

Back in the Day: Summer 2006

Forage Preferences and Feeding Patterns by Mark Massar, Desert Tortoise Preserve Committee

One of the original ways biologists collected information on Desert Tortoise (*Gopherus agassizii*) diet was by examining tortoise scat. However, scat analysis is very inaccurate because certain species, such as grasses, pass through the digestive tract more readily than others (i.e., herbaceous plants).



Acmispon brachycarpus, formerly known as *Lotus humistratus*, a favorite food of Mojave desert tortoises. Common names for this plant include foothill deervetch and short-podded lotus. Photo © 2021 by charlescruessell

Instead, biologists use bite counts, which involve observing a particular tortoise (with binoculars) from dawn to dusk, tediously counting every bite the animal takes and recording the plant species eaten. Based on tens of thousands of bite counts from various tortoises across the Mojave Desert, a clearer picture of the diet of wild Desert Tortoises has emerged.

Tortoises are strict vegetarians. In general their food consists of winter annuals, summer annuals, herbaceous perennials, grasses, and, to a lesser extent, cacti. Tortoises do not eat desert shrubs such as the ubiquitous creosote bush (*Larrea tridentata*). Tortoises are very selective about the plants they prefer.

The specific plants that tortoises prefer are often rather rare in the environment. Tortoises will make deliberate searches in order to find them, often following specific pathways from one plant to another, and

bypassing other, more common and seemingly less palatable plants.

The majority of the diet of Desert Tortoises consists of just a few plant species. Plants in the legume family make up the greatest percentage of their diet, with lotus (*Lotus humistratus*) and astragalus (*Astragalus didymocarpus* and *A. layneae*) being the

most important species, especially in the eastern Mojave. Surprisingly, tortoises do not prefer the more common annual species, such as Desert Dandelions (*Malacothrix glabrata*) and Alkali Goldfields (*Lasthenia species*), although these species can carpet the desert in a sea of color following wet winters.

As it turns out, there is a good reason why tortoises are particular in their food choices. Most desert plants contain

high levels of potassium. Because an accumulation of potassium in the body is lethal, potassium is regularly excreted from the body using a process that is, unfortunately, water intensive. Obviously desert tortoises need to be experts at water conservation, so they select the few desert plants in their environment that have relatively low concentrations of potassium and relatively high levels of water and protein. Desert tortoises prefer fresh, green, succulent annuals over dried vegetation. In the western Mojave Desert, fresh annuals are available mainly in the spring following the winter rains.

In the eastern Mojave Desert and the Colorado Desert, rains come not only in the winter but also in the summer. This gives tortoises living there two opportunities to eat fresh green plants. During droughts, tortoises generally become less active, staying mostly underground in their

burrows and caves.

An alarming trend in the Mojave Desert is the spread of non-native annual plants. This spread is changing the desert in many ways that are jeopardizing the future of the Desert Tortoise. Non-native annuals are replacing many of the native preferred annuals.

Non-native annuals make up a very small percentage of the tortoises' diet, although in some places they now make up more than 90% of the annual-plant biomass. Also, alien annuals promote the spread of wildfires, which in turn creates conditions favorable for the increased spread of alien annuals.

Although the situation appears dire, land managers are beginning to explore options of controlling the spread of alien annuals and reseeding areas with the native annuals that tortoises prefer. 🌱

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Astragalus didymocarpus var. *didymocarpus*, dwarf white milkvetch, a food plant favored by the Mojave desert tortoise. Photo by Alex Heyman. Public domain.