

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 Keratoses, 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) Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions) Tremor
Cadmium compounds	Abdominal pain Conjunctivitis (irritation of mucous membranes, tearing) Cyanosis Diarrhea Dyspnea Pulmonary consolidation Pulmonary edema Salivation Skin irritation, rash, blistering, or erosion (without sensitization) Upper respiratory tract irritation: rhinitis, scratchy throat, cough
Carbamate insecticides	Abdominal pain 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) Runny nose Salivation Sweating (diaphoresis) Tearing Tremor
Carbon disulfide	Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Breath odor of rotten cabbage Incoordination (including ataxia) Paresthesia of extremities Seizures/convulsions (tonic-clonic), sometimes leading to coma
Carbon tetrachloride	Jaundice Liver enlargement Liver enzymes elevated (LDH, ALT, AST, alkaline phosphatase)

PESTICIDE	SIGNS AND SYMPTOMS
Cationic detergents	Skin irritation, rash, blistering, or erosion (without sensitization) Pulmonary edema
Chlordimeform	Anorexia Hot sensations Kidney (dysuria, hematuria, pyuria) Skin irritation, rash, blistering, or erosion (without sensitization) Sweet taste in mouth
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 Porphyrinuria (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 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
Nitrophenols	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

PESTICIDE	SIGNS AND SYMPTOMS
Organochlorines	Cyanosis Pallor Paresthesia (chiefly facial, transitory) Seizures/convulsions (tonic-clonic), sometimes leading to coma
Organophosphates	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
Organotin compounds	Abdominal pain Behavioral-mood disturbances (confusion, excitement, mania, disorientation, emotional lability) Conjunctivitis (irritation of mucous membranes, tearing) Skin irritation, rash, blistering, or erosion (without sensitization)
Paraquat	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

PESTICIDE	SIGNS AND SYMPTOMS
Pentachlorophenol	Anorexia Contact dermatitis Dyspnea Fever Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Sweating (diaphoresis) Tachycardia Thirst Urticaria
Phosphorus	Abdominal pain Breath odor of garlic Hypotension, shock Jaundice Pulmonary edema Skin irritation, rash, blistering, or erosion (without sensitization) Tetany, carpopedal spasms Thirst
Phosphides	Abdominal pain Breath odor of garlic Hypotension, shock Jaundice Paresthesia (chiefly facial, transitory) Pulmonary edema Tetany, carpopedal spasms Thirst
Phosphine	Breath odor of garlic Chills Hypotension, shock Jaundice Liver enlargement Liver enzymes elevated (LDH, ALT, AST, alkaline phosphatase) Pulmonary edema Seizures/convulsions (tonic-clonic), sometimes leading to coma Thirst
Povidone-iodine	Cardiac arrhythmias Seizures/convulsions (tonic-clonic), sometimes leading to coma
Propargite	Dermal sensitization Skin irritation, rash, blistering, or erosion (without sensitization)

PESTICIDE	SIGNS AND SYMPTOMS
Pyriminit	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
Pyrethrins	Contact dermatitis Runny nose
Pyrethroids	Diarrhea Pulmonary edema
Sabadilla	Cardiac arrhythmias Sneezing
Sodium chlorate	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)
Sodium fluoride	Cardiac arrhythmias Hypotension, shock Kidney (proteinuria, hematuria, sometimes leading to oliguria, acute renal failure with azotemia) Pallor Nervous system depression (stupor, coma, respiratory failure, often without seizures/convulsions) Salivation Salty, soapy taste in mouth Thirst

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

Ileus: Obstruction of the bowel.

Keratosis: 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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