

Appendix 2: Characteristic Signs and Symptoms for Several Pesticide Active Ingredients and Classes of Pesticides

PESTICIDE	SIGNS AND SYMPTOMS
Acrolein	Conjunctivitis (irritation of mucous membranes, tearing) Skin irritation, rash, blistering, or erosion (without sensitization) Pulmonary edema Tearing Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Acrylonitrile	Seizures/convulsions (tonic-clonic), sometimes leading to coma Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Aminopyridine	Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Salivation Sweating (diaphoresis) Thirst
ANTU	Dyspnea Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Arsenicals (inorganic)	Anemia Abdominal pain Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Bloody diarrhea Keratosis, brown discoloration Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Leukopenia, thrombocytopenia Metallic taste in mouth Paralysis, paresis (muscle weakness) Paresthesia of extremities Runny nose Stomatitis Thirst
Arsine	Anemia Chills Hemoglobinuria Hemolysis Hyperkalemia Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia)
PESTICIDE	SIGNS AND SYMPTOMS
Borate	Abdominal pain Beefy red palms, soles Diarrhea Hypotension, shock Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia)

	<p>Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions)</p> <p>Tremor</p>
Cadmium compounds	<p>Abdominal pain</p> <p>Conjunctivitis (irritation of mucous membranes, tearing)</p> <p>Cyanosis</p> <p>Diarrhea</p> <p>Dyspnea</p> <p>Pulmonary consolidation</p> <p>Pulmonary edema</p> <p>Salivation</p> <p>Skin irritation, rash, blistering, or erosion (without sensitization)</p> <p>Upper respiratory tract irritation: rhinitis, scratchy throat, cough</p>
Carbamate insecticides	<p>Abdominal pain</p> <p>Anorexia</p> <p>Bradycardia (sometimes to asystole)</p> <p>Diarrhea</p> <p>Diplopia</p> <p>Dyspnea</p> <p>Incoordination (including ataxia)</p> <p>Miosis</p> <p>Muscle twitching</p> <p>Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions)</p> <p>Paralysis, paresis (muscle weakness)</p> <p>Runny nose</p> <p>Salivation</p> <p>Sweating (diaphoresis)</p> <p>Tearing</p> <p>Tremor</p>
Carbon disulfide	<p>Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability)</p> <p>Breath odor of rotten cabbage</p> <p>Incoordination (including ataxia)</p> <p>Paresthesia of extremities</p> <p>Seizures/convulsions (tonic-clonic), sometimes leading to coma</p>
Carbon tetrachloride	<p>Jaundice</p> <p>Liver enlargement</p> <p>Liver enzymes elevated (LDH, ALT, AST, alkaline phosphatase)</p>
PESTICIDE	SIGNS AND SYMPTOMS
Cationic detergents	<p>Skin irritation, rash, blistering, or erosion (without sensitization)</p> <p>Pulmonary edema</p>
Chlordimeform	<p>Anorexia</p> <p>Hot sensations</p> <p>Kidney (dysuria, hematuria, pyuria)</p> <p>Skin irritation, rash, blistering, or erosion (without sensitization)</p> <p>Sweet taste in mouth</p>

Chlorhexidine	Contact dermatitis Urticaria
Chloroform	Jaundice Liver enlargement Liver enzymes elevated (LDH, ALT, AST, alkaline phosphatase)
Chloropicrin	Conjunctivitis (irritation of mucous membranes, tearing) Dyspnea Tearing Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Cholecalciferol	Anorexia Hypercalcemia Polyuria Thirst
Copper compounds	Abdominal pain Conjunctivitis (irritation of mucous membranes, tearing) Hypotension, shock Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Liver enlargement Skin irritation, rash, blistering, or erosion (without sensitization) Stomatitis
Coumarins	Bloody diarrhea Ecchymoses Hypoprothrombinemia
Creosote	Contact dermatitis Hypothermia Methemoglobinemia Pallor Pulmonary edema Seizures/convulsions (tonic-clonic), sometimes leading to coma Smoky urine
Crimidine	Cyanosis Seizures/convulsions (tonic-clonic), sometimes leading to coma
PESTICIDE	SIGNS AND SYMPTOMS
Cyanamide	Dyspnea Hypotension, shock Skin flushing Tachycardia
Cyanide	Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Bradycardia (sometimes to asystole) Breath odor of bitter almonds Dilated pupils Salivation Seizures/convulsions (tonic-clonic), sometimes leading to coma Unreactive pupils

DEET	Contact dermatitis Seizures/convulsions (tonic-clonic), sometimes leading to coma Urticaria
Dibromochloropropane	Low sperm count Skin irritation, rash, blistering, or erosion (without sensitization)
Diquat	Abdominal pain Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Bloody diarrhea Conjunctivitis (irritation of mucous membranes, tearing) Ileus Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions) Skin irritation, rash, blistering, or erosion (without sensitization) Stomatitis
Endothall	Bloody diarrhea Conjunctivitis (irritation of mucous membranes, tearing) Hypotension, shock Seizures/convulsions (tonic-clonic), sometimes leading to coma Skin irritation, rash, blistering, or erosion (without sensitization)
Ethylene dibromide	Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Skin irritation, rash, blistering, or erosion (without sensitization) Pulmonary edema Upper respiratory tract irritation: rhinitis, scratchy throat, cough
PESTICIDE	SIGNS AND SYMPTOMS
Ethylene oxide	Cardiac arrhythmias Conjunctivitis (irritation of mucous membranes, tearing) Dermal sensitization Pulmonary edema Skin irritation, rash, blistering, or erosion (without sensitization)
Fluoride	Abdominal pain Bloody diarrhea Dilated pupils Hypocalcemia Seizures/convulsions (tonic-clonic), sometimes leading to coma Tetany, carpopedal spasms
Formaldehyde	Conjunctivitis (irritation of mucous membranes, tearing) Skin irritation, rash, blistering, or erosion (without sensitization) Upper respiratory tract irritation: rhinitis, scratchy throat, cough

Fumigants (halocarbon)	Cardiac arrhythmias Incoordination (including ataxia)
Hexachlorobenzene	Anorexia Porphyria (wine-red urine)
Hexachlorophene	Contact dermatitis Seizures/convulsions (tonic-clonic), sometimes leading to coma Skin irritation, rash, blistering, or erosion (without sensitization)
Indandiones	Bloody diarrhea Ecchymoses Hypoprothrombinemia
Mercury (organic)	Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Constricted eye fields Hearing loss Metallic taste in mouth Paresthesia of extremities Tremor
Metaldehyde	Abdominal pain Seizures/convulsions (tonic-clonic), sometimes leading to coma Tremor
Metam sodium	Conjunctivitis (irritation of mucous membranes, tearing) Skin irritation, rash, blistering, or erosion (without sensitization)
PESTICIDE	SIGNS AND SYMPTOMS
Methyl bromide	Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Dyspnea Conjunctivitis (irritation of mucous membranes, tearing) Pulmonary consolidation Pulmonary edema Skin irritation, rash, blistering, or erosion (without sensitization)
Naphthalene	Anemia Conjunctivitis (irritation of mucous membranes, tearing) Hemoglobinuria Hemolysis Hyperkalemia Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Sweating (diaphoresis) Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Nicotine	Abdominal pain Anorexia Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Cardiac arrhythmias

	<p>Diarrhea Cyanosis Diplopia Dyspnea Hypertension (early in poisoning) Incoordination (including ataxia) Muscle twitching Paralysis, paresis (muscle weakness) Salivation Seizures/convulsions (tonic-clonic), sometimes leading to coma Sweating (diaphoresis) Tremor</p>
Nitrophenols	<p>Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Fever Hot sensations Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Skin flushing Sweating (diaphoresis) Tachycardia Thirst Yellow stain on skin Yellow sclera</p>
PESTICIDE	SIGNS AND SYMPTOMS
Organochlorines	<p>Cyanosis Pallor Paresthesia (chiefly facial, transitory) Seizures/convulsions (tonic-clonic), sometimes leading to coma</p>
Organophosphates	<p>Abdominal pain Acetylcholinesterase depression (RBC and/or plasma) Anorexia Bradycardia (sometimes to asystole) Diarrhea Diplopia Dyspnea Incoordination (including ataxia) Miosis Muscle twitching Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions) Paralysis, paresis (muscle weakness) Paresthesia (chiefly facial, transitory) Runny nose Salivation Sweating (diaphoresis) Tearing Tremor</p>
Organotin compounds	<p>Abdominal pain Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability)</p>

	<p>Conjunctivitis (irritation of mucous membranes, tearing) Skin irritation, rash, blistering, or erosion (without sensitization)</p>
Paraquat	<p>Abdominal pain Bloody diarrhea Conjunctivitis (irritation of mucous membranes, tearing) Contact dermatitis Cyanosis Dyspnea Jaundice Keratitis Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Myalgia Pulmonary consolidation Skin irritation, rash, blistering, or erosion (without sensitization) Stomatitis Upper respiratory tract irritation: rhinitis, scratchy throat, cough</p>
PESTICIDE	SIGNS AND SYMPTOMS
Pentachlorophenol	<p>Anorexia Contact dermatitis Dyspnea Fever Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Sweating (diaphoresis) Tachycardia Thirst Urticaria</p>
Phosphorus	<p>Abdominal pain Breath odor of garlic Hypotension, shock Jaundice Pulmonary edema Skin irritation, rash, blistering, or erosion (without sensitization) Tetany, carpopedal spasms Thirst</p>
Phosphides	<p>Abdominal pain Breath odor of garlic Hypotension, shock Jaundice Paresthesia (chiefly facial, transitory) Pulmonary edema Tetany, carpopedal spasms Thirst</p>
Phosphine	<p>Breath odor of garlic Chills Hypotension, shock Jaundice</p>

	<p>Liver enlargement Liver enzymes elevated (LDH, ALT, AST, alkaline phosphatase) Pulmonary edema Seizures/convulsions (tonic-clonic), sometimes leading to coma Thirst</p>
Povidone-iodine	<p>Cardiac arrhythmias Seizures/convulsions (tonic-clonic), sometimes leading to coma</p>
Propargite	<p>Dermal sensitization Skin irritation, rash, blistering, or erosion (without sensitization)</p>
PESTICIDE	SIGNS AND SYMPTOMS
Pyriminil	<p>Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Breath odor of peanuts Cardiac arrhythmias Constipation Glucosuria Hyperglycemia (elevated serum glucose) Ketoacidosis Ketonuria Paresthesia of extremities Urinary retention</p>
Pyrethrins	<p>Contact dermatitis Runny nose</p>
Pyrethroids	<p>Diarrhea Pulmonary edema</p>
Sabadilla	<p>Cardiac arrhythmias Sneezing</p>
Sodium chlorate	<p>Anemia Cardiac arrhythmias Cyanosis Hemoglobinuria Hemolysis Hyperkalemia Hypotension, shock Jaundice Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Liver enlargement Methemoglobinemia Seizures/convulsions (tonic-clonic), sometimes leading to coma Skin irritation, rash, blistering, or erosion (without sensitization)</p>
Sodium fluoride	<p>Cardiac arrhythmias Hypotension, shock Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Pallor</p>

	<p>Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions)</p> <p>Salivation</p> <p>Salty, soapy taste in mouth</p> <p>Thirst</p>
PESTICIDE	SIGNS AND SYMPTOMS
Sodium fluoroacetate	<p>Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability)</p> <p>Cardiac arrhythmias</p> <p>Cyanosis</p> <p>Paresthesia of extremities</p> <p>Seizures/convulsions (tonic-clonic), sometimes leading to coma</p>
Strychnine	<p>Cyanosis</p> <p>Seizures/convulsions (tonic-clonic), sometimes leading to coma</p>
Sulfur	<p>Breath odor of rotten eggs</p> <p>Diarrhea</p> <p>Skin irritation, rash, blistering, or erosion (without sensitization)</p>
Sulfur dioxide	<p>Conjunctivitis (irritation of mucous membranes, tearing)</p> <p>Dyspnea</p> <p>Pulmonary edema</p> <p>Upper respiratory tract irritation: rhinitis, scratchy throat, cough</p>
Sulfuryl fluoride	<p>Dyspnea</p> <p>Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia)</p> <p>Muscle twitching</p> <p>Upper respiratory tract irritation: rhinitis, scratchy throat, cough</p>
Thallium	<p>Abdominal pain</p> <p>Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability)</p> <p>Bloody diarrhea</p> <p>Cardiac arrhythmias (ventricular)</p> <p>Hypertension (early in poisoning)</p> <p>Hypotension, shock</p> <p>Ileus</p> <p>Incoordination (including ataxia)</p> <p>Loss of hair</p> <p>Paresthesia of extremities</p> <p>Ptosis</p> <p>Seizures/Convulsions (tonic-clonic), sometimes leading to coma</p> <p>Tremor</p>
Thiram	<p>Alcohol intolerance</p> <p>Contact dermatitis</p> <p>Diarrhea</p> <p>Skin irritation, rash, blistering, or erosion (without sensitization)</p>
Veratrum alkaloid (see <i>sabadilla</i>)	

Adapted from:

Morgan DP. Recognition and management of pesticide poisonings. 4th ed. Washington: US Environmental Protection Agency; 1989.

Reigart JR, Roberts JR. Recognition and management of pesticide poisonings. 5th ed. Washington: US Environmental Protection Agency; 1999.

GLOSSARY OF MEDICAL TERMS:

Anorexia: diminished appetite.

Bradycardia: Slow heart rate (generally less than 60 beats per minute).

Carpopedal spasms: spasm of the hands and/or feet.

Conjunctivitis: inflammation of the conjunctiva (the mucous membrane covering the surface of the eye)

Cyanosis: a dark blueish or purplish coloration of the skin and mucous membranes.

Diaphoresis: sweating, perspiration.

Dyspnea: shortness of breath.

Ecchymoses: Bruises of the skin larger than 3mm in diameter.

Glucosuria: Presence of glucose in the urine.

Hemoglobinuria: Presence of hemoglobin in the urine.

Hemolysis: destruction of red blood cells.

Hypercalcemia: increased calcium in the blood.

Hyperkalemia: increased potassium in the blood.

Hypertension: increased blood pressure.

Hypoprothrombinemia: low levels of prothrombin in the blood.

Hypothermia: decreased body temperature (significantly below 98.6⁰ F.

Ileus: Obstruction of the bowel.

Keratoses: a hard, thick circumscribed skin lesion (characterized by overgrowth of the horny layer).

Ketoacidosis: an increase in the pH of the blood caused by the enhanced production of ketones.

Ketouria: Presence of ketones in the urine.

Leukopenia: Decreased number of white blood cells in the blood.

Methemoglobinemia: the presence of methemoglobin in the blood.

Miosis: pinpoint pupils.

Myalgia: muscular pain.

Paresis: muscle weakness.

Paresthesia: an abnormal sensation such as of burning, pricking, tingling or tickling.

Polyuria: increased production of urine resulting in increased frequency of urination.

Porphyria: increased porphyrins in the urine manifesting as wine-red urine.

Ptosis: a sinking down of the eyelid.

Pulmonary consolidation: an infiltrate in the lung observed on a chest x-ray.

Rhinitis: inflammation of the nasal mucous membranes.

Stomatitis: inflammation of the mucous membranes of the mouth.

Tachycardia: Rapid heart rate (generally greater than 100 beats per minute).

Tetany: a clinical neurological syndrome characterized by muscle twitches, cramps, carpedal spasm, and when severe, laryngospasm and seizures.

Thrombocytopenia: decreased number of platelets in the blood.

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