

The Significance of Cacti in the Diet of the Javelina (*Tayassu tajacu*)

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The pig-like Javelina of the American Southwest can frequently be seen in the desert eating cacti, spines and all. The coarse bristle-like hairs of this wild "pig" come erect when the animal is excited, making it seem like a diminutive version of the European razorback hog (= wild boar). The European boar, and the barnyard pig which was domesticated from it, belong to the Old-World Swine Family (Suidae). The Javelina belongs to the related New-World Peccary Family (Tayassuidae).

An ability to cope with high levels of dietary tannic acid appears to be a basic feature of both families. This has allowed the creatures to eat oak leaves and acorns which other animals might find unpalatable, deleterious, and even poisonous. Apparently a tolerance for dietary oxalic acid has been developed in at least a branch of one of the families, as well. Specifically, a kidney modification allows the Javelina to excrete oxalic acid. This is the physiological mechanism which allows the Javelina to subsist on cacti.

The literature which has developed on this animal is found not only under Javelina but under the alternate name Collared Peccary. The scientific name has been variously listed as *Dicotyles tajacu*, *Tayassu tajacu*, and *Pecari angulatus*. Although various studies have shown the species to have a rather broad diet, all investigators seem to comment on the prominence of cacti in the diet.

Although Javelina seem to relish any type of cactus (see photo), they eat large quantities of Prickly Pear (the flat-stemmed species of *Opuntia*) because of their abundance, slightly less rigid spines, and favorable percentage of succulent to woody tissue. The White-Lipped Peccary (*Tayassu pecari*), which is the only other living species in the family, lives from southern Mexico to Paraguay and is not at all dependent on cacti for food. Spread of the Family Tayassuidae from moist jungles of south central Mexico into the northern deserts was probably possible only because of the presence of Prickly Pears in those deserts. The succulent pads and fruits of Prickly Pears provide not only food for the Javelina but a significant portion of their water as well. Since the animals run in herds, they could quickly use up all of the free water at a typical desert water hole, except that they often will have already satisfied a significant part of their thirst by eating succulent cacti.

Geographic subspecies patterns indicate separate northerly migrations into the Sonoran Desert and Chihuahuan Desert from the center of diversity of the genus in south central Mexico. This clearly occurred after Baja California had rifted from the mainland of Mexico. Since the Peccary Family (Tayassuidae) is essentially tropical, it is not surprising that the Javelina is warmth-loving. Although the animals may feed on acorns and other food of the Chaparral to range up to 6,000 feet elevation in Arizona in the summer, they descend in winter to the lower elevations of the desert where they thrive on winter warmth and a diet high in cacti.

Could the Javelina be a rather recent immigrant into the southwestern United States? The fact that the Arizona and Texas populations have not come together in central New Mexico (despite favorable habitat) is quite intriguing! The Arizona subspecies clearly ranges through *Opuntia* habitat from Sonora northward into Arizona, and does extend into western New Mexico. Likewise, the Texas subspecies ranges through *Opuntia* habitat from Tamaulipas and Chihuahua northward into Texas and does extend into eastern New Mexico. To the biogeographer these suggest rather youthful distribution patterns.



On Christmas Day, 1975, the Crosswhite family woke to find a large number of javelinas in the yard of their residence. The animals, both large and small, were very actively eating the various kinds of cacti which were being propagated and grown in nursery containers. They also turned plants over to look for grubs and roots.

In an attempt to analyze the recentness of Javelina immigration into Arizona, Crosswhite and Crosswhite (1982) searched the literature for archaeological and ethnologic evidence for its presence in various time periods in Arizona. This type of analysis was thought to be particularly appropriate because of the species indisputably being a food resource for humans. Although ample ethnographic evidence for use of Javelina meat in Arizona in historic time by Indian and Anglo alike was found, no reports on excavations of ancient sites revealed Javelina bones. Although Javelina seems not to have been used for food by the ancient Hohokam Indians at Snaketown (cf. data in Greene and Matthews, 1976), the meat was indeed used as food by the Pima Indians in the same region over 800 years later (Russell, 1908).

Could the better part of a millenium have provided enough time for the Javelina to have moved northward into Arizona? To answer this question we need to look at the significance of cacti in the diet of the Javelina. Very few animals are capable of subsisting on cacti because of the poisonous nature of oxalic acid commonly found in plants of this family. Indeed, the high

level of oxalic acid in cacti is recognized by plant scientists as an adaptation in these species against being eaten! A previously overlooked significance of the oxalate-excreting kidney of the Javelina is that once utilization of cacti by the animal became efficient, the creature might have dispersed through *Opuntia* habitat with incredible speed, fully exploiting a food resource which was deleterious to normal animals and hence very abundant.

Interactions of Javelina with *Opuntia* need further research. Since higher portions of taller-growing Prickly Pears escape being used for food by Javelina, it is perhaps not a mere coincidence that where Javelina are numerous there is sometimes an abundance of tree-like Prickly Pears with prominent trunks. Pads which hang down on such arborescent plants within reach of the Javelina are the new year's growth and very succulent. These are the ones which are eaten. In such regions, Javelina and *Opuntia* are in stable equilibrium. Often nitrogenous wastes from the Javelina effectively fertilize the *Opuntia* and a mutually beneficial relationship exists. Such a

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respectively. This is very important in arid regions because of the general scarcity of water. Further, looking to the practically similar growth of the plants with one litre watering and half litre watering, the latter seems most reasonable to adopt for dual advantages of achieving better plant growth on one hand and saving a significant amount of water on the other. Thus, this inexpensive technique of water application in tree plantation can very profitably be used in social forestry as well as in recreation forestry, agro-forestry and fruit orchards on small farms in the arid zone of India.

It appears fairly certain that ground waters of substandard quality, which are of common occurrence in arid regions, could also be used in this system, but experimental data on this aspect with various plant species have yet to be obtained. It is also obvious that the number of bags used, plant distance, scheduling of water, etc., have to be appropriately adjusted depending on the plant species, soil and other local conditions.

Nevertheless, this inexpensive technology of thrifty watering for tree plantation appears to have immense promise for adoption in other similar arid regions of the world.

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stable situation has historically been most common in the southern part of the range of the Javelina. It is tempting to think that it is becoming more common in the north, but this needs confirmation by further research. Javelinas seem to be detrimental to the many species of non-arborescent Prickly Pears which they have exploited in the north, although they do indeed spread the seeds.

For the present state of knowledge on the Javelina we are indebted to the classic studies of Knipe (1957), Sowls (1958), Neal (1959), and Eddy (1961). Low (1970) studied the influence of aridity on Javelina reproduction in Texas. Zervanos and Hadley (1973) reported on energy relationships and adaptational biology. Bigler (1974) published concerning activity patterns and seasonal movement. Energy requirements and water use of captive and free-living Javelinas were compared by Zervanos and Day (1977).

According to Borell and Bryant (1942), Javelinas were killed without restriction in Texas by professional hide hunters and others until 1936. They fared little better elsewhere until modern laws were enacted. The Texas subspecies is said to have ranged as far north as Arkansas where it was extirpated by persons using it for meat and a cheap source of pigskin (Whitaker, 1980). Such habitat was probably marginal at best for a species with tropical affinities and a propensity for eating cacti. In portions of Arizona, New Mexico and Texas where flat-stemmed *Opuntia* are common, the populations of Javelina are stable (Findley et al., 1975; Arizona Game and Fish Department, 1979).

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