

Alaska Agricultural Pest Control Manual



Category Three

Individuals who act as a pesticide consultant or apply pesticides on property other than their own must obtain certification from the Alaska Department of Environmental Conservation (DEC) Pesticide Program. Individuals may apply general use pesticides on their own private properties without specific training or authorization. Those who wish to apply Restricted Use Pesticides (RUPs) to their own property must be certified by ADEC as a pesticide applicator.

Category Three, Agricultural Pest Control, is intended for individuals who apply pesticides to control agricultural pests. This includes application to

- agricultural commodities or properties;
- greenhouses and nurseries;
- feed, bedding, or bodies of animals; or
- treat seeds grown and stored for distribution or planting.

NOTE: This category does not include soil or commodity fumigation. These fumigations are certified under categories 15 and 16.

The information needed to successfully complete the written core examination required for all certified pesticide applicators in Alaska includes:

1. National Pesticide Applicator Certification Core Manual;
2. Alaska Core Manual; and
3. State of Alaska Pesticide Regulations in Title 18, Chapter 90 of the Alaska Administrative Code (18 AAC 90).

The information needed to successfully obtain certification in Category Three in Alaska includes:

1. This Alaska Manual;
2. The Washington State University Manual *Agricultural Weed Management Principles*;
3. The Washington State University Manual *Introduction to Insect and Disease Management*; and
4. EPA's "How to Comply with the Worker Protection Standard" manual (2015 revised).

Learning Objectives from this manual

Agricultural Pests in Alaska

- List common agricultural insects, weeds, and diseases in Alaska, including the crops they may affect.

Designated Private Applicators

- Describe what a Designated Private Applicator is.
- Explain which requirements may be different for Designated Private Applicators

Applying on Someone Else's Property

- Explain why application equipment owners may not be authorized to apply pesticides on neighboring farms.
- List the four conditions that must be met before an equipment owner may legally apply pesticides on property other than their own.

Record Keeping Requirements

- List the three types of pesticide application records that agricultural applicators may have to keep.

CALCULATIONS

Precise and accurate application is important for every pesticide application, but this is particularly true for the types of pesticide applications allowed under Category Three. Strong math skills, including the ability to calculate speed, volume, odd shaped areas, mixing ratios, rates of application, etc. will be necessary to successfully pass the Category Three Exam. You will need to carefully review pages 164-165, and 190-192 in the National Core Manual. Additional resources for pesticide applicator math are available online from the [Purdue Pesticide Program](#).

AGRICULTURAL PESTS IN ALASKA

The most common agricultural pests in Alaska include aphids, root maggots, cut worms, army worms, late blight, and botrytis. These pests have been identified as important due to their widespread presence and the potential injury they may cause. The following tables include agricultural pests common to Alaska.

Common Agricultural Insects In Alaska	Crop
• Grasshoppers, migratory (<i>Melanoplus sanguinipae</i>) and band-winged (<i>Camnula pellucida</i>)	Cereal grains, perennial forage, vegetable crops
• Capsus bugs (<i>Capsus simulans</i>)	Perennial forage
• Black grass bugs (<i>Irbisia pacifica</i> & <i>Labops hesperius</i>)	Perennial forage
• Green Peach Aphid (<i>Myzus persicae</i>)	Potatoes
• Potato Aphid (<i>Macrosiphum euphorbiae</i>)	Potatoes
• Wireworm (unidentified <i>spp.</i>)	Potatoes
• Aphids (various)	Vegetable crops (Lettuce)
• Cutworms (various)	Vegetable crops (Lettuce)
• Root maggots (various)	Vegetable crops (Cabbage)

Common Agricultural Weeds In Alaska	Crop
<ul style="list-style-type: none"> • Annual bluegrass (<i>Poa annua</i> L.) • Bluejoint reed grass (<i>Calamagrostis canadensis</i>) • Buttercup (<i>Ranunculus</i> spp.) • Canada thistle (<i>Cirsium arvense</i>) • Chickweed (<i>Stellaria media</i>) • Common tansy (<i>Tanacetum vulgare</i> L.) • Corn spurry (<i>Spergula arvensis</i>) • Cow cockle (<i>Silene vulgaris</i>) • Cow parsnip (<i>Heracleum lanatum</i>) • Dandelion (<i>Taraxacum officinale</i>) • Dock (<i>Rumex</i> spp.) • Fall dandelion (<i>Leontodon autumnalis</i>) • Fireweed (<i>Epilobium angustifolium</i>) • Foxtail barley (<i>Hordeum jubatum</i>) • Hawksbeard (<i>Crepis</i> spp.) • Hempnettle (<i>Galeopsis tetrahit</i>) • Horsetail (<i>Equisetum</i> spp.) • Lambsquarter (<i>Chenopodium album</i>) • Mustard spp. (<i>Brassicaceae</i>) • Narrow leaf hawksbeard (<i>Crepis tectorum</i>) • Northern bedstraw (<i>Galium boreale</i> L.) • Orange/yellow hawkweed (<i>Hieracium aurantiacum & umbellatum</i>) • Oxeye daisy (<i>Chrysanthemum leucanthemum</i> L.) • Perennial sowthistle (<i>Sonchus arvensis</i>) • Pineapple weed (<i>Matricaria matricarioides</i>) • Plantain (<i>Plantago</i> spp.) • Prostrate knotweed (<i>Polygonum arenastrum</i>) • Quackgrass (<i>Agropyron repens</i>) • Rattlebox (<i>Rhinanthus minor</i>) • Sheep sorrel (<i>Rumex acetosella</i>) • Shepherd's purse (<i>Capsella bursa-pastoris</i>) • Tall larkspur (<i>Delphinium glaucum</i>) • Toadflax (<i>Linaria vulgaris</i>) • Tufted hairgrass (<i>Deschampsia cespitosa</i>) • Wild buckwheat (<i>Polygonum convolvulus</i>) • Wild iris (<i>Iris setosa</i>) • Wild oats (<i>Avena fatua</i>) • Wild rose (<i>Rosa</i> spp.) • Willow (<i>Salix</i> spp.) • Yarrow (<i>Achillea millefolium</i>) 	Various

Common Agricultural Diseases In Alaska	Crop
<ul style="list-style-type: none"> • Scald (<i>Rhynchosporium secalis</i>) • Stripe (<i>Pyrenophora graminea</i>) • Net Blotch (<i>Pyrenophora teres</i>) • Spot Blotch (<i>Cochliobolus sativus</i>) • Smuts (<i>Ustilago spp.</i>) 	Cereal grains
<ul style="list-style-type: none"> • Rust (<i>Puccinia spp.</i>) • Powdery mildew (<i>Erysiphe spp.</i>) 	Perennial forage
<ul style="list-style-type: none"> • Late blight caused by <i>Phytophthora infestans</i> • Blackleg • Common Scab • Leak • Potato Virus S • Potato Virus X • Silver Scurf • Witches Broom • Pinkeye • Potato Leafroll Virus (rare) • Potato Virus Y (rare) 	Potatoes
<ul style="list-style-type: none"> • <i>Fusarium</i> 	Cereal grains, Potatoes, Vegetable crops
<ul style="list-style-type: none"> • <i>Rhizoctonia</i> 	Potatoes, Vegetable crops
<ul style="list-style-type: none"> • White mold - <i>Sclerotinia sclerotiorum</i> 	Potatoes, Vegetable crops
<ul style="list-style-type: none"> • <i>Botrytis</i> 	Vegetable crops (Lettuce)
<ul style="list-style-type: none"> • Shothole (anthracnose) in lettuce 	Vegetable crops (Lettuce)
<ul style="list-style-type: none"> • Cavity Spot in carrots 	Vegetable crops (Carrots)
<ul style="list-style-type: none"> • Wirestem (<i>Rhizoctonia spp.</i>) – cabbage 	Vegetable crops (Cabbage)

Other Agricultural Pests In Alaska

- Migratory waterfowl including geese, ducks and cranes, which may feed on crops.
- Moose and wild bison, which may feed on crops, trample crops, or leave droppings containing weed seed.
- Bear, which may feed on crops.

(Information about agricultural pests in Alaska developed from UAF Cooperative Extension Crop Profile data).

DESIGNATED PRIVATE APPLICATORS

Many individuals involved with agricultural pest control intend to apply pesticides only to their own property. These individuals may become “Designated Private Applicators” by declaring in writing they will only apply on property which they own or lease. Requirements for recordkeeping and liability insurance are modified for Designated Private Applicators. These

individuals may not apply pesticides to anyone else's property under THEIR certification (see below for additional information).

APPLYING ON SOMEONE ELSE'S PROPERTY (18 AAC 90.620, 18 AAC 90.300(g))

In most cases, if you apply pesticides to someone else's property, this is considered commercial application. This is true even if you are not paid for the work. Commercial applicators are required to obtain liability insurance and keep detailed application records. Some Category Three applicators are commercial applicators, but many will be Designated Private Applicators, who are only allowed to apply pesticides on their own property.

This creates a problem in the agricultural community, where only a few people have spray equipment large enough to treat large areas such as fields with pesticide. Many of these equipment owners may wish to spray pesticides for their neighbors, but are not able to meet the insurance requirements for commercial applicators.

There is a way for regulatory requirements to be met in this case, but only if certain conditions are met. If spraying is conducted under the certification of the property owner, rather than the equipment owner, liability insurance and certification requirements may not apply to the equipment owner.

If ALL of the following conditions apply, the equipment owner may apply pesticides to a neighbor's land without needing to be a certified commercial applicator:

1. The property owner is certified in Category Three, Agricultural Pest Control (either as a commercial applicator or a Designated Private Applicator);
2. The property owner purchases and provides the pesticide;
3. The property owner supervises the pesticide application; and
4. Only general use pesticides are applied.

For more information, please review the regulations in 18 AAC 90.620 and 18 AAC 90.300(g).

RECORDKEEPING REQUIREMENTS (18 AAC 90.410-420)

State and federal regulations require that detailed records be kept for ALL commercial applications, as described in the Alaska Core Manual.

Anyone, including Designated Private Applicators, who applies Restricted Use Pesticides (RUPs), is required to keep records of those applications, as described in the Alaska Core Manual.

In addition, for those farms or agricultural facilities that have employees, Worker Protection Standards also require records of pesticide applications. These recordkeeping requirements are described in the EPA *How To Comply With The Worker Protection Standard Manual*.

EPA HOW TO COMPLY WITH THE WORKER PROTECTION STANDARD MANUAL**Learning Objectives**

- Explain the purpose of WPS.
- Define the terms agricultural plants, farm, forest, nursery, and enclosed spaces.
- Describe the situations where WPS standards apply (three conditions).
- Identify if these situations describe your property.
- Define the terms pesticide worker and pesticide handler.
- Identify whether you employ any pesticide workers or handlers.
- Describe the label information that will inform you if WPS requirements apply to its use.
- Define the term Restricted Entry Interval (REI) and treated area.

Pesticide Training

- Explain when you must provide pesticide safety training to pesticide workers and handlers.
- Describe the types of information you must provide to pesticide workers and handlers.
- Explain the qualifications required to conduct pesticide safety training.
- Explain training record keeping requirements.

Central Information

- Describe the three types of information that must be displayed at a central location before pesticides are applied at a WPS facility.
- List the eight types of information that must be posted about each application of pesticide.
- Describe the location where information must be displayed.
- Explain how long WPS information must be posted.
- Explain record keeping requirements for central posting information.

Notice About Applications

- Define the term **AEZ**.
- Explain situations where information about the location of pesticide applications can be.
- Describe when oral notice may be provided (outdoors and in enclosed spaces).
- List the three types of information that must be provided in oral notification.
- Describe when posted notice must be provided (outdoors and in enclosed spaces).
- Describe the location where notification signs must be posted.
- Describe timing for posting notification signs and how long they must remain in place.
- Describe the size, graphics, and required wording that must be on notification signs.
- Describe the information you must provide to handlers

PPE

- Explain what types of PPE you must provide.
- Explain three requirements for respirators.
- State who is responsible for ensuring PPE is worn correctly.
- Explain who is responsible for maintaining PPE. What does this include?

- Describe where PPE should be stored and changed into.
- Explain why PPE should not be taken home.

Pesticide Handlers

- Describe the types of label information you must provide to pesticide handlers.
- Describe the specific duties related to PPE, including providing, ensuring usage, cleaning, and maintaining PPE.
- Explain how handlers should be monitored.

Decontamination Supplies

- List the three kinds of decontamination supplies that must be provided for pesticide workers.
- List the six kinds of decontamination supplies that must be provided for pesticide handlers.
- Explain when decontamination supplies must be made available.
- Describe where decontamination supplies must be located.
- Describe eye-wash requirements for handlers.

Emergency Assistance

- In case of pesticide emergency, what two things are required of employer?
- List the information that should be provided to medical personnel in case of a pesticide poisoning or injury.

Agricultural Owners

- Describe which WPS requirements apply to agricultural owners and their family.

WASHINGTON STATE UNIVERSITY MANUALS**Portions Of The Washington State University Manuals To Disregard**

You may disregard pages 41-42, of the Washington State University *Agricultural Weed Management Principals Manual*, which includes information about Washington State regulations. These regulations do not apply in Alaska.

Learning Objectives**From the *Agricultural Weed Management Principals Manual*:****Basic Weed Science**

- Describe what a weed is.
- Explain why introduced plants can be more problematic in an agricultural area.
- List some ways that seeds spread.
- List the characteristics of weed seeds that make them difficult to eradicate.
- Describe the identifying characteristics of a grass.
- Describe the identifying characteristics of a broadleaf plant.
- Describe the difference between an annual plant and a perennial plant.
- Describe the various ways that perennial plants may spread that do not involve seeds.

Weed Management

- List the most common way that weeds are introduced into croplands.
- Describe some techniques for preventing weeds from becoming established.
- Describe some mechanical methods of controlling weeds.
- Describe some cultural methods of controlling weeds.

Herbicides

- Describe the difference between contact herbicides and systemic herbicides.
- Explain why it is important to get uniform coverage of the entire plant with a contact herbicide.
- Describe some ways that soil applied herbicides can be incorporated into the soil.
- For each of the following modes of action, explain how they work to control weeds, and list some common pesticides with this mode of action: growth regulator, amino acid synthesis inhibitors, lipid inhibitors, seedling growth inhibitors, photosynthesis inhibitors, cell membrane disruptors, and pigment inhibitors.
- Describe the difference between selective and non-selective herbicides.
- Explain how some of the characteristics of plants affect herbicide selectivity.
- Explain how application factors such as application rate, timing, and location affect herbicide selectivity.
- Explain how chemical factors such as formulation and use of adjuvants can affect herbicide selectivity.
- Describe several techniques to help prevent the development of herbicide resistance.

Herbicide Performance

- Define and explain the difference between adsorption and absorption.
- Explain why herbicides are least likely to adsorb to sand, and most likely to adsorb to clay.
- Explain why herbicides are more likely to adsorb to soils with high organic content.
- Describe the type of soil which herbicides are most likely to leach through.
- Explain why higher air temperatures can lead to less herbicide selectivity.
- Explain why rainfall can result in poor weed control for both foliar and soil-applied herbicides.
- Explain how humidity can affect herbicide efficacy.
- Explain how wind can affect herbicide efficacy.
- List the four growth stages of a weed.
- Name the growth stage of an annual weed that is most susceptible to control efforts.
- Explain why it is important to know when plant sugars flow from leaves towards the roots in perennial plants.
- Name the growth stages of a perennial weed that are generally most susceptible to herbicides, and explain why.

Precautions

- List seven factors that may impact the amount of spray drift from applying herbicide.
- Define the term ‘vapor drift’.
- Describe how humidity and temperature can impact vapor drift.
- List some factors that can increase the chance of herbicide leaching into groundwater.
- Explain why it is advisable to dedicate application equipment to one type of herbicide.
- List some factors that determine the length of residual activity of an herbicide.
- List some precautions to take when using residual herbicides.
- Define the term ‘photodegradation’.
- Define the term ‘microbial degradation’.
- Define the term ‘chemical degradation’.
- Explain how adsorption, leaching, volatilization, uptake by plants, and soil pH can affect the persistence of herbicides.
- Describe several methods to help reduce levels of residual herbicide in soil.

Herbicide Application

- Name the part of a cut stump that should be treated with herbicide to prevent re-growth, and explain why treating this area is effective.
- Describe each of the following application methods: foliar, basal, frill, cut stump, soil.
- Describe the common types of pesticide application used in agriculture, including the situations where each would be most appropriate, and advantages and disadvantages of each method.
- List the advantages and disadvantages of the following nozzle materials: tungsten carbide, ceramic, stainless steel, brass, nylon, aluminum.
- State when nozzle tips should be replaced.
- Explain how to dispose of rinsate from cleaning application equipment.

Calculations and Calibration

- Calculate irregular shaped areas and perimeters.
- Describe the steps for calibrating a granular spreader.
- List the three variables that determine sprayer delivery rate.
- State the best way to make major changes to sprayer flow rate.
- Describe the steps for calibrating a boom sprayer.
- Explain guidelines for tank mixing different herbicides.
- Explain the purpose of adjuvants, including stickers, spreaders, penetrants, and buffers.
- Calculate effective application rate and swath width of a granular spreader, application rate of a boom sprayer, and other example problems.

From the *Introduction to Insect and Disease Management Manual*:**Insect Growth and Development**

- List some of the beneficial roles that insects play.
- Define the terms exoskeleton, molting, metamorphosis, instar, nymph, larva, cocoon.
- List the stages of simple metamorphosis.
- Give some examples of insects that undergo simple metamorphosis.
- List the stages of complex metamorphosis.

Insect Physiology and Structure

- Define the term spiracle.
- Explain ways that pesticides can affect the respiratory system of an insect.
- Name some pesticides that affect the nervous system of an insect, and explain why these products can be dangerous to humans or pets.
- Describe the body characteristics of most insects.
- Describe the body characteristics of most arachnids.
- List some common insects that have chewing mouthparts.
- List some common insects that have piercing-sucking mouthparts.

Insect Classification

- Describe characteristics of the following types of insects and insect relatives: grasshoppers, earwigs, thrips, true bugs, aphids/psyllids, leafhoppers/spittlebugs, scales/mealy bugs, white flies, moths/butterflies, beetles, flies/gnats/midges, ants, bees, sawflies, parasitic wasps, spiders, spider mites, eriophyid mites, and symphylans.

Damage

- List some symptoms or damage caused to plants by insects with chewing mouthparts.
- List some symptoms or damage caused to plants by insects with piercing-sucking mouthparts.
- Explain why insects with piercing-sucking mouthparts may help spread disease from one plant to another.
- Define the term secondary pest.

Factors Influencing Insects

- Describe how weather can affect insect populations.
- Define the terms predator, parasite, parasitoid, and host-specific.
- Explain why broad-spectrum insecticides may result in further pest problems.

Insecticides - General

- Explain how contact insecticides work.
- Explain how systemic insecticides work.
- Explain why systemic insecticides are generally more effective against insects with piercing-sucking mouthparts.
- Explain the difference between narrow-spectrum and broad-spectrum insecticides.
- Explain the difference between residual and non-residual insecticides.

Insecticides

- Explain some reasons why many inorganic insecticides are no longer considered safe to use.
- State an advantage of botanical insecticides.
- Describe characteristics of chlorinated hydrocarbons.
- Explain why there are few chlorinated hydrocarbons currently registered for use.
- State which classes of the synthetic organic insecticides are generally most toxic to humans.
- Describe a significant drawback to carbamate type insecticides.
- Explain how pyrethroids work to kill insects.
- Explain how spray oils work to kill insects.
- Name at least two types of insecticides that are systemic.
- Name a type of insecticide that tends to have a long residual effect.
- List some currently used active ingredients in each of the following type of insecticide: botanicals, chlorinated hydrocarbons, organophosphates, carbamates, pyrethroids, and microbials.
- Explain how insect growth regulators, insect attractants, and pheromones work to control insects.
- List some techniques to help prevent insecticide resistance.

Precautions

- Describe the characteristics of insecticides that are most hazardous to bees.
- Describe the timing and temperature characteristics when application of insecticides is least likely to harm bees,
- List some ways that pesticides can enter water.

Plant Diseases

- List the plant function and common diseases that occur in the following plant parts: roots, stems, leaves, fruit/seed.
- List some types of damage to plants that are NOT caused by pests.
- Define the terms pathogen, parasite, and saprophyte.

Plant Pathogens

- List some plant damage caused by fungi.
- List a beneficial activity of fungi.
- List some plant damage caused by bacteria.
- List a beneficial activity of bacteria.
- List some plant damage caused by viruses.
- Define the term vector.
- List ways that each of the following reach plants; fungi, bacteria, viruses, and nematodes.
- Describe the three factors that influence whether or not a pathogen that reaches and enters a plant will develop into disease.

Diagnosing Disease

- Explain why correctly diagnosing a disease is essential to effectively controlling it.
- Describe the following terms: necrosis, discoloration, overdevelopment of tissue, underdevelopment of tissue, and wilting.
- Name an organization that is available to help diagnose plant diseases.
- Describe the characteristics of the following symptoms: fungal leaf spots, bacterial leaf spots, powdery mildew, veinal chlorosis, pollution injury, chemical damage, shoot dieback, shoot blight, needle drop, needle injury, top dying, branch dying,

Disease Control

- List and describe some cultural and plant management principles that help prevent plant disease.
- Define the term tolerant.
- Describe the efficacy of chemical controls against fungus, bacteria, and viruses.
- Explain why fungicides are usually applied as protectants.
- List some currently used active ingredients in synthetic organic fungicides.

Before Using Any Pesticide

STOP

**All pesticides can be harmful to health
and environment if misused.**

**Read the label
carefully. Use only
as directed.**