

MEMO

TO: Honorable Mayor and
Members of City Council

DATE: June 19, 2017

FROM: Oleander Prohibition

This issue first came to council's attention in 2016 when Ms. Boron could not convince her neighbor to trim his oleanders which resulted in the plants growing over Ms. Boron's six-foot wall and dropping leaves in her horse corrals. She obtained a petition from neighbors in the vicinity of Starr and 4th requesting the council outlaw oleanders in areas of the city where horses are present. Some of the residents approached the council and the matter was placed on the council agenda. The city attorney was directed to do some research which was presented to council. On February 21, 2017, council directed city staff to convene an oleander work group (the "OWG"). The city manager selected the following to be on the OWG: Steve McClintock, Darryl Cross, Jeff Watson and Katherine Boron. City Attorney Joel Stern was the facilitator.

At the first meeting on March 28th, the OWG discussed the potential dangers of oleanders for both humans and animals as well as some of the challenges when oleanders are planted adjacent to livestock. Amendments to Apache Junction property maintenance code were discussed as a possible solution.

After this first meeting, the city attorney established contact with Ms. Boron's neighbor, who agreed to trim the oleanders below the height of the boundary wall. He followed through with his commitment and the oleanders are currently trimmed below the level of the wall so that no part of the plant extends over the wall.

On May 1st, the OWG met a second time to further discuss options. The OWG desires to continue pursuing a code amendment in order to limit the planting of oleanders within the city. One example of the dangers of oleanders to animals was presented in the form of a news article from 2011 wherein a giraffe at the Reid Park Zoo in Tucson was killed when an assistant zoo keeper inadvertently fed him oleander trimmings.

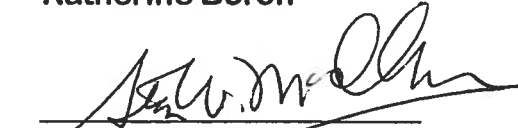
The OWG agreed on possible language for a code amendment which would amend Chapter 9, Health and Sanitation, Article 9-1: Property Maintenance Standards, to include language prohibiting the growing, keeping or planting of oleanders in a manner which would endanger livestock on adjacent property (*see attached draft*). Violations of this new code provision would be handled in the same manner as other property maintenance cases are handled.

Also attached are: 1) the copy of the neighborhood petition; 2) various articles and information on the dangers of oleanders to animals; and 3) information of the economic benefits of horses in communities.

At the upcoming council meeting on this matter, we want you to consider everything that is attached hereto. In addition, we intend on having an equine veterinarian present and a botanist who will discuss the danger oleanders pose to horses.


Katherine Boron


Darryl Cross


Steve McClintock


Jeff Watson

Attachments

Work Group AJCC Code Change Recommendation

WORK GROUP AJCC CODE CHANGE RECOMMENDATION

CONTROLLED ACCESSIBILITY

APACHE JUNCTION CITY CODE, VOL. I, AMENDMENT TO CHAPTER 9: HEALTH AND SANITATION, ARTICLE 9-1: PROPERTY MAINTENANCE STANDARDS

Section

9-1-3 Public nuisances prohibited

(C) *Land maintenance and weeds.*

(5) No person shall ~~offer to sell, sell,~~ maintain, grow, keep or plant any male mulberry tree (*Morus alba*) or olive tree (*Olea europea*) in the city unless it is one of the non-pollinating varieties of such trees.

(6) No person shall maintain, grow, keep or plant any oleander tree or shrub (*Nerium oleander*) in the city unless it is maintained, grown, kept or planted in a location or size in which it is not accessible to livestock, including but not limited to poultry, goats, swine, sheep, cattle, horses and other equine, on adjoining properties, or in such a manner in which the leaves are contained on the property from which the plant is maintained, grown, kept or planted.

Neighborhood Petition

Because Oleander is highly toxic to people and livestock (According to Dr. Durig at Arizona Equine: "Oleander is poisonous for all animals." Another equine vet said ingesting just 3 leaves of oleander will kill a horse.), naturally and periodically sheds its leaves and flowers which are easily disbursed by wind and/or rain so can become mixed in hay and ingested by livestock, is a non-native species, and can grow to over 20 feet high:

We request the City of Apache Junction pass a city ordinance prohibiting land owners from planting, keeping, or maintaining oleander in a location and/size that threatens neighboring livestock, including, but not limited to; horses, cattle, sheep, goats, swine, and poultry.

Name	AZ Address	Own or Rent
1. Katherine Beron	344 S. Stan Rd., A.J.	OWN
2. GENE GOODING	2441 S. Honeysuckle Cir, MESA	OWN
3. Sylvia Drummond	2441 S. Honeysuckle Cir. MESA	RENT.
4. Linda Strader	10291 E. Prairie Hawk Lane, San Tan Valley	OWN
5. Thomas Strader	10291 E. PRAIRIE HAWK LANE, SAN TAN VALLEY	OWN
6. Jerry Rutledge	10335 E Prairie Hawk Ln, San Tan Valley	AZ
7. Linda Rutledge	10335 E Prairie Hawk Ln, San Tan Valley	AZ
8. Melanie Floyd	250 S. Tomahawk Rd #76 Apache Junction, AZ	
9. SHERRY DIAMOND	200 E. SOUTHERN AVE. #72 APACHE JCT. AZ.	
10. Steve M. Clintock	3720 Rowen, mesa, AZ	
11. RUSS WRIGHT	PO BOX 4584 AJ AZ	RENT
12. John Martin	977 S. Wickiup A1, AZ	OWN
13. Cathy Diraff	860 N. Wickiup Rd. AJ, AZ 85119	OWN
14. Judy Woods	6553 E. Virginia St mesa	OWN
15. DARRYL CROSS	1018 N. ACACIA RD, AJ, 85119	OWN
16. BEV DOUGHERTY	1740 N. APACHE DR AJ 85120	OWN
17. BONNIE WELLS	1865 E CANYON ST AJ 85119	RENT
18. ROBERT F. DIROFF	860 N. WICKIUP AJ, 85119	OWN
19. Jeanne Kennedy	1840 N Signal Butte Mesa 85205	OWN

20. ~~Sharna Wetan~~ 2140 Warner Dr, A.J. own
21. Peggy Wilson 128 South Starr Rd AJ own
22. Connie Carver 109 S. Rex Ave AJ own
23. ~~Scott Carver~~ 109 S. Rex Ave AJ own
24. A.W. Osterstein 1434 N. Cortez Rd AJ own
25. Joy Boyer 1700 W. Shiprock St. #44, A.J. RENT.
26. John Boyer 1700 W. Shiprock St. #44, A.J. RENT
27. Debbie Hegerson 2760 S Royal Palm Rd #39, AJ own
28. Margie Wheeler 1700 Shiprock #12 AJ own
29. Barb Houck 1505 S. Sixshooter Rd. A.J. own
30. ~~David Butler~~ 7523 N. 17th Ave. Waddell Own
31. Bill Blackbody 2509 E 4th Ave, Apache Jct. AZ
32. Cheryl Blackbody 2509 E 4th Ave, Apache Jct, AZ
33. Tom Colbert. 676 N. Solana Rd. A.J. own
34. Lynde Baker ^{250 S. Tempeham Rd Lot 133} 7228 W. Cordia Rd Tempe AJ rent
35. ~~Dawn Johnson~~ ~~7228 Cordia~~ 250 S. Tempeham Rd ^{Rev.} AJ AZ
36. ~~Dawn Johnson~~ 5373 Hansiku St Apache Junction Rent
37. Dawn Johnson 5373 Hansiku St Apache Junction Rent
38. Jim McChellard 288 S Solana Rd AJ 85119 own
39. Jamie McChellard 288 S Solana Rd AJ 85119 own
40. Roger Brankham 334 S Solana Rd AJ 85119 own
41. Kim Brankham 334 S Solana Rd AJ 85119 own
42. Joe Baranovich 4623 E 4th Ave AJ - 1 - RENT
43. Fred Bishop 433 S. Cortez Rd. AJ 85119 own

Because Oleander is highly toxic to people and livestock (According to Dr. Durig at Arizona Equine: "Oleander is poisonous for all animals." Another equine vet said ingesting just 3 leaves of oleander will kill a horse.), naturally and periodically sheds its leaves and flowers which are easily disbursed by wind and/or rain so can become mixed in hay and ingested by livestock, is a non-native species, and can grow to over 20 feet high,:

We request the City of Apache Junction pass a city ordinance prohibiting land owners from planting, keeping, or maintaining oleander in a location and/size that threatens neighboring livestock, including, but not limited to; horses, cattle, sheep, goats, swine, and poultry.

Name	AZ Address	Own or Rent
1. Annette Bishop	433 S. Cortez Rd 85119	OWN
2. Richard H. Morgan	477 S Cortez Rd 85119	Rent
3. Greta Durbal	477 S Cortez Rd, Ap. Jct AZ 85119	Rent
4. Pearl Agard	538 S. Acacia Rd A.J. 85119	own.
5. Jack E	2512 E 4th Ave AJ	Rent
6. Q & C Corporation	2215 E. 4th Ave A.J.	own
7. Willard L. Llanos	2215 E. 4th Ave A.J.	own
8. Mark Macaruf	2351 E 39th Ave A.J.	OWN
9. Shannon Lake	2351 E. 39th Ave A.J.	OWN
10. Lupa Kyin	371 S. Chaparral Rd A.J.	OWN
11. Randy Kowalski	2060 E 4th Ave Apache Junction	own
12. Marilyn Farley	2077 E. 4th Ave AJ	own
13. Carl Farley	2077 E. 4th Ave A.J.	own.
14. Sandra L'Odense	2156 E 6th Ave AJ 85119	OWN
15. Jim L'Odense	2156 E 6th Ave AJ 85119	OWN
16. Wendy Messina	2623 E. 4th Ave Apache Junction	owner
17. Eric H. Hester	2623 E 4th Ave Apache Junction, AZ	owner
18. Duane Beard	2623 E 4th Ave 4th Ave Apache Junction, AZ	owner
19. Bob Loyd	2658 E 4th Ave Apache Junction, AZ	owner

20. Loeta Ann Martin 2737 E 4th Av Owner
21. Thomas Walker 2737 E 4th Av Owner
22. Paul Swanson 2667 E WHITELEY RENT
23. James Coe 331 S STARR RD. OWN
24. Karen & Brent Jarrett 777 S. STARR RD own
25. Sharon Mathewson 749 N Hilton Rd own.
26. Douglas Mathewson 749 N. Hilton Rd own
27. Vicki Bruchmuhl 1336 N. Hilton Rd' own
28. Alan Prosch 2986 E Shiprock St. Own
29. Ther Prosch 2986 E. Shiprock St Owner
30. Dale Hamblin 1735 N. STARR Rd. owner
31. Gunn Hamblin 1735 N. Starr Rd. owner.
32. Alfina Smith 1080 N STARR RD owner
33. Anna Smith 1080 N STARR RD owner
34. Julia Tules 2500 E Tlpep owner
35. Clayton Wilson 1855 N. Bowman Rd. owner
36. Patty Kempf 1855 N. Bowman Rd owner
37. Barb Foster 1841 E. Topee St. AJ owner
38. Darla Cheves 3301 E. Goldfield owner AJ
39. Martin Caudro 3301 BOLD FIELD OWNER
40. Living Deters 800 Apache Trail ^{pit 99} A. I. rent.
41. Don Korman 7950 E Kato OWN
42. Don M. M. 11101 E. UNIVERSITY DR. LOT 258 AJ OWN
43. Raymond Tibero 1715 V VISTR ^{AJ} P, Z rent

CAUTION FOR Limiting Oleander

Because Oleander is highly toxic to people and livestock (According to Dr. Durig at Arizona Equine: "Oleander is poisonous for all animals." Another equine vet said ingesting just 3 leaves of oleander will kill a horse.), naturally and periodically sheds its leaves and flowers which are easily disburshed by wind and/or rain so can become mixed in hay and ingested by livestock, is a non-native species, and can grow to over 20 feet high,:

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	Name	AZ Address	Own or Rent
1.	Jeresa Gehls	Kings Stable	Rent
2.	Gene D. Gentry	" "	Rent
3.	Jim L. Hume	" "	Rent
4.	Long Martindale	" "	owner
5.	Ray Patterson	" "	Rent
6.	Chris Archer	" "	Rent
7.	Karen Huesner	" "	Rent
8.	Deer Kuehn	" "	Rent
9.	Juan Archer	" "	Rent
10.	Tom Gentry	" "	Rent
11.	Marcella Sparks	" "	Rent
12.	Martha D.	" "	Rent
13.	Paul Cook	" "	Rent
14.	Chuck Kuehn	" "	Rent
15.	Julia Kipruto	" "	Rent
16.	E.D. Welch	" "	Rent
17.	Dave Wapler	" "	Rent
18.	Larry Nye	" "	Rent
19.	David J. Gester	" "	Rent

- | | | | |
|-----|-----------------|-------------------------------------|----------|
| 20. | RS Nguyen | King Stables | Rent |
| 21. | Tom Short | " " | RENT |
| 22. | Carolyn Bohn | " " | RENT |
| 23. | Jo Ann Yoder | " " | Rent |
| 24. | Tom Yoder | " " | Rent |
| 25. | Rakut Piggott | " " | RENT |
| 26. | Ter Ann Piggott | " " | Rent |
| 27. | PHONG D. NGUYEN | " " | OWN |
| 28. | J Allen Byrd | " " | own rent |
| 29. | Carolyn Byrd | " " | rent |
| 30. | Doug Hudzinski | 1336 - North
Hilton, A.J. | Own |
| 31. | Paul Stromas | 2467 E Whiteley | rent |
| 32. | Jan Kukawski | 4463 W Apache Trl | Rent |
| 33. | Ken Simons | 2667 E. Whiteley | rent |
| 34. | Jayne Feldman | 2655 E. Whiteley | owner |
| 35. | Debra Simons | 2667 E. Whiteley | rent |
| 36. | Ed Ulrich | 2667 E. Whiteley | rent |
| 37. | Jayne Heinrich | 2667 E Whiteley | rent |
| 38. | Roger Heinrich | " | rent |
| 39. | Cliff Mason | 2467 E WHITELEY | RENT |
| 40. | Dorothy DeBayer | 2667 E. Whiteley St. | Rent. |
| 41. | Kay C. Workman | 2655 E Whiteley St | rent |
| 42. | Teri A. Workman | 2655 E Whiteley St | rent |
| 43. | Harold Swanson | 2667 E. Whiteley Apache Junction AZ | 85119 |

Petition for Limiting Oleander

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Name	AZ Address	Own or Rent
1. Bruce Davis	9803 E. Bend Ave Pl, Gold lam.	Own
2. Vi Vi Keeton	2015 old W. Hwy ^{#54} AJ, 85119	own
3. Marnie Reynolds	1275 N. Wicking AJ, 85119	own
4. Larry Pelach	2015 old West Hwy. AJ 85119	own
5. Lynn Holland	2015 old West Hwy AJ	own
6. Scott Schoene	2151 N. Warner 85120	rent
7. Pat Schoene	2151 N. Warner 85120	rent
8. Bill Harris	2151 N Warner 85120	Rent
9. Mary Zaitc	2151 N. Warner, AJ 85120	Rent
10. Joyce Leaba	2151 W Warner AJ 85120	Rent
11. Daniel Sura	" " " " 85120	Rent
12. Eleanor Madhry	" " " " "	" "
13. Joyanne Brown	2151 N Warner Dr AJ. 85120	Rent. ^{J. Brown}
14. Lyle Brown	2151 N Warner Dr. AJ 85120	Rent. Rent
15. Earl Weger	" " " " "	Rent
16. Earl Braisher	2151 N Warner Dr AS 121 AS	Rent OK
17. Earl Braisher	" " " " "	" "
18. Jim Suple	" " " " "	" "
19. Jimmy Watson	2151 N Warner Dr. 85120	Own

20. Shelley Hunter 2151 N Warner Dr Rent
21. ~~4290 Mesquite St~~ ^{3549 N} ~~Strickland~~ ^{Diego} Mesa 85215
22. Gino Bollenberg 451 W Windsong St. AZ 85120
23. JAMES Willis 68 W. Windsong St. AZ 85120 own
24. Lythe BEN 2 245 Woot Hill 85120 owner
25. Chris Song 295 Woot Hill St 85120 owner
26. Maura Jones 288 W. Simsbury St 85120 own.
27. Barbara Taylor 488 N. Cactus 85119. owner.
28. Laura Albert 676 N. Skene Rd 85119 owner
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	Name	AZ Address	Own or Rent
1.	Charlotte Johnson	250 Starnak Rd.	Rent
2.	Thomas Bager	2432 S. Honey Suckle	OWN
3.	Victoria Goodrich	1646 N. Hilton Rd.	own
4.	Cheryl Crisp	2432 S Honey Suckle Cir Mesa	own
5.	Led Craven	2330 E 10 th	OWN
6.	Jennie Debelots	7165 Stone	own
7.	Marilyn Campbell	1721 E Superstition	own
8.	Thomas Moak	3020 S. Goldfield Road	own
9.	Green Moore	3301 S Goldfield #3033	own
10.	Bill BAUER	370 W SMOKETREE ST	OWN
11.	Sheila Stenland	1545 E 23rd Ave	OWN
12.	Larry Schultz	1545 E 2nd Ave	OWN
13.	Beverly G. Huey	2368 W. 10 th Ave	own
14.	Linda West	9828 E Pueblo Ave Lot 19	own
15.	CAROL Y. KAUSCHER	348 S. GOLD DR.	OWN
16.	Beverly Daugherty	1740 N Apache Dr AS	own
17.	Simone Wilber	325 W Smoketree St A.J.	OWN #2
18.			
19.			

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	Name	AZ Address	Own or Rent
1.	Robert Klingler	2867 Whitchy	Rent
2.	David R. Caspell	" "	Rent
3.	Susan Kemper	" "	Rent
4.	Melmorel Mokissou	2304 N. Cortez	own
5.	W. M. Rogers	1571 W. Tonto St	own
6.	Wendie Simpson	10913 E. BOSTON	own
7.	W. M. Rogers	10912 E. Boston	own
8.	Dee Ann Sutter	775 N. Hilton Rd	Rent
9.	Joe Lilly	775 N. Hilton	Rent
10.	Alene Meyer	749 N. Hilton	Rent
11.	Bernard Meyer	749 N. Hilton	Rent
12.	Teri O'Neil	749 N. Hilton	Rent
13.	RF	433 S Cortez	Rent
14.	Walker Lloyd	2436 E 4th	own
15.			
16.			
17.			
18.			
19.			

Articles on the Danger of Oleander

In: **A Guide to Poisonous House and Garden Plants**, Knight A.P. (Ed.). Publisher: Teton NewMedia, Jackson WY (www.tetonnm.com/). Internet Publisher: International Veterinary Information Service, Ithaca NY (www.ivis.org), Last updated: 25-Mar-2010; A5007.0310

Nerium oleander

A. P. Knight

Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO, USA.

Select another plant: [A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

Family

Apocynaceae

Common Names

Oleander, rose laurel, laurel Colorado.

Plant Description

Consisting of a single species with multiple cultivars, *Nerium oleander* is a native of the Mediterranean area and tropical Asia, and is widely cultivated in the warmer regions of the world. It is a popular landscaping plant because it tolerates relatively dry conditions. Oleander is commonly used in hedges and in highway landscaping.

A perennial evergreen branching shrub that can attain heights of 15 - 20 ft (6 metres), with simple, dark green, glossy, leathery, lanceolate, whorled leaves, with a prominent mid-rib. The fragrant showy flowers are produced terminally on branches, and are funnel shaped with 5 petals, in colors of white, red, or pink (Fig. 285 and Fig. 286). Some cultivars have double petals. Fruits are bean-like seed pods with numerous plumed seeds.



Figure 285. *Nerium oleander* (flowers and pod). [To view click on figure](#)



Figure 286. *Nerium oleander*. [To view click on figure](#)

Toxic Principle and Mechanism of Action

Nerium oleander contains numerous cardenolides and their genins that are concentrated in the leaves, flowers, and seeds [1,2]. Also present in the plant are terpenoids that possibly account for the gastrointestinal irritation seen with oleander poisoning.

The cardiotoxic effect of the oleander cardenolides is similar to that caused by digitoxin and digoxin found in the *Digitalis* species. The primary action of the cardenolides is on the cell membrane, where interference with normal transport of sodium and potassium ions across the cell membrane occurs allowing an influx of calcium [3]. At low doses, myocardial function may improve, but at high doses cardiac conduction is impaired with resulting arrhythmias, heart block, and death.

A wide variety of animals including humans, dogs, cats, horses, cattle, sheep, goats, llamas, and birds have been poisoned by oleander [4-10].

Risk Assessment

Oleander is a common plant in many gardens and is frequently used in landscaping in tropical and subtropical areas. In temperate climates it is often sold as a potted plant for indoor use. [Considering that oleander is one of the most cardiotoxic](#)

plants known, and is poisonous to most animals including humans, it should not be planted where it could be a risk to children or household pets. It should not be planted in or around animal enclosures, and the leaves and branches pruned from oleander shrubs should never be fed to animals [11]. Oleander is highly poisonous to birds and therefore should not be included in aviaries [8,11]. Compost made from oleander leaves can result in detectable but low levels of the glycoside oleandrin in plants mulched with the oleander compost [12].

Clinical Signs

Excessive salivation, vomiting, and diarrhea are commonly seen initially in dogs, cats and most other species poisoned by oleander. The diarrhea may contain blood. Within a few hours of ingesting the plant, cardiac signs develop including weakness, depression, irregular pulse, bradycardia, and increased respiratory rate. Electrocardiographically, S-T depression, bradycardia, extrasystoles, and various dysrhythmias will be apparent. Hyperkalemia may or may not be present. Depending on the quantity of the cardenolides ingested, animals may exhibit signs of depression and heart irregularity for many hours before recovering or they may die suddenly due to cardiac arrest.

At postmortem examination, there are generally no specific lesions present. Animals that survived for several days often have necrosis of the myocardium. A diagnosis of oleander poisoning can be made by finding the distinctive leaf parts in the animal's stomach contents, and by detection of the cardenolides in the stomach contents using high pressure liquid chromatography (HPLC) methods [13]. Successful treatment of oleander poisoning depends on early recognition of the toxicity.

Induction of vomiting, gastric lavage, and/or the oral administration of activated charcoal is appropriate for removing the plant and preventing further absorption of the toxins. Cathartics may also be used to help eliminate the plant rapidly from the digestive system. Serum potassium levels should be closely monitored and appropriate intravenous fluid therapy initiated as necessary. Phenytoin, as an anti-arrhythmic drug effective against supraventricular and ventricular arrhythmias, can be used as necessary. Similarly, atropine and propanalol have been used. The use of commercially available digitalis-specific antibody (Digibind - Burroughs Wellcome) may be a beneficial in counteracting the effects of the cardenolides [14-16].

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**Tonto National Forest
Supervisor's Office**
2324 E. McDowell Rd.
Phoenix, Arizona 85006
(602) 225-5200

**Phoenix Interagency
Fire Center**
6335 S. Downwind Circle
Suite 101
Mesa, AZ 85212

Invasive Weeds - Oleander *Nerium oleander* L.

This is a very commonly used landscaping plant in the Phoenix urban area. There are two sites where it has naturalized on the Tonto National Forest. Several clumps of it have attained great height, growing in Arnett and Telegraph Canyons, near Boyce Thompson Arboretum (Grove 2004). Another large individual plant was found growing in Camp Creek, on the Cave Creek Ranger District, apparently naturalized from a nearby recreational residence (Loomis 2006, Nelson 2006).

Oleander has not been considered to have invasive potential until fairly recently. A Red Alert was issued by the California Invasive Species Council for this plant in 2000. It had been found along the Sacramento floodplain near Redding, and riparian zones in southern California (Tu and Randall 2000).

This year, in Arizona, the Arizona Daily Star included oleander in a list of ornamental plants that were becoming invasive in Saguaro National Park (McKernan 2005).

Oleander is native to the Mediterranean region, where it grows in ephemeral washes. Its pods contain seeds that have plumes of hairs for wind dispersal.

All parts of the plant are extremely poisonous, containing 10 different cardiac glycosides. These compounds induce cardiac arrhythmia and eventual death. The lethal dose of green oleander leaves for cattle and horses is 0.005% of the animal's body weight. Inhalation of smoke from a burning oleander also can cause poisoning (Skurka 2005).

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Patti Fenner, Tonto NF



Patti Fenner, Tonto NF



Oleander hedge in Italy,
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Oleander Poisoning of Horses

Guide B-712

Jason L. Turner and Patrick Torres

College of Agricultural, Consumer and Environmental Sciences, New Mexico State University

Authors: Respectively, Extension Horse Specialist, Department of Extension Animal Sciences and Natural Resources; and Extension Agriculture Agent, Santa Fe County Extension Office, both of New Mexico State University. ([Print Friendly PDF](#))

Introduction

The oleander plant (*Nerium oleander*; Figure 1) is a native plant of the Mediterranean region and tropical Asia. It is now widely planted as a drought-tolerant ornamental in the southern United States and Mexico. It is well suited to poor soil conditions and thrives in full sunlight. It is commonly used in roadside plantings, hedges, and yard landscapes. While oleander has value as an ornamental, it is important that people—and especially animal owners—are aware of the toxicity problems associated with the plant.



Figure 1. White oleander trees in a hedge.

Description of Plants

Oleander can be managed to grow as a single or multi-branched evergreen tree or shrub, reaching heights of 10 to 18 feet with a spread of 10 to 15 feet (Figure 2). The simple leaves are opposite or arranged in whorls, and they have an oblong or lanceolate shape varying from 4 to 8 inches long. The bottom side of the leaf is pale green in color, while the top of the leaf has a glossy dark green color (Figure 3). The leathery texture and veins arranged in opposing pairs are further identifying characteristics of the leaves (Figure 4). The 5-petal, funnel-shaped flowers are various shades of red, white, pink, yellow, orange, or purple, and they have a pleasant fragrance.



Figure 2. Oleander shrub.



Figure 3. Contrasting colors of leaf sides.



Figure 4. Close up of leaf showing leaf shape and veins arranged in opposing pairs.

Toxic Principles

Oleander poses a problem for animal owners because it contains cardiotoxic compounds that have been known to poison animals, including humans, dogs, cats, horses, cattle, sheep, goats, llamas, and birds. The primary toxic agent, oleandrin, causes heart arrhythmias that lead to cardiac arrest and death. Although the toxins are found throughout the entire plant, animal poisonings are typically due to ingestion of the leaves. In horses, as little as 1 ounce of green

leaves can be lethal. While horses rarely eat green oleander leaves since they are unpalatable, there is the potential for dried leaves to accumulate in pasture areas with tall grass or end up in the horse's daily hay ration where they may then be ingested. The toxic compounds are retained in the dried plant leaves, although in reduced quantities, where they can still cause death.

Symptoms

Horses that consume a lethal dose of oleander leaves are often found dead 8 to 10 hours later, and symptoms of poisoning rarely last more than 24 hours before death occurs. Clinical symptoms include colic, diarrhea, labored breathing, muscle tremors, ataxia, and the inability to stand. Furthermore, an irregular and weak pulse, due to the decreased cardiac output, will lead to cold extremities, and convulsions prior to death are not uncommon.

If you suspect that your horse may be suffering from these symptoms of oleander poisoning, it is extremely important to contact your veterinarian immediately. While there is no specific treatment for counteracting the effects of the toxic principles, animals that have not consumed a lethal dose may be treated with a guarded prognosis for recovery over the next several days.

Management: Prevention and Control Measures

As is the case with most plant poisoning issues, prevention is the best medicine. Therefore, be diligent in keeping an eye out for oleander leaves on your horse property, and remove any plants you find to keep your horse safe. Because all parts of the plant are toxic, it is recommended that those handling oleander wear gloves and dispose of the bagged plant material in a landfill.

Burning the material is not recommended since the toxic compounds are released in the smoke and may cause poisoning or other health hazards to those nearby. Remember that this plant is toxic to a variety of animals, including humans.

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Jason L. Turner is Associate Professor and Extension Horse Specialist. Jason was active in 4-H and FFA while growing up in Northeastern Oklahoma. His M.S. and Ph.D. studies concentrated on equine reproduction, health, and management. His Extension programs focus on proper care and management of the horse for youth and adults.

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Oleanders a danger to pets, children and even adults

By Bud Foster, Reporter [CONNECT](#)

For children growing up in Tucson it's a lesson learned early. Oleanders are dangerous.

But for newcomers it's a lesson they should learn.

"The plant is very toxic," says DVM Heather Connally, an emergency room vet at Veterinary Specialty Center in Tucson.

She sees one, two sometimes three dogs every month which have ingested Oleander leaves or flowers.

It's difficult to determine how many poisonings there are because accurate records are not kept and shared among the 150 vet clinics in the Tucson area.

If dogs get aggressive treatment early, they usually don't die. But without treatment, survival is iffy.

"They have seizures," she says. "In later stages they become comatose and of course, die from it."

Arizona's poison control sees many cases of poisoning.

"It's very common for us to get a call about an animal who has ingested oleander," says Keith Boesen, the managing director.

He says the entire plant is toxic, "leaves, flowers and roots."

But he also adds, determining whether an animal will die is not an exact science.

"What we don't know about oleanders is is two leaves a problem, three leaves, ten leaves," he says.

The toxicity is determined by the health of the plant and the season. If a plant is healthy and in full bloom, it's likely more toxic and will take less to cause serious damage.

That's one of the reasons why it's been so hard to determine whether the giraffe at the Reid Park Zoo will survive or not.

Denver, the 23 year old female, has not eaten for several days after ingesting oleander leaves given to her by a paid apprentice at the zoo.

Her mate, six year old Watoto, died in less than 24 hours after eating the plant.

"Every reaction is different," says Boesen. "Animals could eat the same amount and have different outcomes."

The fact Denver won't eat has zoo officials very worried.

"Her condition today is worse than yesterday," says Jim Schnormeier, a curator at the zoo.

But animals not eating after ingesting oleander is not uncommon.

"They often won't eat for several days," says Connally. "They're usually okay without food for several days."

Zoo officials have decided it's time to remove the oleanders from the perimeter of the zoo. They've been in place for a half century and provide a buffer for noise and traffic around the zoo.

This is the first time there's been an accident like this but it appears the zoo has been lucky up to now.

"Having the oleander stay in place is just another accident waiting to happen," says Schnormeier.

The zoo is looking for donations to help take out the oleander and replace it with something else, something that would not be toxic to its animals.

If you'd like to help you can [donate to the zoo](#).

The zoo will do an internal investigation to determine if policies need to be changed and if changes are needed to its apprentice program.

But it appears, the problem is fairly widespread.

"We've had people who didn't know it was toxic and made tea out of it and gotten ill," says Boesen. "We've had them use the flowers in salad and get sick from that."

If a dog starts vomiting, it can be a sign it has eaten oleanders and needs emergency treatment. And the sooner the better.

"It can be very quick," says Connally. "Within a couple of hours up to 24 hours."

If the vet can't figure out right away why a young dog is suffering from an irregular heart beat, a few questions might solve the puzzle.

"Sometimes the owner doesn't know until we ask them if they have oleanders," she says.

That will often solve the problem and get the animal on an intensive treatment which can last a week or more.

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http://tucson.com/news/local/reid-park-zoo-giraffe-dies-nd-seriously-ill/article_12656343-565b-56e6-84a6-6c5f7e24c901.html

1 Reid Park Zoo giraffe dies; 2nd seriously ill

Animals mistakenly were fed toxic oleander

Kimberly Matas Arizona Daily Star Jul 21, 2011



GREG BRYAN / ARIZONA DAILY STAR 2010

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Watoto, a male giraffe weighing 2,000 pounds, died Tuesday night. Watoto was born in San Diego and went on display at Reid Park June 2007.



Photo gallery: Watoto the giraffe
Jul 20, 2011

One giraffe has died and another is seriously ill after an apprentice keeper at Reid Park Zoo fed them toxic plants.

Watoto, the zoo's only male giraffe, died Tuesday night, and Denver, a 20-year-old female, remains under observation in guarded condition after a keeper put oleander cuttings in their stalls Monday night, said Jim Schnormeier, general curator at Reid Park. The zoo's two other giraffes, Elinor and Texas, were not fed the toxic plants.

"It's been a tough 24 hours, and we're not done," he said.

The poisoning was discovered Tuesday morning when the regular keeper found oleander remnants in the stalls. Emergency veterinary measures were taken, but later that day the 2,000-pound giraffe's heart stopped, according to zoo officials.

Zoo administrator Susan Basford called the incident "a horrible and unfortunate accident."

It is a common practice at the zoo to feed animals green trimmings from surrounding vegetation, said Reid Park officials, and protocols are in place to ensure trimmings are safe for the animals.

"This is an exceedingly rare occurrence," said Steve Feldman, spokesman for the Association of Zoos & Aquariums, which accredits Reid Park.

Included in a long list of standard operating procedures zoos must follow is assigning "at least one person to oversee appropriate browse material for the collection," according to the association's animal-care manual.

The manual states: "If the institution uses browse plants as part of the diet or as enrichment items for the animals in its collection, the items must be identified and reviewed for safety. It is recommended that the responsibility for approval of browse items and oversight of the program be assigned to at least one qualified individual. The program should identify what plants are safe to feed and to which species, which parts of the plant are safe, whether the browse plants have been treated with any chemicals or if they are near any point sources of pollution. If animals have access to plants in and around their exhibits, there should be a staff member responsible for ensuring that the collection is not exposed to toxic plants."

Reid Park officials are investigating to determine where the breakdown in protocol occurred.

"One unfortunate incident needs to be taken in context with the overall quality of the program," Feldman said. "Even in a great zoo, sometimes unfortunate things can happen. As tragic as this is, it needs to be taken in context."

No decision has yet been announced about the keeper's future with the zoo.



Surviving Tucson zoo giraffe in stable condition

Six-year-old Watoto was born at San Diego Wild Animal Park and went on display at Reid Park in June 2007. His name means "children" in Swahili. Before this week, Yebo was the last giraffe to die at Reid Park. She was euthanized in April 2007 at age 17 after suffering from severe arthritis in multiple limbs.

Giraffe's typically live to 25, Schnormeier said.

Did you know

Oleanders contain a toxin called cardenolide glycosides, according to the International Oleander Society based in Galveston, Texas. The toxin is mostly contained in the sap, which is clear to slightly milky colored, and sticky. When ingested, it can be fatal. Fumes from burning oleander are hazardous as well.

Source: www.oleander.org

Contact reporter Kimberly Matas at kmatas@azstarnet.com or at 573-4191.

Currents

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Economic Impact of Horses

Economic Impact of the United States Horse Industry*

As a large, economically diverse industry, the United States horse industry contributes significantly to the American economy. The horse industry contributes approximately \$39 billion in direct economic impact to the U.S. economy, and supports 1.4 million jobs on a full-time basis. When indirect and induced spending are included, the industry's economic impact reaches \$102 billion.

Key industry statistics and economic indicators

The United States has an estimated 9.2 million horses.

Estimated number of horses by activity:

Recreation- 3,906,923

Showing- 2,718,954

Racing- 844,531

Other- 1,752,439

Estimated economic impact of horses by activity:

Recreation- \$32 billion

Showing- \$29 billion

Racing- \$26 billion

Other- \$15 billion

Estimated number of horses by breed:

Quarter Horse- 3,288,203

Thoroughbred- 1,291,807

Other- 4,642,739

Estimated number of horses by state:

45 of 50 states have at least 20,000 horses

The top three states are Texas (1 million), California (700,000) and Florida (500,000)

The equine industry contributes \$102 billion to the Gross Domestic Product.

The equine industry produces 1.4 million full-time jobs.

Horse Owner Demographics - Of the nearly 2 million horse owners in the United States, only 28% earn annual incomes above \$100,000 while 35% have an annual household income below \$50,000. Almost half of horse owners are from the middle class (\$25,000 - \$75,000 annual income).

Community Facts-

57% of horses are concentrated in communities with less than 20,000 people

17% of horses are concentrated in communities with more than 20,000 but less than 50,000 people

26% of horses are concentrated in communities with more than 50,000 people

A photograph of four horses standing in shallow water, possibly a river or lake. The horses are of various colors, including brown, white, and grey. In the background, there are mountains and some greenery. The image is slightly faded to allow text to be overlaid.

Arizona Horse Statistics *

There are 177,000 horses in 60,000 Arizona households.

The Arizona horse industry is a \$1.6 billion dollar industry.

Horses provide thousands of jobs for Arizona through equine care, medical facilities, retail sales and products, equine related manufacturing, sports, art and literature.

*provided courtesy of the Arizona Horse Council, www.arizonahorsecouncil.org/in-action.html

2015 AHP Equine Industry Survey

by Zoetis | Jul 31, 2015 | AHP Equine Industry Survey |

Equine Industry Poised for Growth, Third American Horse Publications Survey Shows

Horse ownership and involvement has stabilized and is likely to rise, according to key findings from survey sponsored by Zoetis

The equine industry has found stability and shows positive signs of growth, especially among young adult horse owners and event participants, according to results of a survey by American Horse Publications (AHP) sponsored by Zoetis. The survey included responses from over 10,662 horse owners.

Among the highlights, the third online nationwide equine industry survey shows¹:

- For 2016, 88.6% of respondents expect to own or manage the same number of horses or more horses.
- This year, 93% of respondents plan to enter the same or more competitions than last year, and 95.1% expect to compete in the same or more events in 2016.
- A high number of respondents (84.7%) rely on their veterinarians for vaccination advice, and respondents are increasingly relying on veterinarians for deworming advice.

“It appears the industry is beginning to recover from the Great Recession of 2008, as indicated by the percentage of respondents participating in the industry, either through owning/managing horses or competing with them, at the same or greater levels than three years ago,” said Jill Stowe, Ph.D., associate professor of agricultural economics at the University of Kentucky, who analyzed the data and consulted on the results.

The survey was conducted from Jan. 6 through April 1, 2015. It sought to gauge participation trends and management practices in the U.S. equine industry, to identify critical issues facing the equine industry as perceived by those who own or manage horses, and to better understand issues pertaining to horse health and nutrition.

AHP conducted similar surveys in 2012 and 2010. *AHP is a nonprofit professional association dedicated to promoting excellence in equine media and better understanding and communication within the equine publishing industry.*

Industry Stability

The 2015 survey results show 70.6% of respondents own or manage the same number of horses they did last year, suggesting a continued increase in overall industry stability. In addition, 20.7% of respondents expect to own or manage more horses in 2016, while 11.4% expect to own fewer horses. In the 2012 survey, only 18.7% said they expected to own or manage more horses the following year, and 14.7% expected to have fewer.

Looking at horse ownership by age, the future appears bright for the equine industry, with 22.1% of respondents ages 18 to 24 reporting they own or manage more horses in 2015 than they did in 2014, while only 7.6% of respondents age 65 or over reported owning or managing more horses. This pattern is consistent with expectations of horse ownership in 2016, as 36.2% of respondents ages 18 to 24 said they expect to own or manage more horses than they did this year.

Additionally, there appears to be stability in the number of competitions respondents expect to attend this year and next year. Similar to the 2012 survey, most of the increase in competitions is among younger age groups.

Relationship with the Horse

Based on a new question this year, the survey results reflected the complex relationship between humans and horses. Respondents were most likely to view their horses as family members (67.4%), companion animals (62.7%), performance partners (57.6%) and/or best friends (55.9%). A smaller percentage of respondents viewed their horses as an investment (22.4%), livestock animal (21.1%) or employee (7.8%).

Results also show an estimated one of every three horses owned/managed by respondents is idle, retired or otherwise not working.

Horse Health Care

Respondents continue to identify veterinarians as integral to horse health decisions, including vaccinations and deworming.

Veterinarians continue to have a strong influence over vaccination decisions, with 84.7% of respondents saying they discuss with their veterinarian what vaccinations their horse should receive. Those discussions most often include vaccinating for West Nile virus, Western and Eastern equine encephalomyelitis, equine herpesvirus and equine influenza.

A majority of respondents vaccinate once a year (58% to 72%, depending on the antigen). However, about 20% of respondents vaccinate against these diseases twice a

year. Vaccination also presents an opportunity for veterinarians to discuss the American Association of Equine Practitioners (AAEP) vaccination recommendations with their clients, as just 30% of respondents said they reviewed these recommendations with their veterinarian.

It appears the influence of veterinarians on deworming approaches is increasing, as there was a slight increase compared with previous surveys in the percentage of respondents who had a fecal egg count (FEC) conducted and who said their veterinarian is involved in developing their deworming schedule.

Rotational deworming was the most common approach used (55.3%), despite recent recommendations from AAEP to conduct FECs and deworm based on results, which came in second (38.2%), according to the results. Less than half of respondents (47.5%) indicated their veterinarian recommended an FEC. Nearly half (46%) of horse owners deworm their horses four to six times per year. Almost 80% of respondents said parasite drug resistance was an issue of concern, similar to 2012.

Overwhelmingly, respondents deworm their horses themselves, at 88.6%, which was nearly identical to the 2012 survey results. But about half of the respondents (48%) indicated their veterinarian is involved in developing their horses' deworming schedules. This trend has continued to increase, from 15.7% in 2010 to 44.3% in 2012.

A slight decline in the number of insured horses continues to be a trend in 2015 survey, with just 21.7% of respondents indicating their horses were insured. This presents an opportunity for equine veterinarians to make their clients aware of insurance and to reinforce the need for preventive care, including additional diagnostic and treatment options.

The Unwanted Horse

As in the 2010 and 2012 surveys, the issue of unwanted horses (and what to do with them) remains the most significant challenge facing the industry today; however, the percentage of respondents identifying the issue has been declining (62.9% in 2010, 55.8% in 2012 and 53.7% in 2015). The cost of horse keeping (47.1%) and overbreeding (37.3%) continue to be important issues, but land-related issues, such as loss of riding areas and competition for open space, are becoming increasingly important.

Concern over disease outbreak remains low among horse owners, as just 5.8% indicated outbreak was an issue. While concern is low, veterinarians can help horse owners lower their risk of infection by advising vaccine protocols to meet horses' risk levels,

including travel and show requirements, such as following the vaccine requirements of the United States Equestrian Federation (USEF).

About the Survey

The 2015 survey was limited to those who currently own or manage at least one horse, are 18 years of age or older and live in the United States. The survey collected 11,307 responses, of which 10,662 responses were useable.

“As a sponsor of the survey, Zoetis is proud to bring additional insight to the equine industry on topics horse owners and managers find important, so we can work together as partners,” said Katherine Russo, marketing manager, Equine Vaccines.

“We are thrilled with the cooperation of our members and the industry in participating in this survey,” said Christine W. Brune, AHP executive director. “The survey once again demonstrated that our association can provide vital statistics for the equine industry through the power of the media.”

The survey results will be released by Zoetis and AHP members through their own channels beginning in July. Excerpts from this study must be referenced as “2015 AHP Equine Industry Survey sponsored by Zoetis.”

About Zoetis

Zoetis (zō-EH-tis) is the leading animal health company, dedicated to supporting its customers and their businesses. Building on more than 60 years of experience in animal health, Zoetis discovers, develops, manufactures and markets veterinary vaccines and medicines, complemented by diagnostic products and genetic tests and supported by a range of services. In 2014, the company generated annual revenue of \$4.8 billion. With approximately 10,000 employees worldwide at the beginning of 2015, Zoetis serves veterinarians, livestock producers and people who raise and care for farm and companion animals with sales of its products in 120 countries. For more information, visit www.zoetisUS.com.

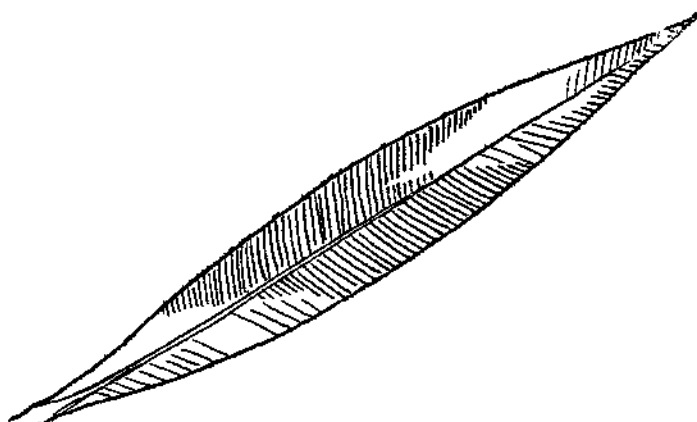


Oleander Poisoning of Livestock

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Bulletin No. 59.



Oleander Poisoning of Live-
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By F. W. Wilson.

Tucson, Arizona, April 15, 1909.

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The Experiment Station office and the botanical and chemical laboratories are located in the University main building at Tucson. The range reserves (cooperative, U. S. D. A.) are suitably situated adjacent to and southeast of Tucson. The work in agriculture, horticulture and animal husbandry is conducted mainly on the Experiment Station farm, three miles northwest of Phoenix, Arizona. The date-palm orchards are three miles south of Tempe, (cooperative, U. S. D. A.), and one mile southwest of Yuma, Arizona, respectively.

Visitors are cordially invited, and correspondence receives careful attention.

The Bulletins, Timely Hints, and Reports of this Station will be sent free to all who apply. Kindly notify us of errors or changes in address, and send in the names of your neighbors, especially recent arrivals, who may find our publications useful.

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Tucson, Arizona.

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Fig 1 Spray of *Nerium oleander*

OLEANDER POISONING OF LIVE STOCK.

By F. W. Wilson

GENERAL DISCUSSION.

The oleander, *Nerium oleander*, is an old-fashioned shrub, familiar to most residents of the South and the Southwest. It occurs native in the Mediterranean regions of the Old World, also in Persia, Japan, and the East Indies, whence it has been distributed to most warm countries. Several species are known, most important of which, next to the common oleander, is the sweet-scented species, *Nerium odorum*, which has pink flowers and a strong, musk-like odor.

Oleander grows readily in the open throughout the southern part of the United States, and is much used as a house plant in many northern and eastern homes. In southern Arizona it is frequently grown as a screen to hide unsightly premises, or is planted in yards as an ornamental. Those commonly found in America are probably of the same species, but sweet-scented and non-scented as well as white and pink flowering varieties grow in this section of the country. Both the white and pink varieties were used in this investigation. According to our experience, however, there is little or no difference in their poisonous action.

Three active principles, all of which are glucosides, have been found in the oleander. The most important of these, oleandrin, may be isolated as an amorphous mass and shows all the characteristics of digitalin. The remaining two, neriin and nerianthin, have less marked poisonous properties.

Nerianthin has been found only in oleanders grown in northern Africa and is believed to be a decomposition product of oleandrin. Neriin, according to Schmiedeberg, appears to

be identical in chemical and physiological properties with digitalein, a second principle of digitalis. As a drug, oleander exhibits the same properties as digitalis or foxglove, and at one time, especially during the middle ages, was used frequently in medical practice. It has no superiority over digitalis and has fallen into disuse. Like digitalis it is a powerful heart stimulant. The purified oleandrin shows all the characteristic poisonous activities of digitalin, and very minute quantities in the frog will arrest the heart's action in systole.

The sequence of phenomena in cases of poisoning by the pure active substances of the digitalin group, which includes not only oleandrin but several other active principles from dogbane, also called Canadian or Indian hemp (*Apocynum cannabinum*), and various African arrow poisons, is given by Schmiedeberg as follows: first, increase of normal arterial pressure as a rule, but not necessarily accompanied by decrease of pulse; second, continuation of the higher blood pressure with more than normally high pulse; third, continued high blood pressure with great irregularity of heart activity and changeable pulse; fourth, rapid sinking of blood pressure, sudden stopping of heart and death.

The supposition that emanations from the plant are poisonous has been shown to be fallacious. The active principles are non-volatile and actual tests in closed rooms have demonstrated the harmless nature of the perfume. The poisonous or medicinal properties of the oleander were known to the ancients and mention is made thereof by Pliny, Discorides, Galen, and other early writers. Eber Barthar, an Arabian, writing in the year 1248, mentions its application and action in several skin diseases. It has also been used in southern Europe to destroy rats.

A very complete compilation of the most interesting cases of poisoning by this shrub has been made by Schmiedeberg¹ some of the most interesting of which are given here. These are not only of general interest but serve to illustrate the dangerous character of this plant.

¹Arch. Path. u. Pharm. 16. 149 (187).

Five soldiers² were poisoned by stirring a pot of barley soup with an oleander branch. Vomiting occurred. In one case there was dizziness and abdominal pain; in another, dulling of the senses and insensibility to external pressure.

Three hundred French soldiers³ in the army corps of Marshal Suchet in Catalonia became sick after eating roasted meat that had been skewered with oleander sticks. A number of those who were poisoned died.

A French soldier⁴ near Madrid used an oleander branch freed of the bark as a skewer. Of twelve soldiers who ate the meat, seven died.

Three Italian women drank alcoholic tincture of oleander thinking that it was brandy. They suffered from pain in the abdomen, vomiting, unconsciousness, and bloody stools. The pulse was light, thready, and irregular. All recovered.

Two cases are recorded in the Indian Medical Gazette.⁵ The first, in 1881, was that of a Hindu who had taken an unknown amount of the root with suicidal intent. Vomiting ensued before he reached the hospital. When received he was mentally dazed. Pupils of the eyes were dilated and fixed, pulse 36 per minute and light, gait staggering, respiration rapid, and skin normal. Two hours later epileptiform convulsions occurred, temperature 97.4 by axilla, semi-coma. After this, violent convulsions similar to hysterio-epilepsy occurred every half hour lasting about one and one-half minutes, temperature rose to 101 and pulse to 120. Twelve hours later he was still unconscious, pulse 40, respiration 18, temperature 98. Five days later the pulse was 44, and there were evidences of mild mania, such as singing and saying that there was a god in his abdomen and that he wanted a piece of glass to cut him out.

The second case, in 1887, was that of a Hindu who took an infusion of about four ounces of the root at 8 A. M. In about one hour he was seized with vomiting and severe cramps in the abdomen

²Journal de chim. med. II Ser. IX, 535, 1843.

³Journal de pharm. et chim. 32, 332, 1857; Journal de chim. med. IV, Ser. III, 249, 1857.

⁴Journal de chim. med. II Ser., IX, 393, 1843.

⁵Through Therap. Gaz., July, 1888, p. 452

and extremities One hour later he became insensible, but was not seen by the doctor until near 4 p. m. At that time he was unconscious, skin cold and clammy, pulse weak and thready, jaw muscles stiff, fingers rigid, and he had light convulsive spasms. He remained in the hospital two nights and one day and was then removed to his house, still unconscious and with increasing collapse. Death occurred five days after taking the poison.

One experiment⁶ is recorded in which a cow and two goats were poisoned by oleander leaves given with other feed. Coldness of the nose and extremities, marked tremors in posterior extremities and cramp-like contractions of all the muscles were observed. The goats passed into a general paralytic condition and died in about eleven hours, while the cow died paralyzed twenty-four hours after eating the leaves.

OBSERVATIONS IN ARIZONA.

The opportunities in this region for domestic animals to obtain oleander are many. In towns it is not unusual for the family horse to graze on the lawn or to feed on the fresh grass which has been clipped with the mower. Thus, if oleanders are growing in the yard, the animal is quite likely to obtain a few of its leaves. Sometimes in the heat of summer when flies are bothersome, dairy cows will run hurriedly under brush and nip off leaves as they go. If the bushes happen to be oleanders fatal results may follow. Nervous horses are apt to nip nearby trees which may be oleander and result in poisoning.

Animals which have been accustomed to oleanders do not as a rule bother them, but instances where they have eaten the leaves accidentally with their feed are frequent. Only one case has been reported where an animal, having eaten oleander leaves and recovered, has repeated his action and eaten them a second time. In general, stock will not eat the plant unless they have an intense craving for green feed or, on the other hand, after being on green feed for some time, they may crave something dry.

⁶Centralb f klin Med, I, 161.

While the work with oleander was being conducted at the Experiment Station Farm near Phoenix, a number of cases of poisoning that had occurred previously were reported to the writer by farmers. To illustrate losses of this nature several of these reports are repeated, as follows:

Mr. B——, Phoenix, reported the loss of a horse supposed to have obtained the poison while passing under oleanders growing on the Station farm.

Dr. R——, Phoenix, reported at least 30 cases of oleander poisoning during his practice in and near Phoenix.

Mr. M——, of Phoenix, reported the loss of a fine team of draft horses which were the property of the city. Later an unclaimed stray horse, that had been impounded by the authorities, and given a feed of oleander leaves in a bran mash by one of the stable boys, died showing symptoms similar to those observed in the team of draft horses.

Mr. R——, Phoenix, reported a number of cases of oleander poisoning among his own animals and those of several of his neighbors.

Mr. A——, Phoenix, reported that he had noticed a driving horse eating several oleander leaves in the morning with no bad effects. He stated, however, that the animal had just been fed and watered.

Numerous other cases were reported but no definite knowledge of their nature could be obtained. A number of deaths from uncertain causes have also been accredited to oleander poisoning.

EXPERIMENTS WITH OLEANDER.

The objects of the experiments carried out at this Station were to define accurately the symptoms of an animal suffering from oleander poisoning and to determine the quantity of the plant necessary to cause death. Trials were made with green and dry leaves, flower stems, portions of the branches, and bark and roots.

Both the crude dry and green material and aqueous infusions were used. These three possible cases of poisoning were investigated since an animal might obtain dry or green leaves

in his feed, nip the green leaves directly from the bush, or obtain the poison by drinking water into which oleander leaves had accidentally fallen. The alcoholic extract was not used since there is little or no probability of poisoning with it, although the chief poisonous principle, oleandrin, is very much more soluble in alcohol than water.

The animals used were two horses, a cow, a mule, and several sheep. The first method of feeding the leaves was to place them in a grain ration. It was soon discovered that a definite amount could not be given in this way, because the animal would not eat all of the leaves. When once he had taken enough to make him sick he could not be induced to touch a second dose. In later experiments the desired amount was placed in large gelatin capsules, which are quite easily administered and insure accurate dosing. The aqueous solution, when used, was added to a pint of water and given as a drench. It was prepared by macerating the green leaves over night in a small container with distilled water at ordinary temperatures.

In the following cases the results of our experiments with each animal will be given in detail in regard to dose, symptoms, and post-mortem appearance.

CASE I (HORSE).

A sorrel mare about fifteen years old, in good health and spirits with the exception that she had the heaves, was used. Temperature was normal and pulse a little above normal.

March 17, ten grams of green oleander leaves were fed in a bran mash. No perceptible change was noticed.

March 24, twenty-five grams of green oleander leaves were given in capsules as she evidently remembered the former dose and would not touch the tempting mash.

March 26, the animal was in low spirits and at 8 A. M. was purging freely. At 5 P. M. she was very weak and refused to eat or drink.

March 27, the mare was found dead in the morning; probably having died early in the night. There was no evidence of a struggle or pain at any time. No post-mortem was made as

we were not prepared to hold one. In fact it was not expected that the mare would die at this time.

CASE II (HORSE).

The second horse was a bay gelding, old but in perfect health and spirits. Pulse and temperature were normal for his age.

March 24, an aqueous infusion of 10 grams of green leaves was given with a bran mash. There was no effect other than a slight purging at the end of 24 hours. Before further experiments were made the animal was allowed to fully recover.

April 17, at 9 A. M. six grams of dry oleander leaves, picked up from the ground under and near the bushes, were fed. There seemed to be no change in the animal's condition until the next day at 4:30 P. M., when he began to purge quite freely. This was accompanied by some wind, the odor of which resembled that of sour oleander leaves, after standing in water for several

days. Feces were olive green in color. Pulse rapidly rose to 60, accompanied by a slight rise in temperature. By ten o'clock the next day the horse recovered his normal health and spirits and ate very heartily of green feed, his mouth being quite sore from the effects of the poison.

April 19, the leaves remaining from the previous infusion, which in a partly dried condition weighed twelve grams, were fed. The

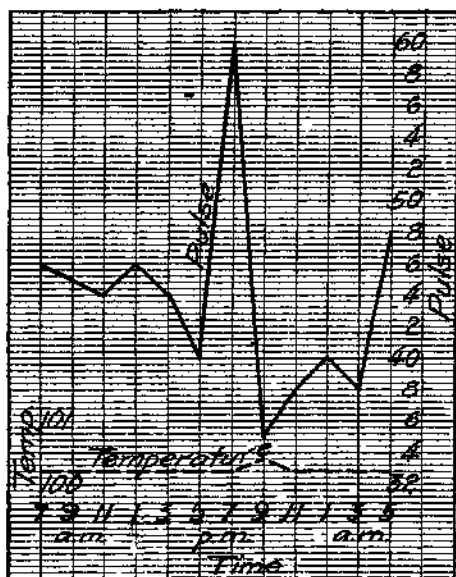


Fig. 2. CASE II, showing the temperature and pulse of horse when fed six grams of dry oleander leaves, with recovery

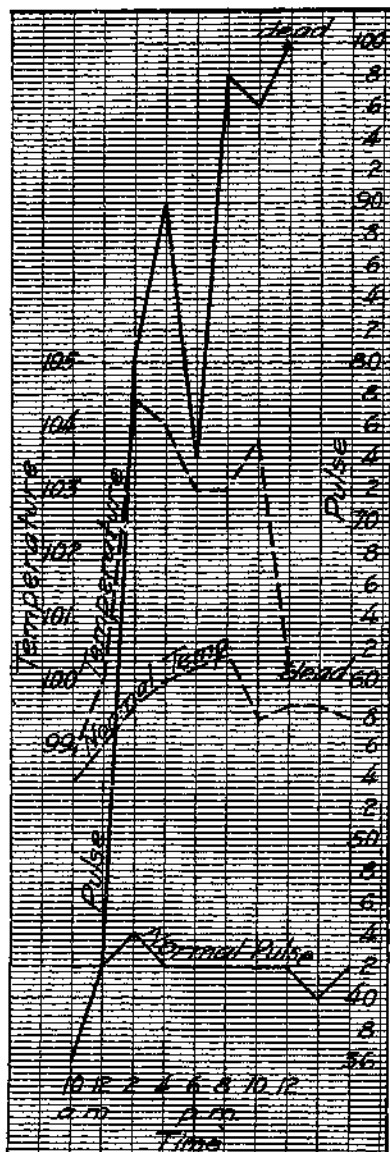


FIG. 3 CASE 11, showing temperature and pulse of horse when fed 14 grams of dry oleander with fatal results, and showing the temperature and pulse of an old horse under normal conditions.

horse seemed in a normal condition for a few hours. Six hours after the feed both the temperature and pulse rose gradually but later dropped very low. At the end of four hours he was in a critical condition, and it seemed at the time he would die. His temperature then rose gradually to 102.8 and pulse to 70. After that there was a gradual decrease in temperature to 97.2 and in pulse to 48. His spirits and general health at this time were decidedly poor, but with good care he fully recovered.

April 23, at 10 A. M. he was again fed 14 grams of dry oleander leaves. His pulse rose gradually from 36 to 100 at 12 P. M., his temperature standing at 100. About 12:30 P. M. he lay down but rose up immediately and then died without a struggle. A short time before his death white tenaceous feces accompanied with some wind and blood were passed. The extremities were cold

and the body was wet with sweat. There seemed to be some pain at this time as the muscles of the abdomen were somewhat drawn and short groans were emitted. About four hours before death a slow thready pulse was recorded.

At 10 A. M. the next morning the post-mortem examination was held with the following findings:

The *adipose tissue* was yellowish in color, which is characteristic of a case of this kind. This was later found to be true in the case of all animals used in these experiments.

The *spleen* was normal.

The *veins* in the intestines and stomach were filled with blood.

The *kidneys* were normal.

The *mucous membrane* of the stomach was sloughed off to some extent. That of the mouth was dark in color. The entire mouth was swollen and seemed very sore, judging from the fact that the animal ate only soft and tender food.

The *stomach* showed much discoloration similar to that sometimes caused by gastritis. However, the action of the heart in this case would show that oleander poisoning was the cause of death.

The *heart* was very soft and pliable and showed overwork during the action of the poison. The right and left auricles were filled with post-mortem clots.

The *tongue* was enlarged and very dark in color.

CASE III (COW).

A young milch cow that had been sick for some time without much chance for recovery was used in this trial. She seemed to be partly paralyzed and was unable to get on her feet. Her appetite was normal and otherwise she was in good health. After death the trouble was located in her right kidney, which was enlarged and filled with fluid. Dr. F. O. Richmond, the veterinary surgeon who directed the post-mortem, stated that the oleander could not have caused the kidney trouble and a close examination of the sheep and horses used in the other experiments did not show similar symptoms.

The animal had been sick so long that it was decided to give her a fatal dose at once. She was therefore fed eighteen grams of green leaves on April 17th and died without any perceptible pain. As death approached the extremities grew cold while the body was yet warm. The heart action was so low that the pulse could not be accurately taken for some hours before death. The post-mortem findings were as follows:

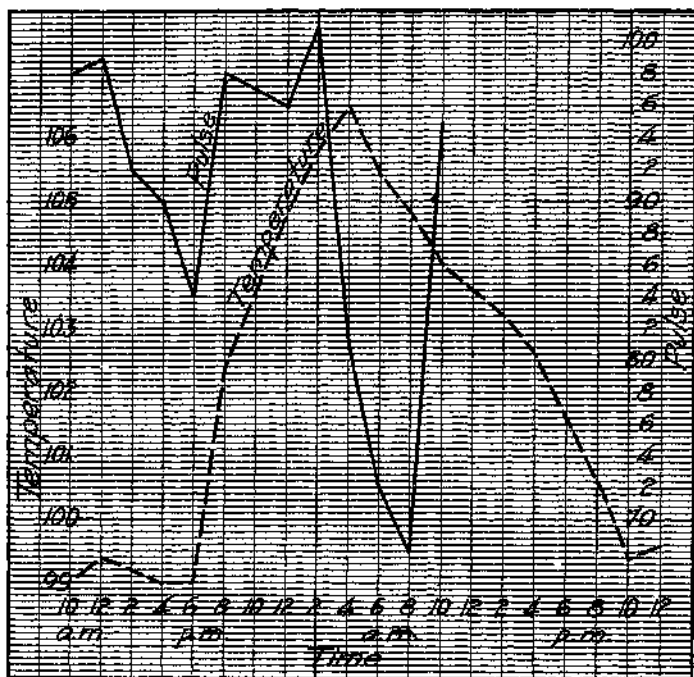


FIG. 4. CASE III, showing the temperature and pulse of cow when fed 18 grams of green oleander leaves.

The *adipose tissue* was yellowish in color.

The *spleen* was normal.

The *left kidney* was normal; the *right kidney* was enlarged and filled with fluid. As noted above this did not cause death.

The *mucous membranes* were the same in appearance as in the horse.

The *stomach* showed discoloration and the veins were distended.

The *heart* stopped on systole. The organ was quite soft.

The *lungs* were normal.

The *brain* was normal.

The *liver* was normal.

CASE IV (MULE).

In this experiment an old mule was used and proved to be an excellent subject. He was in perfect health and spirits. His temperature and pulse were normal. After the first dose of

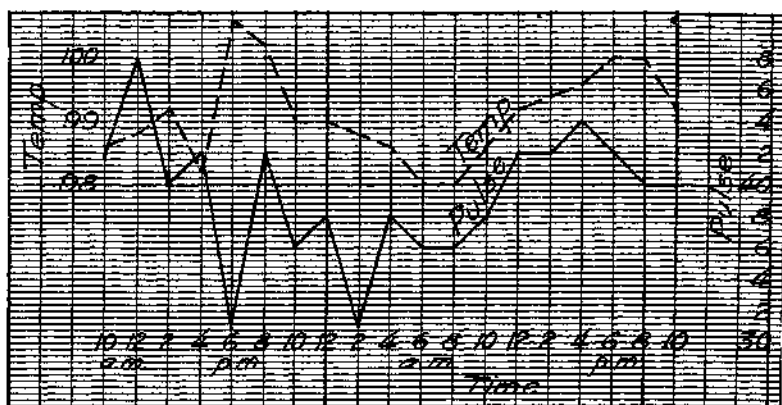


FIG. 5. CASE IV, showing the temperature and pulse of mule given an infusion of 15 grams of green oleander leaves, with recovery.

poison he seemed to know that his life was in danger and it became very hard to administer further poison even in the capsules.

April 23, the first trial was made with an aqueous infusion prepared from fifteen grams of green oleander leaves and given on a full stomach. There was very little change in the animal except that he seemed in excellent spirits, the poison acting apparently as a stimulant in this case. A slight rise in temperature accompanied by a slight increase in pulse was the only change noted. The animal was allowed to fully recover his normal condition.

May 3, the second trial was made with twenty-six grams of green leaves fed on a full stomach. At the end of twenty-four hours the pulse reached 92 and the temperature 102. At the end of thirty-six hours both pulse and temperature began to drop. The excellent constitution of the animal, coupled with the method of feeding on a full stomach, probably pulled him through. This was the largest dose used and the animal did

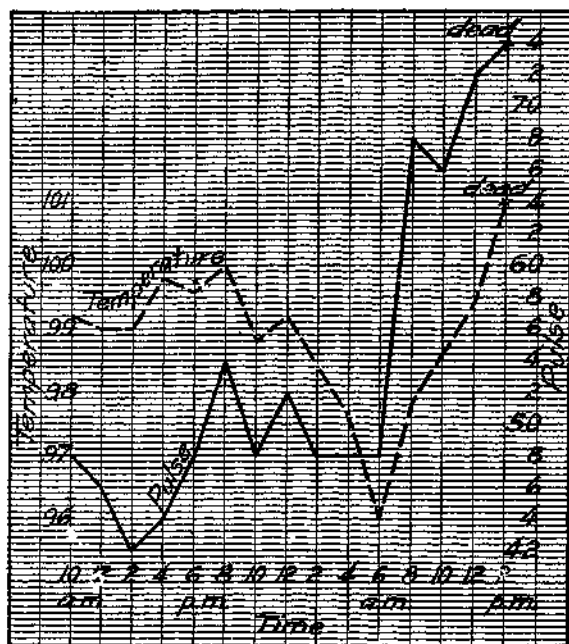


FIG. 6 CASE IV showing the temperature and pulse of mule given 24 grams of dry oleander leaves on a full stomach. Death resulted.

not seem to be very sick at any time. However, he purged quite freely and there was decided coldness of the extremities. His mouth did not become sore and his appetite remained good. This would lead to the conclusion that more leaves are required to produce fatal results when taken on a full stomach than otherwise. Also, that an animal would eat while under the influence of the poison if his mouth were not sore. The animal recovered.

Later a third trial was made with the same mule, using twenty-four grams of dry oleander leaves on a full stomach. He died in twenty-four hours showing the same symptoms that the other animals had shown. The post-mortem findings were the same as in the horse.

CASE V (SHEEP NO. 1).

A wether lamb, six months old, was fed one gram of green oleander leaves at 6 P. M. and died the next night at 12 P. M. The temperature and pulse were not taken but it was noticed that the animal was in a partly unconscious state for several hours before death. The mouth and nostrils were sore for six hours before death. The post-mortem findings were the same as in the cow.

CASE VI (SHEEP NO. 3).

An old ewe was fed two grams of oleander root without any effect. Two days later she was fed two grams of petals from oleander flowers. There was no effect. Two days after that she was fed two grams of cross section of an oleander branch with no effect. Again, one week later she was fed four grams of green oleander leaves and died in twenty-four hours. The post-mortem findings were the same as in the cow.

CASE VII (SHEEP NO. 4).

An old ewe was fed two grams of dry oleander leaves and died in thirty hours. The post-mortem findings were the same as in the cow, with the exception that a small quantity of undigested leaves was found in the throat. Near the small wad of leaves the mucous membrane was discolored to some extent.

TREATMENT.

There is little or no treatment that can be offered, if the animal has received a fatal dose. When oleander has been taken by human beings an emetic may be used with more or less success if given promptly. The case should then be treated by a physician who will combat symptoms as they arise, remembering that oleander is practically identical with digitalis in its poisonous action. In the case of live stock emetics can not be used with success.

SUMMARY.

Oleanders are poisonous when eaten by human beings, rodents and common farm animals, but do not exhale poisonous materials when growing in the house. The manner of obtaining the poison is generally accidental and its presence is not usually known until death is approaching. Dry leaves are poisonous as well as green leaves. There is little danger of the animal obtaining the poison from leaves in drinking water. The amount of poison necessary to cause death is small, but depends also on the condition of health of the animal. The physiological effects of oleander are similar to those of digitalis and if enough poison is obtained the patient is sure to die.

The amount of oleander necessary to cause death in horses ranges from fifteen to twenty grams of green leaves, and from fifteen to thirty grams of dry leaves. This depends on the condition of the animal at the time the poison is obtained. A full stomach will necessitate more poison. In the case of cows it is safe to say that from ten to twenty grams of green leaves and fifteen to twenty-five grams of dry leaves are sufficient to cause death. For sheep the fatal dose of either green or dry leaves is from one to five grams. There is little danger in the bark, roots or flowers since livestock would hardly obtain sufficient poison in that way.

In the case of human beings greater care should be taken. Often persons thoughtlessly chew leaves, flowers and small sticks. Small children playing under oleanders are very apt to pick up leaves, flowers or sticks and chew them, with fatal results. In case human beings obtain oleander poison treat as directed above.

The general symptoms are increased temperature and pulse, coldness of the extremities, warm body temperature, dilation of the pupils of the eyes, and discoloration of the mouth and nostrils, followed by sore mouth. The body becomes wet with sweat, due to the exertion caused by the powerful heart stimulation. The animal generally refuses to eat or drink during the twenty-four hours preceding death. This is usually due to soreness of the mouth and throat, making it painful to masticate

and swallow food. The bowels act often and feces are usually greenish in color. The action of the kidneys is increased slightly and color of urine is normal.

In our list of shrubs that may be planted for hedge, screen or ornamental purposes, are numerous harmless ones that compare favorably with the oleander so far as resistant and ornamental qualities are concerned. The well-known pomegranate, Japanese, California, and Amoor River privets, common myrtle, laurustinus (*Viburnum tinus*), and tamarisk may be mentioned in this connection. If oleanders are to be used, however, they should be planted only in places of safety, and not in parks, along public highways, or other drives.

There is little doubt that numerous cases of oleander poisoning have never been brought to light because of death being attributed to other sources. It is safe to say, however, that many hundreds of animals have been lost in southern Arizona from this shrub.