

Arid Zone Times

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Cold Hardiness of Desert Trees

Editor's Note: The following article is a revision of an Arid Zone Times originally published in 2007, and is offered in response to the numerous inquiries we have received following the December, 2010 very hard freeze. Typical hard freezes in the desert southwest usually range from 22 to 28 degrees F. In this respect the 2010 freeze was typical of what we have periodically experienced, historically. As spring unfolds and new growth appears on damaged trees, the freeze damage expressed will require attention, both in the interest of the appearance and long term health of affected trees. Temperatures this fall gradually cooled down through October and November giving desert trees ample time to transition into winter dormancy. In the Phoenix metro area we had our first frost/freeze during the week of Thanksgiving. This freeze was followed by even lower temperatures that persisted for a longer period of time during the New Year's weekend (coldest weekend on record since 2007). Fortunately as of this publication date no temperature in the teens as were experienced in the winter of 1989-1990 and 2007.

In other regions of the country there is a gradual but definite change in the weather toward cool days and even cooler nights as fall proceeds to winter. By comparison, the desert southwest can remain warm and sunny right up to the first killing frost. While many plants begin slowing growth in response to shorter days, as opportunists, desert adapted tree species will grow as long as water, nutrients and warm temperatures persist. With this extended period of nearly ideal growing conditions, desert adapted trees can be severely damaged when freezing nights do arrive if trees are not properly conditioned.

Plants are damaged by freezing tem-



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Dedicated to providing quality trees to the landscape industry, that are appropriate to the desert Southwest.

peratures because the water inside the plant freezes. As liquid water is transformed to ice it forms crystals within and between the cells and tissues in the plant. Ice crystals expand as they grow taking up more space than did the liquid water. This expanding ice crushes, pierces and irreparably damage and death of an array of critical plant tissues. This initial damage usually appears within a few days following the actual freezing temperatures but the damage observed may not represent the full extent and severity of the damage.

The inherent ability of a plant to tolerate freezing temperatures is called cold hardiness. Cold hardiness is most often reported in terms of a specific temperature or over a range of temperatures (e.g. hardy to 25 F or 23 to 28). These numbers represent temperatures at which, historically, little if any cold damage has been observed but these numbers are not a guarantee. Several factors influence cold hardiness: the maturity of the plant, the duration and intensity of freezing temperatures, rain fall, humidity, cloud cover vs. clear night, protection provided by other plants and structures, whether the plant is actively growing or dormant and

hardened off and the genetic characteristics of the plant. Many popular desert landscape trees, like hybrid mesquites, will continue to grow so long as temperatures and cultural practices encourage growth. If not hardened off succulent new wood, the result of late summer and early fall growth, is especially prone to frost injury from a sudden onset of freezing temperatures.

What to do with damaged Trees? Trees that are frost damaged should not be pruned until new growth begins to appear, usually late spring or early summer of the year following the injury. In spring you can more accurately detect the extent of damage and better limit pruning to damaged branches only. Pruning during the winter months, following a freeze, will make the newly exposed tissues more vulnerable to further damage should freezing temperatures recur. Good pruning techniques should be used to prevent stimulating excessive or unwanted new shoot growth.

September and October are the best months to begin winterizing landscape trees for the approaching colder temperatures. The simplest and most effective method is to slow growth by gradually reducing irrigation and halting fertilizer application by September 1. This will serve to reduce the amount of new, terminal (tip) growth that is the most susceptible to cold injury. Growth management of this sort can be complicated in landscapes where under-story plantings or winter and fall color plants are added at the end of the summer. Trees and shrubs planted in lawns that are over-seeded with winter grasses pose special challenges. Over-seeding requires that large amounts of water and fertilizer be applied during a season (mid to late fall) when trees being "winterized" should receive little of either.

A survey conducted by William Kinnison in 1978 (published in Desert Plants") at Central Arizona College after a hard freeze (24-25 F) showed that

the following trees were hardy: *Acacia aneura*, *A. berlandieri*, *A. craspedocarpa*, *A. stenophylla*, *Prosopis chilensis*, *Pithecellobium flexicaule*, *P. mexicana*. Warren Jones writing about the effects of the same freeze in northern Sonora Mexico (also published in "Desert Plants"), reported that *Lysiloma thornberi* was damaged by temperatures below 25F and *Olneya tesota* were damaged at 20F. Prevention remains the most effective method of preventing cold injury. Appropriate initial landscape tree selection and proper horticultural practices keep the landscape vigorous and minimizes injury from cold temperatures.

One of the advantages of the vegetative propagation behind 'Variety AZT' selections is uniform cold hardiness across a given selection as opposed to the more unreliable hardiness of seed grown desert trees. 'Variety AZT' selections that showed little or no damage as a result of the 2007 freeze include: *Acacia smallii* 'AZT', *Cercidium* (*Parkinsonia*) hybrid 'AZT', *C. (P.) praecox* 'AZT', *Chilopsis linearis* 'AZT B-Color', Desert Amethyst, Dora's Desert Rose, *Olneya tesota* 'AZT', *Prosopis thornless* hybrid 'AZT', *P. glandulosa* thornless 'AZT', *P. seedless* 'AZT', and *P. velutina* 'AZT'. Additional frequently utilized desert trees include: *A. aneura*, *A. schaffneri*, *C. (P.)* 'Desert Museum', *C. (P.) floridum*, and *Sophora secundiflora*.

Ed Mulrean Ph.D., Editor

Short list of tree hardiness temperatures

The following information supersedes hardiness temperatures shown on AZTimes articles prior to this update of January 6, 2011.

This is a short list of cold hardy desert trees from our website.

To see the complete list visit www.aridzonetrees.com

<u>Botanical Name</u>	<u>Common Name</u>	<u>Fahrenheit</u>	<u>Celsius</u>	<u>Botanical Name</u>	<u>Common Name</u>	<u>Fahrenheit</u>	<u>Celsius</u>
<i>Acacia aneura</i>	<i>Mulga</i>	15	-9.4	<i>Cercidium microphyllum</i>	<i>Foothill Palo Verde</i>	15	-9.4
<i>Acacia berlandieri</i>	<i>Guajillo</i>	10	-12.2	<i>Cercidium praecox</i> 'AZT'	'AZT' Sonoran Palo Verde	18	-7.7
<i>Acacia constricta</i>	<i>Whitethorn Acacia</i>	0	-17.7	<i>Chilopsis linearis</i> 'AZT Bi-Color'	<i>Desert Willow</i> 'AZT Bi-Color'	10	-12.2
<i>Acacia craspedocarpa</i>	<i>Leather Leaf Acacia</i>	18	-7.7	<i>Chilopsis linearis</i> 'AZT Desert Amethyst'	<i>Desert Willow</i> 'AZT Desert Amethyst'	10	-12.2
<i>Acacia greggii</i>	<i>Catclaw Acacia</i>	0	-17.8	<i>Chilopsis linearis</i> 'AZT Dora's Desert Rose'	<i>Rose</i>	10	-12.2
<i>Acacia schaffneri</i>	<i>Acacia</i>	15	-9.4	<i>Olneya tesota</i> 'AZT'	'AZT' Ironwood	20	-6.7
<i>Acacia smallii</i> (<i>A. minuta</i>)	<i>Sweet Acacia</i>	20	-6.7	<i>Prosopis</i> hybrid 'AZT'	'AZT' Thornless Hybrid Mesquite	15	-9.4
<i>Acacia stenophylla</i>	<i>Shoestring Acacia</i>	18	-7.7	<i>Prosopis glandulosa</i> 'AZT'	'AZT' Thornless Honey Mesquite	0	-17.8
<i>Cercidium floridum</i>	<i>Blue Palo Verde</i>	10	-12.2	<i>Prosopis velutina</i>	<i>Velvet Mesquite</i>	0	-17.8
<i>Cercidium</i> hybrid 'AZT'	<i>Verde</i>	18	-7.7	<i>Sophora secundiflora</i>	<i>Texas Mountain Laurel</i>	0	-17.8
<i>Cercidium</i> hybrid (Desert Museum)	<i>Desert Museum</i>	15	-9.4	<i>S. secundiflora</i> 'Silver Peso'	<i>Texas Mountain Laurel</i>	0	-17.8

Visit our website at www.aridzonetrees.com to see the most current literature on Variety 'AZT'.

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