El consumo y la falta de producción:

Un machete de doble filo en la conservación del peyote

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Resumen

Lophophora williamsii (peyote), una cactacea del Desierto Chihuahuense, se utiliza para propósitos medicinales y ceremoniales en culturas indígenas de México y los Estados Unidos. La planta está actualmente considerada "Vulnerable" en términos de su estado de conservación, debido en gran parte a la sobreexplotación de las poblaciones silvestres durante las últimas décadas, y al hecho de que las poblaciones silvestres constituyen la única fuente de peyote para tantos usos por tantos grupos de consumidores. El peyote, siendo una cactacea binacional, está sujeto a leyes y reglamentos distintos en los dos países. Hasta ahora, el foco de esos instrumentos legales ha sido el consumo del peyote — o para prohibirlo o para crear excepciones a la prohibición para no interferir con las costumbres tradicionales de las culturas indígenas que usan el peyote. Pero prácticamente no ha habido preocupación gubernamental por la ausencia de producción del peyote para sustentar el consumo autorizado. Aquí se presenta un breve sumario de las técnicas ya disponibles para la producción de peyote. Tambien se presenta la lógica de tomar acción oficial — en los dos países — para promulgar los reglamentos apropiados para permitir la aplicación de tales técnicas a la producción de peyote. El objetivo eventual es que se produzca suficiente peyote por cultivación reglamentada para abastecer el consumo legal. Asimismo se hará posible la recuperación de las poblaciones silvestres diezmadas de peyote, y también el restablecimiento de poblaciones extintas.

Abstract

Lophophora williamsii (peyote), a cactus of the Chihuahuan Desert, is utilized for medicinal and ceremonial purposes in indigenous cultures of Mexico and the United States. The plant is currently considered "Vulnerable" in terms of its conservation status, due in large part to the overharvesting of wild populations for the last several decades, plus the fact that the wild populations constitute the only source of peyote for all the uses by all the groups of consumers. Peyote, being a binational cactus, is subject to the different laws and regulations of the two countries. Up until now, the focus of those legal instruments has been the consumption of peyote — either to prohibit it or to create exceptions to the prohibition in order not to interfere with the traditional customs of the indigenous cultures that use peyote. But there has been practically no governmental concern about the absence of production of peyote to sustain the authorized

consumption. Here is presented a brief summary of the techniques now available for the production of peyote. Also presented is the logic of taking official action — in both countries — to promulgate the appropriate regulations to permit the application of such techniques to the production of peyote. The eventual objective is that enough peyote would be produced through regulated cultivation to satisfy the demands of legal consumption. That would likewise make possible the recovery of the decimated wild populations of peyote, as well as the restoration of extinct populations.

I'm honored to have been invited to participate in this gathering of people with knowledge and experience with ceremonial plants such as peyote. I don't think it is appropriate for me to take a position on one side or the other of the question of whom should be authorized to consume peyote for ceremonial purposes. I am sympathetic to the non-indigenous people who feel that they have the inalienable right to use peyote for ceremonial purposes, and that no government has the right to dictate how people should direct their minds and focus their attention in spiritual matters. I am equally sympathetic to the indigenous peoples, who in an ideal world with abundant peyote might be inclined to share their peyote traditions (and their peyote) with people from other cultures. But many of the indigenous peyote people now find themselves faced with shortages of peyote for their ceremonies, and in the real world where peyote is becoming scarcer every day, they feel that they have little enough peyote for their own use, and they are not in a position to welcome outsiders to share what they consider to be exclusively their own peyote. I have great empathy for all peyote people who have difficulty accessing peyote, whether it be because of antiquated laws and regulations, or because of ethnic discrimination against certain groups when they venture out of their homeland to gather peyote for their ceremonies.

My own interest, and that of the Cactus Conservation Institute (www.cactusconservation.org) , is in conserving peyote as a species for future generations. And we fully recognize that adequately providing for the future needs of peyote people is a crucial component of our objectives and activities if we are to be successful in conserving the species. On the one hand, peyote people have the most incentive to protect peyote as a species. On the other hand, if all their energy is focused on the politics of legalization of peyote for all vs. restricting the legal use of peyote to indigenous groups who have used peyote traditionally, one morning they will inevitably wake up to the realization that it really doesn't matter who has the legal right to use peyote, if there is no longer any peyote left to be used.

The first question to be addressed is the most fundamental: Is there a shortage of peyote? The answer is of a personal nature and depends on where you live and whether you are affected by a shortage. If you happen to live in the U.S., then you live in a country where (1) peyote may be legally consumed only by indigenous peoples in their religious ceremonies of the Native

American Church (NAC); (2) the entire supply of legal peyote comes from a small region of South Texas known as “the Peyote Gardens” located in parts of four counties; (3) the “Peyote Gardens” are unfortunately not managed gardens at all, but rather wild peyote populations which are being harvested too frequently by anyone and everyone who can get access to the land. The NAC of North America (NACNA), an association of NAC groups from many parts of the U.S. and Canada, has been talking about the problem of the scarcity of peyote since the 1970’s, according to the late Emerson Jackson (personal communication). Most of the talk, however, has centered on the seductive illusion of getting permission from the U.S. government to import peyote from Mexico and permission from the Mexican government to allow exportation of peyote to the U.S. Four decades later, there has been little progress, but the NACNA continues to pursue this goal, to the exclusion of more realistic and productive alternatives. At least it is clear that a peyote shortage in the U.S. is perceived by many NAC leaders.

The situation in México is somewhat different, in that there are areas where peyote is still relatively abundant. The result is that there are many people in México, as well as peyote people in the U.S., who believe that there is no shortage in México comparable to the very real shortage in the U.S. However, a closer look at populations of peyote in México, comparing the present conditions to conditions 10−15 years ago in the same place, gives a quite different impression (Terry, 2008). Some populations have been totally eliminated by farming equipment when the land was cleared for marginal agricultural use. Other populations have been virtually eliminated by commercial harvesters of whole peyote plants, who have left little behind except holes where the peyote plants used to be (slide Chihuahua, slide El Huisache). It looks as if the harvesters forgot something here, where a population of peyote was decimated by harvesters near El Huizache, SLP. In our field study of the effects of harvesting peyote in South Texas we've witnessed a lot of digging done by feral hogs. (slide of hog) It is usually easy to tell hog damage apart from human damage as hogs are digging for something under or around the peyote and the peyote is typically just displaced or buried. In the case of holes dug by humans, the nurse plants are being trampled and holes are being dug for removing whole peyote plants.

It is worth considering that in the USA just forty years ago it would have been hard to imagine that the abundant and extensive populations in the "Peyote Gardens" of South Texas would be diminished so dramatically, as a major portion of the range of peyote in South Texas has been cleared or converted to other land use.

If we look for a more objective view of the conservation status of peyote across its entire geographic distribution, we quickly encounter the professional scientific assessment of the Unión Internacional para la Conservación de la Naturaleza (UICN, 2013) (slide). In the UICN Red List of endangered and threatened species, it is seen that the conservation assessment of peyote

(*Lophophora williamsii*) has been changed in the last few months from the category of "Least Concern" to "Vulnerable" (slide). The revised assessment of the UICN notes an estimated 30% decrease in numbers of peyote plants across its entire geographic range (México and the U.S.)

Now let us address the next obvious question: What are the causes of this substantial decrease in the number of peyote plants on the planet, as noted by the UICN? The causes can be grouped into a few major categories:

(1) **Habitat destruction**: This is the single most important factor in decreasing the availability of peyote. One form is the clearing of land for agricultural use (root-plowing slide). The other form is urban sprawl — the replacement of peyote habitat with human habitations, buildings, roads, and any other types of land use that require complete removal of native brush (RGC urban sprawl slide). Any kind of habitat destruction results in the death of all peyote plants on the land, and furthermore creates hostile environmental conditions that preclude any regrowth that might have occurred from the seed bank of the natural habitat. An obvious example would be construction of a paved road, which is clearly not conducive to the growth of peyote. A less obvious example is root plowing which greatly increases the degree of alkalinity of the surface soil in arid climates. This kind of loss consists not only of the loss of all the peyote plants in the affected area, but also the permanent loss of that area as possible future habitat for the reestablishment of a peyote population.

(2) **Harmful harvesting techniques**. To understand what is meant here, I have to ask you to bear with a bit of anatomy [slide]. While the most fundamental division of the parts of a plant would be "root" (consisting of the part of the plant that absorbs water from the soil and stores some nutrients that the plant uses as energy reserves) and "shoot" (essentially the stem and everything that the stem produces). But with some plants, including peyote, the division is not so simple. There are three important parts of the peyote anatomy: (a) the crown, which is the upper (apical) part of the plant, which is green and yielding to the touch; (b) the nonchlorophyllous stem, which starts at the base of the crown and is usually subterranean, unyielding to the touch, and covered with thin brown bark; and (c) the true root, which begins at the base of the nonchlorophyllous stem and extends down from there, usually bearing some lateral root branches and having a cream-colored epidermis with no brown bark. The nonchlorophyllous stem, the largest of these three parts of the plant, is often mistaken for part of the root. The importance of the nonchlorophyllous stem is that it is from there that regrowth can occur from dormant areoles, following harvest of the crown (including the apical meristem, which normally suppresses branching or new crown formation). Regrowth cannot occur from the true root, which bears no areoles (Terry & Mauseth 2006; Klein 2013).

The most important kinds of harmful harvesting practices are the following:

(a) **Deep cutting**. (Slide K. Feeney) Deep cutting occurs when the person doing the harvesting cuts too deeply below the crown, thereby removing part of the nonchlorophyllous stem (which is usually below ground level). The deeper the cut, the greater the percentage of the nonchlorophyllous stem removed, and concomitantly the greater the percentage of areoles that are removed. If the entire nonchlorophyllous stem is removed, there is no possibility of regrowth, and the plant will inevitably die (soon). If only part of the nonchlorophyllous stem is removed, then the probability of the plant surviving and producing new crowns is inversely proportional to the percentage of the nonchlorophyllous stem removed along with the crown.

(b) **Harvesting the whole plant**. [whole plant slide again] It is painfully clear that when the whole plant is removed from the ground, the probability of regrowth is reduced to exactly zero. The question then arises: Why do people want to harvest whole peyote plants? What do they believe is the benefit? Some of this seems to involve the early accounts referring to peyote itself as a root. However, the answers are not that simple or clear. One of the answers to this question, supposedly from an anonymous Huichol, is that if one wants to get the full experience of peyote, one must eat the root. The dissemination of this idea is a recent phenomenon and a very self-destructive one, simply because a plant dug up entire in order to "experience the root" is a plant that will never produce regrowth and will never produce seed. So, not content with the peyote experience that many generations of people have sought by eating the crown of the peyote, a curious person kills a plant that took 20−30 years to mature, in order to experience some undocumented, nontraditional, and probably nonexistent aspect of the root of the plant. In our laboratory we have recently done a study where we determined the mescaline content of crown tissue, nonchlorophyllous stem tissue, and root tissue. (Graphic slide of Klein results.) What we found was that the mescaline content of the nonchlorophyllous stem was only about 1/10 of that of the crown, and the mescaline content of the root was only about 1/100 of that of the crown, so if there is any truth to the recently manufactured claim about the experience of the root, it has nothing to do with mescaline content (Klein 2013). Hypothetical medicinal virtues of the root do not change the fact that every wild plant experiencing a root harvest is a dead plant. And it is not only the individual plant that is lost. The potentiality of the individual plant to produce offsets (additional crowns that arise from areoles in the nonchlorophyllous stem) is also lost, as is the cumulative seed production that would have taken place in the lifespan of the harvested individual.

(3) **Harvesting too frequently**. We have a long-term field study ongoing, now beginning its 7th year, where we examine the effects of harvesting every two years (which is a common practice among licensed commercial peyote distributors in South Texas). One of the questions we are

asking is how long it takes for a properly harvested plant to grow back to its original volume of crown tissue. Plants need to be allowed to regrow for more than 6 years between harvests but the exact minimum time frame between harvests has not yet been established. It is clearly greater than six years but that portion of our field study on the effects of harvesting is still underway (Terry et al. 2011; Terry et al. 2012).

(4) **Industrial harvesting for herbal medicine production**. We know that much of the harvesting of peyote in Mexico is of the lethal variety, where as many whole plants as possible are dug up and hauled away (Terry 2008). Where are these plants going? What are they being used for? One possible answer — yet to be confirmed — is that such plants are being used in the manufacture of pomadas de peyote and aceite de peyote. (Slide of pomada.) These products are commonly sold with other non-prescription medicinal products in the markets of the major cities of Mexico. They are for topical application for the relief of sore muscles. Some manufacturers put their addresses on the labels; others do not. We are currently analyzing several of these products to determine whether they actually contain any peyote, but the analysis is not yet completed. If these products are in fact made with peyote, then the manufacture of these products constitutes a major additional threat — not previously documented — to peyote as a species, since as of this moment the only source of peyote is the wild populations, which are already shrinking (per UICN) because of pressure from harvesters collecting peyote for ceremonial use.

The dubious monopoly of single-source peyote, and the tragedy of the commons

It may seem surprising that all peyote being consumed for whatever purpose is being harvested exclusively from wild populations, but that is in fact the case. There simply is no other significant source. That brings us to the principle of "The Tragedy of the Commons," described in a 1968 paper of that title by Garrett Hardin. When a resource is accessible to a large group of people, who use it "in common," each individual who has an undivided interest in the resource tends to optimize his own individual benefit from the resource at the expense of the other users-in-common. Let's apply this principle to the resource called peyote. If peyote grows in a defined land area, and if all the peyote harvesters who have access to the land decide individually when each one of them can harvest peyote, then each one's decision about when to harvest tends to be influenced by how much that person stands to benefit from harvesting peyote at any given time. So let's say that co-user A harvested peyote in February of this year, including as many large, old plants as he could find, because such "grandfather" plants are more desirable in ceremony (and happen to contain more mescaline) than small, immature plants, and therefore they bring a higher price. Now co-user B notes that co-user A has made a profitable harvest, and B decides to come back after 5 years and harvest the same area that A harvested, which would

give the harvested plants some time to regrow. But in the meantime, after only two years, co-user C comes along and recognizes that the regrowth buttons are quite small and really should not be harvested so soon, but C needs money now, and decides to go ahead and harvest the peyote consisting of small regrowth buttons now, rather than waiting for the 5-year time point which would be preferable. There are hardly any grandfather plants left in the population, because A harvested practically all of them. But C harvests as many of the small regrowth buttons as he can find, and leaves the peyote population with no harvestable plants remaining. Now let's look at the economic benefit to each of the co-owners: Harvester A made by far the most money from his harvest of all the grandfathers as well as the smaller plants. C made a much smaller amount because of the lack of grandfathers and the fact that almost all the plants available for harvest were small regrowth buttons. B made nothing at all by not harvesting before C did. At this point B may be tempted to come back after two more years and harvest the most recent regrowth buttons, which may be expected to be even smaller than the first crop of regrowth buttons. The tragedy of the commons is that a resource like peyote that is accessible to multiple users, gets used in ways that maximize the economic benefit to the individuals who assert their right-to-harvest with greater force or greater frequency than the other users.

A further adverse feature of peyote being accessible to multiple users is the uncertainty surrounding the availability of peyote for harvesting. That uncertainty engenders a tendency for the multiple users to harvest more frequently than they otherwise might, perhaps due to a sense of optimism, but it is just as likely to be because each one knows that if he declines an opportunity to harvest peyote today, it might not be there tomorrow, due to having been harvested in the interim by one of the other users. The tragedy of the commons clearly does not work to the benefit of all the users, and it definitely works <u>against</u> sustainable harvesting, and thus to the detriment of peyote as a hunted species.

Cultivation of peyote is the only logical, achievable solution to the problem of scarcity

If peyote were cultivated for ceremonial use on a truly massive scale, it would provide a second source of peyote that would compete with the wild populations for the patronage of the NAC and other major groups that consume peyote ceremonially. That is to say, the harvesting pressure on the native populations of peyote would at some point in time be reduced because there would be cultivated peyote readily available to the groups seeking peyote as sacrament for their ceremonies, and the cultivated peyote would eventually be of equal quality and of approximately equal price, in comparison to the wild-harvested plants. And the availability of cultivated peyote would be far more consistent than that of the wild-harvested peyote. Let us look at some of the issues that have been raised about cultivating peyote.

The idea that cultivated plants are not equivalent to wild plants is an error based on a failure to understand the fact that plump and well watered plants will typically be lacking in potency. In order to cultivate plants that will be found acceptable as sacrament, peyote needs to be grown as naturally as possible. One important factor is that wild plants experience recurrent periods of lengthy drought. In order to produce natural peyote plants in cultivation similar prolonged periods of drought are important. Siniscalco (1983) determined that his peyote plants which had been kept drought-stressed for six months became about 27 times more potent than those which he kept watered. Most noteworthy is the fact that his fairly young but drought-stressed European peyote plants reached a mescaline concentration of 2.74% by dry weight, which is in the range of what is found in wild peyote that is harvested as Medicine. In contrast, his well irrigated plants were found to contain only 0.1% mescaline by dry weight. Understanding this can help people grasp why cultivated plants have been found to be "weak" and inferior for ceremonial purposes, as well as how to grow better plants in cultivation.

A commonly encountered but false idea is that the shortage of peyote in Texas is part of some plot or conspiracy to eliminate access to peyote by the NAC. The present picture is simply the result of ongoing harvest practices not changing in response to the steady loss of accessible land due to land conversion for agriculture and other uses. The DEA has been open to the NAC importing Mexican peyote for more than twenty years; it is the Mexican legislative and regulatory side of the picture which has prevented Mexican peyote from being a legal item of international commerce. Despite that, it has been clear for some years that a substantial amount of peyote from Mexico has been invisibly imported into the USA for NAC use, at least since the 1990s.

Grafting produces plants lacking in potency but it is a valuable tool for increasing peyote seed production. (G. Koehres slide.) Many people are not aware that a skilled grower can start with peyote seeds and, by means of grafting the peyote seedlings onto *Pereskiopsis* grafting stock, begin producing new peyote seeds from the scions within two years. A hidden benefit of using grafting for rapid seed production is the capability of producing many seeds with genetics identical to the genetics of the peyote plants of the source population. This readily enables the genotypes best suited for a particular geographic location to be used.

Some conclusions of our field studies (Terry et al., 2011; Terry et al., 2012) that are relevant to sustainable peyote production, are:
(1) Cutting the plant flat, flush with the soil surface, produces the highest rates of survival and regrowth.

(2) Plants should not be reharvested for at least 6 years. The exact minimum time frame between harvests has not yet been established. It is clearly greater than six years, but that portion of our study is still underway.
(3) Harvested plants grow more heads than the parent plant, but even after 6 years the total volume of peyote present as regrowth crowns is less than the volume of the original crown, AND the regrowth is substantially weaker in potency (due to lower mescaline concentration) than the original crown.
(4) When a plant with more than one large crown is harvested all of the large crowns should be harvested as leaving one appears to interfere
with the amount of regrowth which results.

Chronic overharvesting of any single population will result not simply in loss of that population but additionally creates a seed deficit that can prevent that population from being able to recover in the future.

Understanding why there is such a difference between pumped-up cultivated plants and plants from the wild that have seen drought stress for at least half of the year for almost every year of their lives make three things clear:

1. Why cultivated plants have been found to be so much weaker and are considered to be grossly inferior to wild plants (0.1 to 2.74% by dry weight is a striking difference).
2. Why that difference does not HAVE to be true for cultivated plants (as 2.74% by dry weight is in the range of what is harvested and acceptable as sacrament right now).
3. The techniques are readily available for growing better plants that are more suitable for use as Medicine, in cultivation. Cultivation of peyote is not technically difficult. It is one of the easiest plants to grow in the greenhouse.

The suggested goal for cultivated peyote is not to raise the mescaline content or grow “stronger” peyote using special horticultural techniques, but rather to grow plants that are more like those that nature produces and therefore more suitable for use as spiritual medicine and sacrament.

Peyote cultivation is not a new invention, as evidenced by a small prehistoric peyote garden situated among archaeological structures and pictographs in Texas.

There is plenty of peyote in Mexico to last for our lifetime. It’s the generations who follow who will experience the weight of what occurs or does not occur now. Even if a person preferred wild

peyote over cultivated peyote, it would be better to leave them with a legacy of cultivated peyote than no peyote.

Cultivation of peyote means empowerment of peyote people.

"If a person performs his duties as a keeper of the living medicine with the same care and reverence that he would bring to a peyote meeting – the same care and reverence with which he might tend the fire – then the medicine will reflect that care and that reverence to those who use it as the sacrament."

Ted Herrera
Spiritual Leader
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