



TOXINS IN THE GARDEN :
Southern Nevada Version

Gail Brandys, Master Gardener
Master of Science in Industrial Safety Management
Certified Safety Professional (Retired)

TOXINS IN THE GARDEN

- PATHOGENIC / TOXIC ORGANISMS
- PLANT TOXINS AND IRRITANTS
- HAZARDOUS MATERIALS UPDATE



PROLOGUE

Our goal is not to dissuade you from gardening . . .

but to provide you with useful knowledge to help you garden safely for many years to come

WORK SMARTER, NOT HARDER !



Gardening is a rewarding but challenging hobby in the desert Southwest !

- Beastly hot summers
- Lots and lots and lots of sunshine
- Alkaline, salty, low organic matter, caliche "soil"
- Spiny and toxic plants
- Potentially harmful insects and micro-organisms in the soil & air
- Landscape contractors with a vast chemical arsenal

Sure . . . lets pursue gardening as a hobby !

PUBLIC HEALTH CONCEPTS

"Preventive Medicine" - Keep people healthy

IDENTIFY THE HAZARD

ELIMINATE / SUBSTITUTE / CONTROL
(Engineering Controls or PPE)

EDUCATION

PATHOGENIC / TOXIC ORGANISMS

Rose Handler's Disease (Sporotrichosis)
San Joaquin Valley Fever (Coccidioidomycosis)
Pet Feces Parasites (Toxoplasmosis and Giardiasis)
Tetanus (Clostridium tetani)
Hanta Virus
Invertebrates (Scorpions, Black Widow Spiders, Africanized Bees, Fire Ants and Mosquitos)

PLANT TOXINS AND IRRITANTS

Oleander Trees (Oleandrin and other toxins)
Euphorbia / Spurge Sap (eye / skin irritant)
Sacred Datura (Nightshade poisons)
Lantana (Triterpene poisons)
Sago Palm (Three toxins including cycasin)
Globe Mallow (Physical eye irritant)
Hemlock (Several alkaloids)

AND MANY OTHERS

HAZARDOUS MATERIALS UPDATE

Round up – Glyphosate toxicity
Naturally-Occurring Asbestos – Actinolite
Vermiculite – Tremolite Asbestos

GENERALLY LOW RISK MATERIALS WITH LOTS OF MEDIA HYPE



PATHOGENIC ORGANISMS

TYPICALLY :

FUNGI INFECT PLANTS 

BACTERIA INFECT ANIMALS (HUMANS) 

BUT THERE IS SOME CROSS OVER WITH SOME "OPPORTUNISTIC" SPECIES OF FUNGI AND IN IMMUNO-COMPROMISED INDIVIDUALS (SUCH AS "SENIOR CITIZENS")

US Centers for Disease Control

Rose Handler's Disease (Sporotrichosis)



Rose Handler's Disease is a fairly rare disease caused by a thermophilic fungus *Sporothrix schenckii* that is naturally found worldwide on roses, hay and sphagnum moss and pine needles

Being stuck or scraped by a rose thorn can inject the fungus under the skin

A firm pink or purple bump may then form under the skin days or months later (painless or mildly tender)

Rose Handler's Disease (Sporotrichosis)



Treatment : a prescription iodine solution is generally recommended

Untreated, it can become an ulcerated sore, cause lung and breathing problems, bone infection, arthritis, and infection of the nervous system.

Treatment may take months or years to cure infection

Prevention : Cover existing scratches before gardening
Wear leather gloves, long sleeves and sturdy soled shoes for rose gardening
Avoid steroids – hamper immune system

San Joaquin Valley Fever (Coccidioidomycosis)

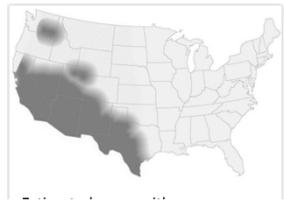
San Joaquin "Valley Fever" is a fairly rare disease caused by a thermophilic fungus *Coccidioides immitis* that is naturally found in the soil of some areas of California, Arizona, New Mexico, Nevada and Utah

Once inhaled, it produces flu-like symptoms (fever, cough, fatigue, headache, muscle aches, joint pain)

FARMERS FIELD CONSTRUCTION QUARRYS



San Joaquin Valley Fever Prevalence



San Joaquin Valley Fever

Who is Susceptible :

Residents over 60 years old, people with chronic illnesses, people who are exposed to airborne dust and dirt and recent "transplants to the Southwest."

Las Vegas Review Journal reported 72 cases in 2007
CDC reported 350 cases in 2019 (NV, NM, UT)



San Joaquin Valley Fever

Diagnosis : sputum or blood test for fungus/antibodies

Treatment : a prescription antifungal oral medication is typically recommended (~ 60% effective)
DO NOT USE STEROIDS !

Untreated, or improperly treated, can cause permanent lung damage - fatal (2%) CDC

Prevention : No vaccine for it yet
Avoid very dusty activities
Wear a dust mask (N95) with 2 straps
Wet soil down before tilling
Change and wash clothes after dusty activity

Animal Excrement Parasite – Toxoplasma (Toxoplasmosis)*

Toxoplasmosis is a rare disease caused by a parasite *Toxoplasma gondii* that is found throughout the world and infects some wild and domestic animals

Common exposure routes :

- Touching feces or urine of infected animals that ingested contaminated animals or water
- Dust exposure in areas where feral animals defecate or urinate followed by hand to mouth contact (eating or smoking)



* Sources : Haven Animal Hospital Fact Sheet, Las Vegas, NV and Southern Nevada Health District Fact Sheet

Toxoplasmosis

Symptoms : Flu-like : swollen glands, muscle aches
Mild cases can have no symptoms
Can be teratogenic* in pregnant women

Diagnosis : variety of blood tests

Treatment : none necessary unless pregnancy is an issue

* Causing birth defects if infected during pregnancy

The College of Family Physicians of Canada : Jan 10; 52(1): 29–32.

Toxoplasmosis

Prevention : Use gloves when touching contaminated soil
Keep cats indoors
Don't feed pets raw meat
Clean litterbox daily (not infective that soon)
Or use gloves and wash hands afterwards
Wash hands after gardening & before eating
Wash vegetables and fruit thoroughly
Wash hands and utensils after touching veggies and raw meat

Preventing congenital toxoplasmosis. Lopez A, Dietz VJ, Wilson M, Navin TR, Jones JL, MMWR Recomm. Rep. 2000 Mar 31; 49(RR-2):59-68.

Pet Feces Parasite – *Giardia lamblia* (Giardiasis)*

Giardiasis is a rare disease caused by a parasite *Giardia lamblia* that is found throughout the world and infects some wild and domestic animals

Common exposure routes :

- Touching feces of dogs who ingested contaminated animals or water
- Gardening in areas where they defecate followed by hand to mouth contact (eating or smoking)



* Source : Southern Nevada Health District Fact Sheet

Giardiasis

Symptoms : Mild or severe diarrhea, stomach cramps, weight loss, fatigue, fever is rare

Diagnosis : stool sample to look for the parasites

Treatment : Anti-parasitic medication. Some people recover without treatment.

Giardiasis

Prevention : Use gloves when gardening
Wash hands after gardening & before eating
Don't feed pets raw meat
Don't eat raw or undercooked meats
Wear gloves when cleaning up pet feces or pet messes and wash hands afterwards
Wash vegetables and fruit thoroughly
Wash hands and utensils after touching veggies and raw meat

Source : Cleveland Clinic

Tetanus (*Clostridium tetani*)

Tetanus is caused by a toxin made by spores of the bacteria *Clostridium tetani*, found in soil, dust and animal feces. When the spores enter a deep flesh wound, they grow into bacteria that can produce a powerful toxin, tetanospasmin. The toxin impairs the nerves that control your muscles (motor neurons).

Another name for tetanus is "lockjaw". It often causes a person's neck and jaw muscles to lock, making it hard to open the mouth or swallow.

CDC recommends vaccines for infants, children, teens, and adults to prevent tetanus at least every 10 years.

https://www.mayoclinic.org/diseases-conditions/tetanus/symptoms/_page-20351635
<http://www.cdc.gov/tetanus/index.html>

Hanta Virus (Hanta Pulmonary Syndrome - HPS)

A viral disease spread through infected rodent feces and urine.

The host is the deer mouse (*Peromyscus maniculatus*), present throughout the western and central US and Canada.

(The disease is not carried by regular house mice but by deer mice that are brown and have a white underbelly.)

Hantavirus is endemic in Washoe County, including the Gerlach area.

It affects the lungs, kidneys and other organs.

* CDC.gov/hantavirus

** Juan P. Olano, David H. Walker, in *Vaccines for Biodefense and Emerging and Neglected Diseases*, 2009




Hanta Pulmonary Syndrome -

Symptoms :

include fatigue, fever and muscle aches, especially in the large muscle groups—thighs, hips, back, and sometimes shoulders. These symptoms are universal.

There may also be headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain.

No vaccine, treatment or cure.

Mortality Rate : 38% * (CDC)

Hanta Virus (Hanta Pulmonary Syndrome - HPS)

Prevention :

Eliminate or minimize contact with rodents in your home, garden, workplace, or campsite. Seal up holes and gaps in your home or garage. Clean up any easy-to-get food. Store food securely.

Many people who became ill reported that they had not seen rodents or rodent droppings at all. Therefore, if you live or camp in an area where the carrier rodents are known to live, try to keep your home, vacation place, workplace, or campsite clean.

HAZARDOUS ENVIRONMENTAL PESTS

INVERTEBRATES

- Scorpions
- Black Widow Spiders
- Africanized Bees
- Fire Ants
- Mosquitos



SCORPIONS



There are about 25 species of scorpions in Nevada, but the Arizona Bark scorpion is the most venomous in North America and a common pest in the Las Vegas Valley.

A scorpion's stinger releases a neurotoxin that is painful and can be potentially harmful.

Those most at risk for complications from a scorpion sting are the elderly, children younger than 18 months and pets.

Anyone who fits these categories and is stung by a scorpion should be taken to an emergency room.

Las Vegas Review Journal – June 9, 2016 – Sandy Lopez
M.L. Robinson, Associate Professor, UNCE

BLACK WIDOW SPIDERS



Black Widow Spiders are found throughout the Las Vegas Valley.

The female black widow spider is considered the most venomous spider in North America.

Male and juvenile Black Widow Spiders are harmless.

The adult is about 1/4 inch long, shiny black with a red or orange hourglass or circular shape on the underside of the abdomen.

The venom is 15 times as toxic as the venom of a rattlesnake.

BLACK WIDOW SPIDERS



The webs look very cottony and are quite sticky and is the most obvious sign of an infestation.

The webs appear uneven and tangled.

The webs are often found near the ground inside storage sheds or small holes and crevices around building foundations and outdoor furniture.

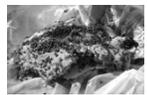
Vacuum cleaner can be used to remove webs, spiders and their egg sacs or call an exterminator.

orkin.com

AFRICANIZED BEES



- A hybrid of Western honey bees and African bees
- Slightly smaller than European honey bees
- Attack in higher numbers than other types of bees
- Entered the southern US in the early 1990s
- Form hives in unusual places
 - Sprinkler control valve boxes
 - Abandoned car tires
 - Empty boxes
 - Cars
 - Walls of a home
- Native bees do not form typical hives



Beemaster.com

AFRICANIZED BEES

- Africanized bees acquired the name "Killer Bees" because they will viciously attack people and animals (orifices) who stray into their territory, often resulting in serious injury or death.
- May attack in response to noises, vehicle or equipment vibrations or walking.
- Their venom is no more potent than native honey bees but they attack in greater numbers and pursue perceived enemies for greater distances.

If you are attacked by Africanized bees :

- Hold your breath – bees are attracted to CO₂
- Run to an enclosed, sheltered place
- Scrape a sting, do not grab and pull

Desertusa.com



FIRE ANTS



Fire Ants are introduced to the Las Vegas area by imported plants.

They are small but aggressive and can cause a variety of problems with their painful bites.

They seek out moist areas outdoors such as golf courses, lawn irrigation systems and standing water.

Eradicating all ants can backfire – it leaves a vacuum for fire ants to inhabit the area unchallenged.

Jeff Knight – Nevada State Entomologist

MOSQUITOS



Mosquitos are not ubiquitous in Southern Nevada.

However, they may be present in stagnant water such as ponds, swimming pools and gutters that are not maintained properly where mosquito larvae can survive to adulthood.

Mosquitos in Las Vegas have been known to carry West Nile Virus (WNV), Western Equine Encephalitis (WEE) and Saint Louis Encephalitis (SLE).

106 probable or confirmed cases of WNV were reported by Clark County Health Dept. (CCHD) since 2004. 16 cases in 2019 alone.

As of August 2019 : 17% of mosquitos in LV tested positive for WNV

southernnevadahhealthdistrict.org/mosquito-surveillance
kntv.com : KTNV 13 Local News 8/9/19 : Sean DeLancey

PLANT TOXINS AND IRRITANTS

Oleander Trees (Oleandrin and other toxins)

Euphorbia / Spurge Sap (eye / skin irritant)

Sacred Datura (Nightshade poisons)

Lantana (Triterpene poisons)

Sago Palm (numerous toxins)

Globe Mallow (Physical eye irritant)

Hemlock

AND MANY OTHERS

Oleander Trees (Oleandrin and Other Toxins)



Oleandrin and other toxins are found in all parts of the oleander tree – dried or green

Cardiac toxin

Skin contact is most common exposure route.

Ingestion of any part of the oleander plant or inhaling smoke from burning oleander can lead to serious illness and possibly death for humans and animals.

**Oleander Trees
(Oleandrin and other toxins)**

Symptoms of oleander ingestion include :

skin rash, blurred vision, visual disturbances such as halos, diarrhea, nausea, stomach pain, vomiting, loss of appetite, irregular or slowed heartbeat, weakness, low blood pressure, confusion, dizziness, headache, fainting, depression, drowsiness, or lethargy.
(also drooling in pets)

Oleander Trees

Treatment : Depends on route of entry and the severity of symptoms
May require hospitalization
Consult MD or Poison Control Center

Poison Control Centers For People (800) 222-1222

ASPCA Animal Poison Control Center * (888) 426-4435

*aspca.org/poisonous plants

Euphorbia / Spurge Sap

All succulent *Euphorbiaceae* contain a poisonous sap which exudes from the tiniest injuries, while trimming off live or spent leaves or sometimes even when only touching the plant.



Euphorbia rigida

Typically this sap is milky white and sets into a latex.

In some species the poison is only mild, but in others it is extremely dangerous.

Euphorbia / Spurge Sap

The irritants contained in the sap contain a multitude of Diterpenes and Triterpenes.



On mucous membranes and in the eyes even the smallest splashes can cause long-lasting, severe pain. Vapors from sap may also cause eye irritation for some. Sap can also cause skin irritation on prolonged contact. Several of the components can promote tumors. (Liver)

(CO State U : Veterinary Teaching Hospital Fact Sheet)

Euphorbia / Spurge Sap

Treatment : Depends on area affected and severity of symptoms
Skin irritation : Wash off skin immediately
Eye irritation : Consult a physician

Prevention : Wear rubber gloves and safety goggles when working with Euphorbia
Never touch your eyes while working with the plants
Afterwards wash your hands thoroughly and clean all tools and gloves
Trim branches when dried to minimize sap



**Sacred Datura
(Nightshade poisons)**

Common names "Thorn-Apple" (due to its spiny seed pod), Jimson Weed and Locoweed



All parts of the plant contain numerous belladonna alkaloids that are toxic to humans and animals and can be fatal if ingested



Toxicity varies widely from plant to plant.

**Sacred Datura
(Nightshade poisons)**

Symptoms of ingestion of the flowers, leaves or seeds (1 – 4 hrs) after ingestion can include :




Dry mouth, thirst, photophobia, blurred vision, confusion, then delirium, visual hallucinations, dilated pupils, agitation, coma, seizures and death (inhibits neurotransmitters)

Keep pets and children away from this plant.

**Lantana
(Triterpenes)**

In the *Verbenaceae* family

Common names include red sage, wild sage and shrub verbena and has fragrant multi-colored flowers followed by clusters of round seeds that ripen from green to purple/black.




All parts of the plant contain Triterpenes (liver toxins) which are toxic to animals and occasionally to humans.

**Lantana
(Triterpenes)**

Symptoms of poisoning :

Depression, vomiting, diarrhea, weakness and possible liver failure (Most commonly in farm animals.)

Source : Pet Poison Helpline




Sago Palm

The sago palm produces three different toxins: **cycasin, beta-methylamino-L-alanine, and a third, unidentified toxin.**

While all parts of this plant are toxic, the seeds contain a larger amount of cycasin than other parts of the plant.

It is not uncommon for pets to ingest or chew on the seeds. Can be deadly.

Sago Palm

If your dog displays the following symptoms after exposure to a sago palm, seek medical attention :

- Vomiting
- Diarrhea
- Nosebleeds
- Lethargy
- Loss of appetite
- Increased thirst and urination
- Blood in stool
- Yellow coloration of gums and skin
- Fluid accumulation in the abdomen
- Abdominal pain
- Bruising
- Paralysis or seizures



Globe Mallow (*Sphaeralcea ambigua*)

Its other common name is "sore-eye poppy."



Fuzzy leaves have star-like hairs (stellates) that are very irritating to the eyes.

Native perennial that you typically cut back as needed in winter.

Wash gloves after touching globe mallow leaves.

Do not rub your eyes after touching the leaves.

Hemlock - (*Conium maculatum*)

Hemlock contains a toxic alkaloid known as Conine that is a potent neurotoxin if touched or tasted and causes "ascending paralysis."

It begins to paralyze muscles in the legs and then progresses up the body to the lungs resulting in death by oxygen starvation.




Seek medical attention immediately.

Dr. Don Deevers, UNR Professor

Hemlock - (*Conium maculatum*)



Does not grow in desert regions of the US

HAZARDOUS MATERIALS UPDATE

Round up – Glyphosate
Naturally-Occurring Asbestos – Actinolite

GENERALLY LOW RISK MATERIALS WITH LOTS OF MEDIA HYPE





Round up – Glyphosate

Glyphosate is the main ingredient in Round up.



Herbicide to kill weeds and dehydrate crops

Lawsuit in California awarded \$ 289 M to a school groundskeeper who developed non-Hodgkins lymphoma.

Cancer was believed to be due in part to his use of Round up on his job for many years.

Round up – Glyphosate

Numerous health agencies have stated that there is not sufficient evidence that glyphosate causes cancer.



One agency, IARC has stated that they think glyphosate is a "probable carcinogen" based on animal study (not human) research.

ABSENCE OF EVIDENCE IS NOT EVIDENCE OF ABSENCE

Round up – Glyphosate

What is more troubling is the research done on a variety of oat (and wheat) products marketed in the US :



Round up is used on some mature oat and wheat plants to speed up desiccation before harvesting it to then be use in food meant for human consumption.

Article on internet Alexis Temkin, PhD, Toxicologist "Breakfast With a Dose of Roundup?" 8/15/18

FIFRA - Federal Insecticide, Fungicide and Rodenticide Act

There is a major loop hole in FIFRA !

" Inert Ingredients" are defined as any chemical in the pesticide that is not there to kill the target organism.

UNFORTUNATELY, CHEMICALS THAT ARE HAZARDOUS TO HUMANS CAN BE ADDED TO PESTICIDES AS "INERT INGREDIENTS." (E.G. BENZENE*)

* Air Quality Study conducted while Spraying for Dutch Elm Disease in IL



GO ORGANIC WHENEVER POSSIBLE

AVOID CHEMICAL PESTICIDES THAT FALL UNDER FIFRA AS MUCH AS POSSIBLE

LAST RESORT !

CALL MASTER GARDENER HELPLINE IF YOU NEED ADVICE ON ORGANIC ALTERNATIVES

702 - 257 - 5556 M - F 9 AM - 3 PM



Naturally-Occurring Asbestos – Actinolite

Naturally-Occurring Asbestos (NOA) can be found in many parts of the US including : California, Nevada, Arizona, Washington, the Northeast US, and Eastern seaboard near the Appalachian Mountains

In Southern Nevada it has been found in Boulder City, Henderson, Lake Mead area



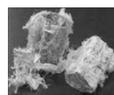
NOA – Actinolite

Actinolite Asbestos was found in small quantities in the soil.

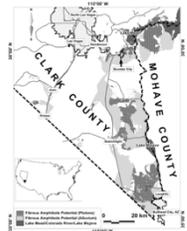
This is considered to be one of the more harmful mineral types.

In an industrial setting asbestos has been known to cause asbestosis, lung cancer, mesothelioma, and recently, ovarian cancer (hygiene products.)

Diseases are related to high, long-term exposures



NOA – Actinolite Locations *



* Excerpted from "Asbestos found in Nevada and Arizona : Roadblock and potential health hazard?" EARTH magazine, Sara Pratt, 1/29/15

Mesothelioma rate slightly above national average of 1 / 1,000,000

NOA – Actinolite

Industrial hygienists studied the Hoover Dam bypass construction project and took steps to control fugitive dust during the project.

Avoidance of very dusty activities in these areas is advisable : dirt biking, road construction, commercial farming, etc. (Wear N100 mask)

Gardening not believed to be a significant risk.



JULIE - Joint Utility Locating Information for Excavators

Locally-administered program to identify the locations of utilities and construction activities prior to excavating or major disturbance of the soil.

Dial 811



Gardening Safety Summary

Beware of toxic plants, invertebrates, toxins in the soil and air, limit the use of pesticides, and call JULIE for any large excavations.

SAFELY ENJOY GARDENING FOR YEARS TO COME !



Questions?



Beth Tattersall



Local Resources

- **Master Gardener Home Garden Helpline :** 702-257-5556
(9 am – 3 pm, Monday – Friday)
- **UNR Website :** www.unr.edu and click on Horticulture
Check out the 800+ factsheets, photos, videos, social media.
- Subscribe to the free monthly **Community e-newsletter**
- Tours of UNCE Display Gardens, Monthly Gardening Classes
- **UNCE - Master Gardener Program** – Held annually
Consider becoming a trained Master Gardener volunteer!