

Mistletoe: Where and How Much is at the Crux of its Ecological Role

Gillian Martin September 2020



Female Mountain Bluebird consuming mistletoe fruits.

Todd Esque, USGS Western Ecological Center

It is September as I write this and I know it won't be long before many resident and migratory birds will be turning on their search images for mistletoe. The plant's compact vegetation bundles can escape our attention, especially in evergreen trees; but not so for many birds including bluebirds, grouse, evening grosbeaks, mourning doves, and cedar waxwings. Its fruit is an important food source in fall and winter when insect populations are lower. In the desert Southwest the Phainopepla is the Duke of mistletoe. In fact, its digestive tract is specialized for rapidly processing copious amounts of its fruit and seeds.

Some mistletoes are host specific, but don't let that fool you into thinking that hosts are few. A forest ranger can point to it in many conifers, so can growers of apples, walnuts and pecans. In some oak woodlands, lower canyons and along riparian areas you have undoubtedly walked under its bundles in oaks, willows, sycamores, cottonwoods, mesquites and paloverdes.



Phoradendron macrophyllum. In CA. Gillian. Martin

All mistletoes are parasitic but not entirely (hemiparasitic is the proper term) because most of them have green leaves necessary for photosynthesis. They pilfer their hosts' water and nutrients. Most mistletoe species, except for dwarf mistletoes (which have 'exploding' fruits), are predominantly reliant on birds to disperse their seeds. It's no accident that the plant's seeds are sticky and remain so in the birds' excreta which is deposited onto the bark of host trees or rubbed off when birds clean their bills or groom themselves. There the plant ingeniously takes root.

Whether leafy mistletoes or dwarf mistletoe are high in a canopy or near the ground, its berries, leaves or aerial shoots are munched on by other small and large organisms apart from birds. Among the entourage are elk, deer, squirrels, chipmunks and porcupines. When spring ushers in the nesting season numerous songbirds, several hawks and owls, even squirrels and the dusky-footed woodrat usurp clumps of mistletoe plants as nurseries.



White, round
fruits of

*Phoradendron
macrophyllum*

Robert L. Mathiasen



Phainopepla scat containing mistletoe seeds by NPS Brad Sutton

But before this fertile time while snow still lies deep among the pines the forest ranger passes beneath his trees with no awareness that a normally chatty avian member of the community has stilled its voice and huddled for warmth inside the mistletoe overhead. Its name is likely mountain chickadee. You can bet a pine squirrel notes the ranger's presence, though. That's because

it is vigilant that none of its enemies appear interested in the particular clump of mistletoe plant that stores its pinecones. The plant's compact structure makes it suitable for these many purposes as well as for protection from predators.



© Bettina Arrigoni

Male Phainopepla by Bettina Arrigoni

Though less obvious to us, mistletoe flowers have their own followers. Their nectar and pollen attract insects including bees, wasps and butterflies. Flies, ants and beetles are important pollinators. Three kinds of hairstreak in the United States are entirely dependent on mistletoe. For example, the great purple hairstreak lays its eggs on mistletoe leaves upon which its caterpillars feed. And before we move on, it's worth mentioning that insects also rely on its fruit and seeds for food.

At first glance you might frown at the amount of dead wood that a heavily damaged host tree might have in its crown. Observe the downy or acorn woodpeckers for a while. See how they frequent dead wood. They and their relatives are in search of all available insects, from ants to beetle larva. Note how they drum on dead wood to telegraph messages to one another. I suspect you've already seen how the acorn woodpecker studs decayed wood with acorns.



Purple hairstreak Alan Schmierer

What a fascinating 'cooperative' these organisms make! Consider how birds and insects support the spread of mistletoe while deriving its benefits. But birds also 'reciprocate' to the host tree by reducing its pests and possibly slowing its demise. It does not escape you, does it, that 'elasticity' can be an attribute. By that I mean, if an organism diversifies its role, it reaps the benefit and serves the greater good.

Ultimately mistletoe has a commendable destiny. Because host trees are not equally susceptible, it is one of many organisms that advances the evolutionary concept we know so well. 'Survival of the fittest.' In an otherwise healthy ecosystem, if mistletoe kills a tree, its death is an asset to countless organisms. In nature's ledger, the loss of a tree is an investment in new life and diversity. Balance and sustainability are key.

I wonder if this will surprise you as it did me. Frequent leaf drop may be the best ecological benefit of mistletoe because their dropped leaves have high nutritional value (more than those dropped by deciduous trees). As decomposed matter, mistletoe earns five stars for enriching soil. This has been studied by Dave Watson and his students in Australia (but not thus far in the U.S.). Let's pause at this discovery, or should I say, rediscovery: Matters unnoticed---I mean mere things like fallen mistletoe leaves---rarely touch our consciousness, and rarely yet, register as things of value.



Phoradendron villosum on oak in CA. Robert L. Mathiasen

Despite its many ecological benefits there are circumstances when mistletoe abundance is a serious problem. In some regions, especially in cool and temperate forests, it can be highly impactful to many trees. Timber producers would quickly point out that it reduces growth, yield and quality of wood. Fruit and nut growers likely agree. Impacts can be costly to them, particularly when mistletoe management and preventive costs are included.

Here's a point that will not surprise you. Dwarf mistletoe poses additional hazards. In forest systems the witches brooms are the culprits. A ground fire can ignite a low-hanging broom and the fire can move up the tree into the crown; hence the mistletoe broom has served as a fire ladder to carry the fire up the dwarf mistletoe-infected tree. Heavy dwarf mistletoe brooms in recreational areas can snap and are also a safety concern.

In most cases, mistletoe grows like it has all the time in the world. It may take several decades to kill a tree. However, as reinfestation occurs, and when periods of drought persist, a tree's life will be shortened. Mistletoe can kill a tree in two ways: directly by reducing its water and nutrients, or indirectly, by weakening its ability to fight off pathogens which cause yet more harm. In fact, cankers caused by dwarf mistletoes can act as a doorway to pathogens. You can complete the story, can't you? We've reach a place where we hear an echo---'Mistletoe damage provides habitat for insectivorous and cavity-dwelling species.'

The plant's location, abundance and rate of spread are key to its ecological benefits as well as to human tolerance. Naturally the rate of leafy mistletoes is contingent on factors that include the number of avian consumers, the size of their territorial range, and the presence and distribution of suitable hosts. We understand that controlling the spread of mistletoe is an important goal for some commercial enterprises and property managers, perhaps even for those that harvest it commercially for medicinal and other cultural practices.



Mistletoe in urban park in Southern California . Gillian Martin

Mechanical removal is the most effective strategy to minimize leafy mistletoe impacts if it is applied early and regularly. It is labor intensive, however. Knowing which methods of management are appropriate and effective requires a thorough understanding of each kind of mistletoe. One resource for best practices can be found in the list of references provided at the end of this article. In the west, the most common genera are *Phoradendron* spp and *Arceuthobium* spp. The European mistletoe (*Viscum album*) was introduced to Sonoma County, California in the 1900s by Luther Burbank. It is now established and mostly still limited to this region. Hawaii has several indigenous species in the genus *Korthalsella*.

Best practices do not usually focus on the presence of mistletoe in more developed areas where management objectives may be

broader and fewer mistletoe consumers may be present. I am referring to urban parks and adjacent natural areas where recreation is a priority, and where habitat conservation is also a possibility. These circumstances provide the opportunity to allow leafy mistletoes to grow naturally. Furthermore, prior to tree care, guidance can include conducting a pre-work inspection for nesting birds in mistletoe (and elsewhere in the tree) in the nesting season, and if a nest is found, delaying work in the tree until birds (in particular) have left the nest. Homeowners and businesses could also opt to not remove leafy mistletoes from trees on their property so the trees could provide wildlife habitat as long as trees are not severely infected with mistletoe. At low levels of infection, mistletoes do not harm their hosts.

Let's widen our lens in closing. Wildlife have had a long association with mistletoe. Fossil records suggest that mistletoe has filled many ecological niches in the forest

landscape for over 40-million years. Highly regarded scientists such as D. M. Watson, F. G. Hawksworth and D. A. Norton (identified in the provided references) have proposed that native mistletoe should be regarded not as destructive pests, but possibly keystone species whose loss, could negatively impact habitat quality and wildlife diversity.



Mistletoe removal in forest. R. Kulawiak

The consistent call of good stewardship is to balance the protection of natural resources with commercial and other human interests. It is complicated by the fact that impacts to ecosystems may be gradual and go unnoticed by most. Furthermore, their consequences are often not acknowledged as significant.

Ecological considerations are not always possible or practical. In many circumstances however, 'all or nothing' thinking can be moderated and enhanced through collaboration between commercial and horticulture industries. If management objectives become more elastic overall the pace of ecological change can be slowed, thereby providing wildlife more time to adapt. I reflect with pleasure on the metaphor this hemiparasitic plant provides. It takes and it gives. The community of organisms that benefit from it do the same. In the process, the 'whole' is served and sustained.

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