields. These practices require special designs so that they capture pesticide drift but do not attract the beneficial insects you want to protect. Some of the better practices to intercept pesticide drift with are: Windbreak/Shelterbelt (380, 650), Hedgerows (422), Field Borders (386), and Tree/Shrub Establishment (612). For more information, see 'Conservation Buffers in Organic Systems: Western State Implementation Guide' listed in References.

Resources & References

Dufour, R. et al. 2013. **Conservation Buffers in Organic Systems: Western State Implementation Guide.** Oregon Tilth. www.tilth.org

Mohler et al., 2009. **Crop Rotations on Organic Farms: A Planning Manual.** Natural Resource, Agriculture and Engineering Service. http://www.sare.org/Learning-Center/Books/Crop-Rotation-on-Organic-Farms

[i] Zehnder, G. 2011. Managing the Soil to Reduce Insect Pest. eOrganic. http://www.extension.org/pages/18574/managing-the-soil-to-reduce-insect-pests

[ii] Schonbeck, Mark . 2011. How Cover Crops Suppress Weeds. eOrganic. http://www.extension.org/pages/18524/how-cover-crops-suppress-weeds

[iii] eOrganic. 2013. Cover Cropping in Organic Farming Systems website. Includes information on specific cover crop types, seeds and sourcing, estimating Nitrogen, video clips, and webinars. http://www.extension.org/pages/59454/cover-cropping-in-organic-farming-systems

[iv] Clark, A. (ed.) 2007. Sorghum-Sudangrass Hybrids for Cover Cropping in Organic Farming. Adapted from: Managing cover crops profitably. 3rd ed. Sustainable Agriculture Network Handbook Series Book 9. National Agricultural Laboratory, Beltsville, MD. http://www.extension.org/pages/18541/sorghum-sudangrass-hybrids-for-cover-cropping-in-organic-farming

[v] Sideman, Eric. 2007. Using Green Manures. Maine Organic Farmers and Gardeners Association. http://www.mofga.org/Portals/2/Fact%20Sheets/FS%2010%20Green%20Manures%20web.pdf

[vi] Grubinger, V. 2006. Farmers and their Innovative Cover Cropping Techniques [DVD]. University of Vermont Extension. Video Clip: Summer Cover Crop: Buckwheat from Vegetable Farmers and their Innovative Cover Cropping Techniques. http://www.extension.org/pages/59419/video-clip:-summer-cover-crop:-buckwheat-from-vegetable-farmers-and-their-innovative-cover-cropping-t

[vii] Zehnder, G. 2011. Managing the Soil to Reduce Insect Pest. eOrganic. http://www.extension.org/pages/18574/managing-the-soil-to-reduce-insect-pests