

Edible Wild Plants

I wish to thank the organizers, especially Dr. Maurizio Paoletti, for the kind invitation to participate in this symposium on Biodiversity and Sustainability at your prestigious university. My great grandfather, Michael Grivetto, was born in Rivirolo de Canavesi, north of Turino and immigrated to the United States in the late 19th century. By inviting me to participate and address you today, you honor my family. By selecting this topic you also honor the many hundreds of Africans all of us have interviewed through the years – who taught us ethnobotany and the many uses of edible wild plants. Our work honors these men and women as well.

This morning I will speak in English for about 20 minutes. I will then end with a powerpoint presentation that illustrates the range of our work on edible wild plants in Africa through the past 30 years.

Ethnobotany has been a major effort of my research group for nearly three decades. It may be strange for you to learn that I am not a trained botanist: I had no formal botanical coursework during my university training. The fact is I had little interest in the plant kingdom until the middle years of my life, until I started my dissertation field work in dry, arid eastern zone of the Republic of Botswana. In my case – in contrast to most of my colleagues in the audience – ethnobotany was an acquired interest, initially peripheral, but the topic soon became central to my Ph.D. training in geography and nutrition science at the University of California, Davis.

My dissertation supervisor was Professor Frederick Simoons. He guided me in cultural food practices and encouraged me to explore the nutritional consequences of food-related behavior. I selected a dissertation problem in the Republic of Botswana in southern Africa. My research question was this: why had the Tswana peoples of the eastern Kalahari thrived during eight years of drought between 1965-1973, when a drought of similar intensity and timing in the West African Sahel had caused the untimely deaths of more than 2 million people? The enigma was obvious: two similar agricultural-economic systems in similar environmental niches – in one instance the Kalahari cultures thrived – while in the Sahel, similar cultures with similar ways of agriculture, animal husbandry, and economics experienced social disruption and death.

My wife and I arrived in Gaborone, the national capital, in April, 1973. My dissertation topic was approved by the Botswana Office of the President, and I was given permission to work among the baTlokwa ba Moshaweng, a Tswana society whose tribal capital, Tlokweng, lay a short distance east of Gaborone. During week days, I worked at the Ministry of Health where I assisted a Maternal and Child Health, Family Planning Project. During evenings, on weekends, and holidays – for two years – I worked at Tlokweng and the bushlands adjacent to the baTlokwa settlement and collected data for my dissertation.

I had prepared extensively for fieldwork prior to arrival in Botswana and had summarized the cultural monographs and geographical works on the pre- and post-colonial era in southern Africa. These documents mentioned the role of edible wild plants as components of Tswana diet, but I was unprepared to find that these so-called "lesser foods" were in fact critical to survival in the eastern Kalahari Desert.

I was welcomed into baTlokwa society by the tribal elders, introduced to tribal members, hired field assistants, and held focus group interviews with elderly women and men in order to learn about baTlokwa culture, food, and the mechanisms of survival during drought. Villagers at Tlokweg village had not suffered during the recent eight-year drought (1965-1973) that preceded my arrival. I looked for evidence of malnutrition but saw none: during my two years in the eastern Kalahari I saw no kwashiorkor, marasmus, no overt vitamin or mineral deficiencies. How had the baTlokwa survived eight years of drought, when so many hundreds of thousands of their cultural counterparts had died in the environmentally similar Sahel of western Africa? What had sustained the baTlokwa, nutritionally, during the difficult drought years when their livestock died and their field and garden crops failed?

One key to baTlokwa nutritional success was their sustained ability to identify and use edible wild plants during years of good rainfall or drought. Tribal elders – through focus groups and interviews – provided me with the names of more than 200 edible wild plants. I learned that many species were critical components of diet after domesticated plant foods had vanished during drought.

It was obvious early in my fieldwork that elderly baTlokwa men and women held the key to plant identifications and uses in this arid desert land whereas younger children, especially teenagers, did not recognize the broad spectrum of edible plants available within tribal territory – and worse – the young children and teenagers did not care about learning the names of the plants. This problem, of course, presented an enigma and paradox: if the information how to recognize and use edible wild plants was not being learned and passed to future generations of baTlokwa children, there would come a time when a drought of severe magnitude would hammer the people and many would starve – in the midst of food plenty.

I was fortunate. I arrived in the eastern Kalahari when knowledge of the environment and edible wild species was still maintained by village elders. Most evenings and weekends elderly men and women greeted me with conversations that began something like this: "Welcome. I have so much to tell you about the plants. My grandchildren do not care. They do not know the most basic ones. Please write this down."

During my 2 years of field work I collected cultural, historical, and botanical data, and probed for information and insights from baTlokwa elders. Early in my work two elderly men recommended by the Tribal Council were assigned to teach me the "local botany." By this time I had access to the published Kalahari botany texts and had trained myself how to identify most of the key species.

During my "initiation" period with my elderly counterparts, I prepared a master list of seTswana names of wild plants, wrote down their culinary, medicinal, or other uses, and prepared my first botanical checklist. There came a time when I administered my checklist to a stratified sample of 200 baTlokwa households to understand which species – if any – had been consumed during the recent drought. After three/four interviews, however, I determined that something was wrong and in fact I had made a classical error commonly made by Western-trained fieldworkers: traditional baTlokwa plant taxonomy bore no relationship to classical Linnaean genus/species designations that we scientists here today would use. Each woody species could be called by one

of four distinct names, depending whether or not the representative specimen was "tall" vs. "short" or "in fruiting season" vs. "out of fruiting season." This revelation required me to winnow my floral check list, and was my first introduction to what we call folk taxonomies.

The eastern Kalahari offered a great diversity of edible wild plants and the baTlokwa regularly utilized these available resources for food and many non-food purposes. The primary message that emerged after two years of fieldwork was that drought did *not* cause famine. One explanation for the Sahel disaster was cultural inability to recognize and use available wild food resources – foods that once were sustaining during drought. I argued in my dissertation and in subsequent publications that "semi-arid environments continue to offer potential opportunities to societies able to recognize and utilize them," and urged further work on the so-called "lesser plants of agriculture," or what members of my research team ultimately would call the "edible weeds of agriculture."

Upon completion of my dissertation in 1976, I joined the Departments of Geography and Nutrition at the University of California, Davis. My Kalahari work ultimately came to the attention of United States Agency for International Development (USAID) and I was invited to lecture in Washington DC on two topics: 1) the importance of edible wild plants in maintaining sound nutrition during drought and periods of social unrest, and 2) the paradox of agricultural development, whereby heavy reliance upon herbicides, paradoxically, reduced food security in many regions of the globe because the so-called "edible weeds of agriculture" were being eliminated.

Through the years my graduate students and I expanded our work on edible wild plants within Africa, ultimately working in Burkina Faso, Niger, Nigeria, Swaziland, and elsewhere as in Greece, Thailand, and even use of edible wild plants by Native Americans in the United States. Still, much of our focus remained on Africa. Our team published evidence that reported dietary use of edible wild plants was an integral component of the diets of many sub-Saharan societies throughout the calendar year, and many species were especially important during the periods just before harvest, the so-called "hungry months." Our findings complemented those of others and emphasized the need for caution when economists (not trained in botany) embarked upon agricultural development, since expansion of agricultural fields into bush lands merely to produce more acres/hectares of domesticated cultivars – at the expense of edible wild plant habitats – was a shortsighted policy since it often led to *reduced* – not improved – food security.

Let me now share with you some of the findings of our research team through the years. My comments are brief but I have brought with me and given to Dr. Paoletti copies of all of our published papers for your review and consideration.

Dr. Britta Ogle, one of my former graduate students and today among the most knowledgeable scientists working on edible wild plants globally, conducted her field-work on edible wild species in the Kingdom of Swaziland. Before training with my research group Dr.Ogle had lived previously in Swaziland, spoke rudimentary setSwasi, and already had established a friendship network of home economists and extension specialists to draw upon for fieldwork assistance. Swaziland is divided, ecologically, into four distinctive zones: High-, Middle-, and Low-veld, and Lubombo. She identified a very wide array of edible wild plants in each zone and data from

her thesis are enlightening: nearly 40% of respondents indicated that wild plants contributed *more* to their annual diet than food from domesticated cultivars. She found that many species were utilized quite locally and were unfamiliar to Swazi living in different ecological niches. She also documented extensive cultivation of edible wild plants in Swazi household gardens.

One unusual finding was that local Swazi school children exhibited more extensive knowledge of edible wild species than their elders (this was just the opposite of my Kalahari findings). Dr. Ogle explained this curiosity, in part, because Swazi schools commonly were located, geographically, at the boundary lines between two distinctive ecological niches. Given such school settings, children collected different arrays of plants as they walked to and from school – going up and down slope – and experienced a greater exposure to edible wild species than their parents or grandparents who lived almost exclusively with a specific ecological niche. Dr. Ogle recommended to the government of Swaziland that schools continue to be constructed at these critical ecological boundaries to maintain this important knowledge.

Another member of my research team, Dr. Carol Humphry, returned to the West African country of Niger where previously she had been a Peace Corps Volunteer. Dr. Humphry compared the use of edible wild plants in two Hausa villages located in different ecological niches and she collected data on foraging strategies. She identified 84 commonly consumed edible wild plants and nearly 50% of these were important dietary components by a majority of the Hausa interviewed. She wrote that half of the villagers could identify more than 60 wild species, and 10% of respondents reported the problem that some edible plants actually had disappeared as a result of recent droughts.

The so-called "edible weeds of agriculture" played prominent roles in Hausa agricultural and dietary traditions. Dr. Humphry reported that nearly all villagers (93%) protected such plants and did not remove them by hoeing. She reported that drought always had been a companion of the Hausa, and raised the paradox that as the villagers grew more and more dependent upon the cultivation of non-drought adapted domesticated food plants, villagers were at higher risk for malnutrition when these crops failed.

Dr. Garrett Smith, another member of my research team, also with previous Peace Corps volunteer experience in West Africa, returned to Burkina Faso and explored dietary use of selected species during drought. He reported that 36% of all the vegetable foods consumed in villages were edible wild plants, and such species accounted for approximately 20% of all regional dietary products. The most commonly consumed wild species included: *Adansonia digitata*, *Sclerocarya birrea*, and *Tamarandus indica*. Dr. Smith wrote that wild plants were gathered primarily by women and girls (81%) who collected for family use, whereas men and boys gathered mainly for personal consumption. Gathering required considerable energy expenditure since primary collection sites sometimes were 8-10 kilometers distant. He reported that knowledge and use of traditional famine foods had declined in recent years, because government and international relief agencies had supplied food to drought-affected areas – so many had stopped gathering wild plants. This decline in knowledge – partially caused by governmental and international "good deeds" – was viewed by Dr. Smith as ominous, since food relief led to less gathering – less gathering led to less interest and loss of knowledge of which species could be sustaining during drought – and ultimately would result in cultural inability to

identify life-sustaining foods growing near villages. He reported that would be a treat tragedy since many edible wild species were outstanding dietary sources for copper, iron, manganese, magnesium, and zinc, and were reasonable sources for Beta-carotene.

Dr. Cassius Lockett conducted his fieldwork on edible wild plants in eastern Nigeria where he worked among both Hausa and rural Fulani located at different settlements. Dr. Lockett was interested in dietary patterns of target groups – meaning – those most effected by drought and potential malnutrition: children under five, pregnant and lactating women, and the elderly. He also identified food procurement strategies for edible wild plants, and determined whether or not these strategies changed during periods of drought compared to times of normal rainfall. Fulani elderly men and women collected and identified for him 36 species that were available to augment diet during the dry season, among them: fruits, leaves, and seeds of *Adansonia digitata* and *Balanites aegyptiaca*; fruits and seeds of *Dererium microcarpum* and *Tamarindus indica*; and fruits of *Ziziphus mauritiana*. Important species collected and available to be eaten during the wet season included: *Aden microcephala*; *Lannea schiniperi*; and *Ximenia americana*.

Dr. Lockett reported that many local species were not eaten universally by Fulani, but were restricted by traditions associated with the consumer's age, gender, or physiological status. For example, wild plants considered beneficial as food and as medicine to neonates and infants included: bark of *Adansonia digitata* (in the belief that consumption enabled infants to gain weight); fruits of *Ficus sycomorus* and roots of *Cissus cornifolia* (eaten to stop stomachache); fruits of *Bridelia ferruginea* (eaten to treat diarrhea); and leaves of *Veronia colorate* (given to infants to reduce vomiting and diarrhea).

Other edible wild plants were commonly identified by the Fulani as women's food and associated with pregnancy and lactation, among them: *Annona senegalensis*, *Balanites aegyptiaca*, *Grewia mollis*, *Parkia biglobosa*, *Tamarindus indica*, and *Ximenia americana*. Fulani women commonly ate fruits of *Ficus thonningii* during the last weeks of pregnancy to reduce labor time and to ease pain. During the post-partum period several preparations of edible wild plants were consumed in the belief that breast milk production would be increased, among them: porridge mixed with fruits of either *Tamarindus indica* or *Ximenia americana*. Further, leaves of *Veronia colorate* were pounded and the extracted fluid drunk to increase breast milk production.

More recently, Dr. Britta Ogle and I prepared a literature review on the value of traditional foods in meeting macro- and micro-nutrient needs. We reviewed the basic themes associated with wild plant research: historical studies; what we call salvage ethnobotany (surveying elderly men and women so to learn the species and their uses before the elderly die and the information is lost forever); famine foods (those foods recognized and used during drought to alleviate hunger); the hidden harvest or "edible weeds of agriculture;" problems of incomplete nutrient databases; difficulties when scholars and professionals in different fields fail to communicate; and problems of inconsistent project design, diversified methods, and variables in laboratory analysis of micro-nutrients.

Dr. Ogle and I – along with many others – have continued to argue that edible wild plants are part of global agricultural systems, and that agricultural development should not be at the expense of nutritional quality of human diet where edible wild species play critical roles. We continue to echo the perceptive comments by Dr. Joyce Doughty – published more than 25 years ago – that "nutritional quality of diet may decline with agricultural development unless edible wild species that provide essential micronutrients to the diet are considered part of the total food system." We continue to suggest that individuals and communities may starve – paradoxically – in the midst of food plenty because of the inability to identify and utilize the edible wild plant base in surrounding bushlands, and that it would be "tragic if in the rush to become modern, humans lost the ability to identify and use species available to them.

Another member of my research team, Ms. Noelle Johnson, and I have written on this issue and have coined the phrase "nutritional extinction." We have written that . . .

Certain edible wild plants may be ecologically stable and present throughout a given geographical area – but in actuality may be nutritionally extinct – because such plants no longer are recognized by family members as potential food and no longer contribute to household food intake.

I conclude my comments this morning with the note that much work is needed, globally, on improving and expanding the nutrient databases of the major and minor edible wild species within the Sahel and other arid or semi-arid zones, and within the high cold deserts of southern Asia north of the Himalayas. Hundreds of plant collectors, ethnobotanists, anthropologists, geographers and others have worked independently in areas as diverse as eastern India, the southeastern tropics of the Malay Peninsula area, the South American and African rainforests, have published in very different journals, and only rarely communicate. Nutrient analysis of edible wild species should be accelerated, information shared, and young scholars in different nations of the world encouraged and trained in botanical techniques – before loss of this important, critical biomass. A database should be developed of so-called "famine foods," and the information preserved for all generations to come – lest persons starve in the midst of food plenty by not being able to recognize potential foods in the surrounding environment. Would it not be a tragedy of extraordinary dimension to lose such information?

Before I show the slides, let me return to Botswana one last time for a comment. When I worked among the baTlokwa in Botswana, I learned the Kalahari plants from two wise, elderly men: Mr. Mphoeng Lekoko and Mr. Gaborone Sekgokgo. Both exhibited great patience with me, especially when I had difficulty providing the precise seTswana name for a plant (given that the same plant could have up to 4 different names). On many occasions when we walked past baTlokwa households I pointed out what I perceived to be patches of dry weeds, areas that in my mind represented potential fire hazards or potential habitats for dangerous Kalahari snakes. Both my teachers would smile and say: "Wait, Louis, be patient. Wait for the rains."

And when the rains arrived that second year of my field study, I remember to this day my amazement. What I identified as merely patches of dried weeds, in fact, were cultural gardens composed of Kalahari Desert species that had been transplanted by baTlokwa men, women, and children. The areas in front of the household walls were filled with blooms, and we stopped,

viewed, and reflected upon the vibrant colors – the blues, magentas, oranges, reds, violets, whites, and yellows – all blossoms of wild desert species – interspersed with stunning green leaves of different shapes and patterns. And at such times I recalled how the American botanist, Edgar Anderson, more than 50 years ago today, had written that domestication of plants was not for food – but came about because of human attraction to aesthetics and beauty. And thinking back from the perspective of nearly 30 years of fieldwork – I still think that Anderson was correct.

To repeat – I have brought with me copies of our African edible wild plant papers and given them to Dr. Paoletti for your consideration. I have much to learn from you today and tomorrow.

Let me conclude with images from our field work in Africa . . .