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FACTORS INFLUENCING BOTANICAL RESOURCE PERCEPTION AMONG THE HUASTEC: SUGGESTIONS FOR FUTURE ETHNOBOTANICAL INQUIRY

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ABSTRACT.— Patterns abstracted from interview sessions, discussions, and observed behavior during 13 months of fieldwork among the Huastec in northeastern Mexico suggest some of the factors shaping Huastec botanical resource perception. The recognition of a plant as a particular sort of resource depends on the interaction of a number of factors. Among the many factors discussed here are the biological, physical, and chemical properties of the available plants, human biological and cultural needs, Huastec perception of their natural and social environment, the subsistence system, household demography, economic strategies, politico-economic standing, historical trends, and illness and curing beliefs. Factors influencing the resource status of a subset of plants used by the Huastec for firewood, construction, and medicinal purposes are discussed. An understanding of plant use context is necessary to interpret Huastec plant use data, to study Huastec plant management systems, to investigate the impact of human activities on plants and plant communities and to evaluate the adaptive functions of ethnobiological knowledge. It is suggested that inquiry into the reasons for species' inclusion in useful plant lists can bring to ethnobotany a much needed focus for organizing systematic, multidisciplinary research yielding integrable data.

INTRODUCTION

This paper focuses on the botanical resource perception of individual human actors who sustain themselves in a moist tropical northeastern Mexican environment emicly understood on Huastec terms. The questions to be addressed are: What makes a given plant a particular kind of resource? What kinds of needs do resources fill? What factors influence the perception and choice of resources to fulfill these needs? In order to answer the questions I have raised, my discussion will develop the meaning of "resource" and "need" in the context of action-related decisions made by individual Huastec actors. Before the discussion is begun, however, I will briefly delimit the term "resource perception". As it is used here, "resource perception" refers to the process of assigning a particular resource role, or "use" to a plant by evaluating that plant's possible utility and the consequences of using it.

By elucidating the factors influencing resource perception, I hope to accomplish two things. First I hope to provide a new perspective for interpreting the data in useful plant lists, and secondly, I hope to contribute to the development of appropriate methods for evaluating the adaptive functions of ethnobotanical knowledge. Useful plant lists collected from indigenous people are often touted as the empirically valuable results of millenia of native experimentation designed to fine-tune the human to his environment. It is generally felt that, unless a "supersititious" basis for a plant's use is clear, the plants are listed as specific kinds of resources because they have the physical properties which answer standard human needs and would very likely serve these purposes well in any context where they are available. In most cases, no further criteria beyond the folklore vs. functional distinction are applied for understanding the value or meaning of a plant's use. The Huastec data suggest that the value of the information in these useful plant lists, so long associated with the term ethnobotany, has been both under and over estimated.

In addition to containing "uses", ethnobotanical lists usually include native plant names. During the past few decades cognitive and linguistic anthropologists have focused on the plant names in these lists to the *de facto* exclusion of their accompanying uses. Investigators (Berlin et al. 1973; D'Andrade 1976; Hunn 1977; Randall 1976), however, have debated the value, structure and functioning of classification systems generated using ethnoscientific methods. Randall (1976) has stressed that the motive for classification must be examined in the context of real-life situations if classification behavior and the underlying mental organization of the information relevant to the classification are to be understood; i.e., plant names and plant uses need to be tied back together and studied within real contexts where plant names are signs for information about more than just the plant's morphology. Hays (1981) has called for testing of assumptions that folk biological classification systems are adaptive. If "uses" are to be interpreted as "behavioral responses" as Hays (1974; 1981) suggests, then we must learn to recognize and understand these responses by developing a deeper understanding of the real-life contexts in which the responses occur. The following consideration of Huastec resource perception suggests the complexity pursuant to developing appropriate methods for evaluating the adaptive functions of ethnobiological knowledge and folk biological classification systems.

RESEARCH SETTING AND METHODS

The Huastec are Mayan language speakers who in pre-Conquest times controlled a large ecologically diverse area including most of San Luis Potosi and large areas of Hidalgo, Tamaulipas, Queretaro, and Veracruz states (Laughlin 1969). Today approximately 60,000 Huastec speakers live southwest of Tampico in the Sierra Madre Oriental foothills of southeastern San Luis Potosi and northern Veracruz, primarily a climax vegetation zone of tropical rainforest, Bosque Tropical Perrenifolio (Rzedowski 1966). The vegetation today, however, consists almost entirely of successional communities that reflect human management (henceforth referred to as anthropogenic vegetation zones).

Huastec resources labeling decisions occur within the context of the natural and social ecosystems in which they participate. The Huastec live as Indians within the mestizo (i.e., national cultural identity) dominated politico-economic setting of Mexico. Families generally live in dispersed household units within corporate communities and receive their subsistence from the products of their land, cash cropping and wage labor. Anthropogenic vegetation zones usually maintained by a Huastec family include cash producing sugarcane, managed forest plots, and cornfield-fallow cycling fields managed as *milpa* by slash and burn methods. The details of Huastec botanical resource management within these anthropogenic zones have been discussed elsewhere (Alcorn 1981). Land use patterns are affected by individual and community concerns, local interpretation of government regulations about using available land, and locally administered government loan policies. Cash cropping centers around sugarcane which is processed into raw sugar by individual family operations and sold at low prices into a mestizo controlled market. Henequen and coffee are also important cash crops in some areas.

Research was designed to identify Huastec botanical resources, to investigate the methods and impact of Huastec resource management, and to construct and integrate cognized and operational models of the Huastec natural and social environment in order to generate hypotheses about the impact of Huastec world view on ethnobotanical processes influencing elements of the Huastec vegetational environment. Methods used during 13 months of fieldwork included structured and informal discussions, the administration of interview schedules, the drawing of land use maps in consultation with Huastec land holders, and participant observation. Interviews were conducted in Spanish and Huastec. Extensive data about plant uses, plant names, and plant management were provided by 50 informants from 20 communities. Eighty-four individuals were formally

interviewed but many more people provided valuable insights. One Huastec collaborated with me throughout the entire project and participated in most interview sessions.

To date, 2000 plant specimens have been collected in scientifically identifiable condition (i.e., flowering or fruiting specimens). I have identified the majority by using pertinent floras, monographs, and the University of Texas herbarium. Specimens that were difficult to identify were sent to appropriate specialists for determination. Different botanical taxa collected and identified from the Huastec habitat during this project now total 910. Vouchers will be deposited in the following herbaria: CHAPA, INIF, MEXU, TEX, and the Instituto Nacional de Investigaciones sobre Recursos Bioticos in Jalapa, Veracruz.

RESULTS

The Huastec depend on the plant world for many raw materials. Men, women and children quickly discriminate between plant resources and nonresources every hour of the day. Specific uses have been recorded for 65% of the botanical taxa I collected. Plant utility is reflected in three of the four Huastec botanical life-form cover terms. The word for tree, *te'l*, also means a branch, a pole, or a piece of wood, be it a loom, a housepost, or a quickly fashioned hook for retrieving a desired fruit. *Ts'a:h*, the cover term for vine, also refers to any lashing material, be it vine or rope. *Ts'oho:l*, the cover term for herbaceous plant, is also used to mean medicine derived from any plant source (tree, vine, bark, root, etc.). Today *tom* only refers to grass. Grass is rarely used for thatch in the Huasteca today but in Tzeltal, a related Maya language, *tom* refers to the grass bundles prepared for thatching a house. A term for grass thatch bundles was not elicited in Huastec.

When presented with a fresh vegetative shoot, Huastec informants attempted to recognize and identify the specimen by evaluating characteristics which would make it useful. Leaves were usually crushed and smelled (chemical evaluation). Questions were asked about the fruit, habit and habitat. Knowledge of all these characteristics has potential value for resource assessment as well as for identification. Unless they were large and showy, edible, or otherwise useful, flowers were rarely discussed. Once identification was made, the informant usually volunteered uses for the plant and added qualifying statements about preparation, value, and problems involved in its use. The resource value of a particular plant for a particular use often hinged upon the context of the use and the user. Although "resource" means something which is used to satisfy social, biological, and physical needs, the Huastec acknowledge that trade-offs are inherent in the use of any resource.

Plants are clearly resources for the Huastec. But what kinds of resources are necessary and what makes "plant X" a specific kind of resource? When a Huastec informant was asked, for example, "Is 'plant X' a resource for 'use Y', a wide range of responses were given. "Yes" and "no" answers were rare. Characteristic answers included:

"My ancestors needed it, I don't."

"Only other people know."

"I can't use it, people are too invidious."

"I've heard that it can be used, but I've never tried it so I don't know."

"I don't know. Maybe that's why mestizo merchants buy it from us in the market."

"No, well yes. It could be used, but I use 'plant Z' because I have it here by the house."

The range of answers to this question gives us some clues about the Huastec resource labeling process. The utility of a resource is assessed by the individual from a shared Huastec bias and a personal idiosyncratic bias. Respondents' replies indicate a personal consideration of actions implicit in the choice, the appropriateness of the action, and the constraints limiting the action. Nonetheless, a given respondent's answer is not necessarily optimally adaptive. His decision obtains from his calculation of the interplay effects of factors which also shape that context.

Patterns abstracted from conversation, interview sessions, and observed behavior suggest some of the factors shaping the context of Huastec resource perception. Based on the investigative focus necessary to study them in further detail, I have chosen to lump the factors into four general catagories: biological and physical; cultural; economic; and personal and social.

Basic to the Huastec resource evaluation process are the empirically measurable physical or chemical qualities which qualify or disqualify a plant from the use in question. Huastec, however, not only assess the physical and chemical attributes of "plant X" but also consider its spatial and temporal position in their vegetational environment. The plant's ecological requirements, its membership in a particular community, its life cycle, its reproductive biology, its speed of growth as well as other aspects of the plant's biology are considered, as far as they are known to the individual, within the context of the existing time and space investment patterns which characterize his land management system. Because his existing land management system is designed to meet many other needs apart from the one under question, the consideration of the changes necessary for the integration of "plant X" into that system is critical to his decision. Ecological changes potentially caused by the integration of "plant X", the scarcity of "plant X", and the scarcity of resources necessary to maintain "plant X" are also considered and compared to similar criteria for available substitutes. Other empirically measurable variables considered include the biological needs of the individual, his household, and his domestic animals.

There are also, however, less easily measurable factors that are important in the resource perception process. Culturally generated needs create the requirement for certain resources (e.g., specific ritual items). The perceived context for plant use is shaped by Huastec world view. Native inquiries into a plant's properties and the interpretation of the results are shaped by native epistemological biases. Cultural sanctions against the use of "plant X" in a given way may remove it from the resource category of "use Y". In some cases a use or a plant may be identified with a particular cultural identity and thus appropriate or inappropriate for the person being questioned. For example, some plants are identified with mestizo as opposed to Indian identity. Other plants/uses are identified with a particular role within Huastec society. For example, the use of short, hollow lengths of carrizo [*Arundo donax* L., *Pennisetum bambusiforme* (Fourn.) Hemsl. *(paka:b)*] is associated with curers.

Other considerations are economic. Allocation of time and space necessary for the maintenance, acquisition and/or use of the possible resource is considered within the context of the individual's present life strategy and against the value assigned free time. The known "opportunity costs" of opting for a "new" resource are evaluated against the probable gains. The risks and uncertainties that surround the maintenance of "plant X" were it to be acknowledged as a resource are considered within the context of the land management system presently in operation. Risks are also evaluated in a social context. Some resources are more easily appropriated by other people, and the individual must assess the ease of appropriation as well as the losses and benefits which might attend such a transaction. Limitations on the individual's land management system may leave particular needs unfilled and transactional resources become necessary to fulfill these needs. The cash generating potential of a resource, the labor investment necessary, and the stability of the market for "plant X" may also be considered in this context.

A final category of considerations are those peculiar to each individual. The individuals's household demography affects the household's needs and resources, and, of course, changes over time. The individual's personal knowledge of "plant X" and alternatives, as well as his knowledge of particular resource categories, clearly affects his answer to our question. His knowledge depends upon the form of existing information networks and the person's participation in them in order to gain other's knowledge. It also depends on the individual's own investigations of the plant. Age, personality, experience, and status affect the individual's knowledge as these factors change with

time. The individual's particular management skills and his personality also affect the decision to perceive "plant X" to be a resource. For example, an individual's definition of plant resources is affected by his personal response to the traditional wealth leveling pressures of the community, his personal desire for power, and the paths he chooses to achieve it. The individual may rely on others for certain services/products and have no need to know about resources necessary to them. The factors considered by the individual in resource labeling decisions reflect the fact that the Huastec derive their plant resources from two sources: directly from the natural environment to which they have access, or indirectly through transactions with other people. Resources maintenance activities include the management and cultivation of social relationships as well as the management and cultivation of vegetation. Methods open to the individual for attaining goods indirectly through other people influence his resource perception and vegetation management.

The factors which I have listed here clearly do not exist in isolation. My isolation and classification of them can only be heuristic because these and other interrelated factors interact in shaping resource perception. The individual's answer will vary over time as any of the factors mentioned above, and thus the interrelationship between factors, is altered. In addition, past interactions have created historical trends of resource definition and "use" that shape the possible present-day choices. Huastec plant resource "needs" and "uses" are restricted to those that are part of particular present-day Huastec strategies (including existing technological patterns such as raw sugar production practices, the "invisible technology" of Huastec agroeco system management, etc.) designed to operate in today's Huastec habitat and within Huastec social organization. At the same time, however, "needs" and "uses" bear marks of the historical strategies out of which they developed.

Conflicts and constraints limit the use of available resources. Needs and the choices of certain resources may conflict with the choice of others. Such conflict imposes constraints on the use of particular plants. Other constraints are generated by peculiar intracommunal resource access regulation. For example, while each family has a specific, often inadequate, land holding, other people may request loan of the land without payment of rent, or demand part of a harvest in exchange for volunteered labor. Thus, individuals are forced to juggle their household operations both to avoid being taken advantage of by others while at the same time attempting to get as much as possible from others. Finally, the politico-economic environment of the individual as an Indian within the Mexican sector of the world economic system limits and shapes his decisions. His choices can only be made within the context created by the decisions of those of higher authority.

The ethnobotanical list of Huastec plants and their uses generated by my research reflects the interaction of factors influencing Huastec resource perception. A brief treatment of a few selected species in each of three "use" categories important for survival (firewood, construction materials, and medicine[2]) will illustrate this interaction.

The species commonly recognized as firewood include: *Acacia angustissima* (Mill.) Kuntze *(shi:shit)*, *Acacia cornigera* (L.) Willd. *(thobem)*, *Adelia barbinervis* Schlecht. & Cham. *(ata')*, *Calliandra houstoniana* (Mill.) Standl. *(wi:t'ot')*, *Callicarpa acuminata* H.B.K. *(et te')*, *Conostegia xalapensis* (Bonpl.) D. Don. *(chikab te')*, *Croton reflexifolius* H.B.K. *(olih)*, *Cupania dentata* DC. *(ts'aw')*, *Guazuma ulmifolia* Iam. *(akich)*, *Leucaena pulverulenta* (Schlecht.) Benth. *(thuk')*, *Lippia myriocephala* Schlecht. & Cham. *(anam te')*, *Nectandra loeseneri* Mez. *(oh te')*, and *Sapindus saponaria* L. *(walul)*. Although one might expect the firewood designation to be awarded to heavy wood which burns slowly to produce long lasting, hot coals, some of these species produce firewood of a very poor quality. What these species do share in common is their membership in the fast growing successional community of fallow cornfields. Depending on its age and structure, the vegetation which covers the fallow can be a resource to be burned, grazed, or kept for future use. If the decision is made to slash and burn the vegetation, then the option is

where to burn it and for the production of what. It can either be burned in the field to provide ash for fertilizing the corn to be planted or it can be collected and burned in the hearth to provide heat for cooking. My preliminary data suggest that the amount of land devoted to the cornfield-fallow cycled fields depends more on the amount of firewood needed than on the amount of corn needed.[3] Management practices often emphasize firewood production over corn production. Deliberate light burning of fields and removal of wood before buring increase the firewood yields but cut the yield of corn (Fig. 1). Pollarding of firewood-producing trees and opting not to carry out the traditional one-time weeding of the milpa speed up firewood production. Thus, factors influencing agricultural patterns, the availability of alternate firewood resources, species' response to the agriculture regime, and species' representation in the successional fallow vegetation are reflected in the labeling of these species as firewood resources.

The species commonly used for the main houseposts in house construction include: *Cordia alliodora* (R. & P.) Oken *(wish te')*, *Diphysa robinoides* Benth. *(chichath)*, *Harpalyce arborescens* A. Gray *(k'an te')*, *Nectandra loeseneri* Mez. *(oh te')*, and *Piscidia piscipula* L. Sarg. *(tsi:hoi)*. The physical requirements for houseposts strictly limits the species that could potentially fulfill this resource role. The species listed share strong wood, a straight bole, and decay resistance. They also share the ability to grow well on agriculturally poor ridgetop soils or as isolated individuals spared in the sugarcane or milpa-fallow cycle fields.

The species used for roofing materials are: *Imperata brasiliensis* Trin. *(ata: to:m)*, *Licaria capitata* (Schlecht. & Cham.) Kosterm. *(sholim te')*, *Sabal mexicana* Martius *(oto:mal, apats')* and *Saccharum officinarum* L. *(pakab)*. The superior material is the thatch of *Licaria capitata* leaves. *A Licaria* leaf roof is said to last for 30 or more years, keep the house cool, and be impervious to rain. Today, however, few people recognize

FIG. 1—Planting milpa after firewood harvest. Stacked between the new milpa and the stand of flowing corn in the background is the firewood collected before burning the slash. Light burning left more firewood to be gathered later. Also visible are spared palms for thatch production and developing housepost trees that were pollarded for firewood during preparations for planting corn.

or use *Licaria capitata* as a roofing resource ostensibly because increasingly intensive land use has caused *Licaria capitata* to become a scarce forest tree in many places. Palm thatch from *Sabal mexicana* has largely displaced *Licaria* and *Imperata brasiliense* thatch. *Sabal mexicana* is a multipurpose species that has been purposefully introduced into many local areas in the past 50 years. Palms neatly fit into existing patterns of land use because, once established, they can be spared during milpa clearing or integrated into sugarcane fields. People who are really pressed for land and can't afford to devote space in their fields to palms or those who can't afford to get palm leaves from others choose to use the inferior thatch of sugarcane leaves, instead of using the sugarcane leaves as a resource to mulch and fertilize their cane fields. Thus, the list of thatch resources is not a list of four functionally equivalent species but rather a list that reflects a trade-off between land use and utilitarian considerations.

The list of Huastec medicinals can not simply be viewed as a list of drug plants used to treat biomedical diseases. Medicines, as a Huastec category, have the innate power to transform, or to be empowered by a curer or witch to transform a person's state of being. They may be used to poison or to sicken someone as well as to cure a person of an illness, or to prevent illness from striking. An illness, moreover, is not just a biomedical malfunction but also an event within a social field, and both of these aspects of illness are treated by curative medicines. Medicines may do their work by direct application, by ingestion, by merely being swept over a person, or by burning at midnight in the pathway to a person's home. Huastec illness etiologies include such agencies as embedded foreign objects sent by witches, interference by dead spirits, the action of stars, and soul loss by fright.

While knowledge of the same construction and firewood resources is shared by most adult Huastec, the knowledge of many medicinal plants is not. Over half of the 900 plants I collected had medicinal uses but agreement on the use and the means of application varied widely. There are many reasons for this. A person may learn about medicines from treatments applied by relatives, neighbors, and curers. Visible signs of use (e.g., seeing scars on a tree's trunk) might lead the individual to ask someone what kind of resouce the tree is. At the same time, however, a person may also have a plant's use revealed to him or her in a dream. Some people also experiment with plants to determine their effects on the body, and the information derived is then processed according to Huastec beliefs. Such individually derived information is not freely shared. Another factor influencing medicinal plant resource recognition is the increasing availability of manufactured medicines which substitute for some herbal remedies. People may know that a given plant has a given medicinal use but not perceive it to be resource for themselves because they prefer some other plant or because they prefer to get injections or take pills instead.

In order to illustrate briefly the complexity of evaluating Huastec medicinal plants, I will discuss one commonly used species. *Cissampelos pareira* L. *(k'on k'ach)*, a pantropical vine found in a variety of habitats, is used to treat *ichich* in the Huasteca. *Ichich* is similar to the concept of "evil eye", but rather than referring to eyes, it refers to hearts. The heart of an older, more serious person, for example, naturally saps energy from the heart of a younger, more lighthearted person, causing *ichich.* Chidren are especially vulnerable to this malady, but adults and even pigs also suffer from it. *Ichich* is often the initial diagnosis made when someone feels ill, especially from gastro-intestinal problems. The patient who is suspected to be suffering from *ichich* may be swept with the leaves of *k'on k'ach* or a number of other plants. In the case of *k'on k'ach,* the leaves are then crushed in a small amount of water by rubbing between the hands. If the liquid gels, as it invariably does, it is seen as a positive diagnosis of *ichich* detected and removed by the sage, omniscient plant. Of the 34 people questioned about *k'on k'ach,* only three stated that this diagnostic procedure could be followed by the ingestion of a root decoction made from the same plant. *K'on k'ach* is a relative of the South American plant *Chondrodendron tomentosum* Ruiz & Pav. from which tubocurarine and other

alkaloids that paralyze voluntary muscles are extracted for biomedical use. The roots of *k'on k'ach* contain some of the same alkaloids and have been exported as substitutes for *Chondrodendron tomentosum* (Morton 1977). In other parts of the world, native people have taken advantage of the muscle relaxant properties of *k'on k'ach* for a number of purposes including the expulsion of intestinal worms (Uphof 1968). But, although the root is pharmacologically active, the Huastec primarily perceive the plant to be a medicinal resource because of its predictable, diagnostically valuable (as culturally defined) gelling properties. Huastec who have chosen to identify themselves as mestizos assert their new identity by denying the existence of *ichich* and the resource value of *ichich* treatment plants like *k'on k'ach*.

Change in the resource status of a plant can alter its management and thereby the ethnobotanical process to which it is subjected. Huastec informants assign resource value to plants not only while acting to use particular plants but also while making plant management decisions. Twenty-five percent of native non-corn plants available to the Huastec are currently "managed for" by some individuals, and resource status is an important determinant of how a particular plant is managed (Alcorn 1981). Resource designation, then, potentially affects at least two types of "behavioral responses": the usage of a plant and the management of a plant.

DISCUSSION

The Huastec data fulfill the expectation that indigenous people know a great deal about their environment. But the Huastec data also demonstrate that the specific "uses" to which plants are put at any given time derive from a complex plant resource evaluation process operating from a well developed knowledge base that includes contextually related/dependent data. Resource evaluation is not an objective consideration of a plant's material qualities abstract from context, and resource perception is influenced not only by the individual's context but also by his understanding of that context.

The "needs" whose fulfillment is being sought include biological needs of the individual and household, as well as cultural needs, both of which vary over time. The use of one particular resource, be it plant or human, may in turn create the need for other specific resources. Consideration of "costs" of recognizing a particular resource include the assessment of the energy expenditure to fulfill the "need" and the possibility of losing this investment to others with or without compensation. The interpretation of what "fulfills" a need also depends on biological and cultural factors. Because of culturally determined preferences, a particular food, a particular style of house, or a particular kind of medical treatment may "fulfill" needs better than other available items of equal or better functional value.

Useful plants lists isolated from their context may be of limited value to economic botanists seeking empirically valuable data about the useful characteristics of particular species. On the other hand, these lists provide an indispensable vocabulary for studying the grammar of human ecological relations. For example, once resources are known, studies of the management of these plant resources can contribute to the evaluation of human impact on plant evolution and the structure of plant communities (Alcorn 1981; Bye 1979). Furthermore, investigation into the context of plant use not only contributes to the interpretation of plant uses, but also, in turn contributes to the understanding of humans' adaptation to their environment. Plant "use" is an integral part of the mental and physical life of people who live in direct contact with their natural resources. Any attempt to understand the adaptive value of the structure and functioning of human cognition as evidenced in ethnobiological classification systems must come to grips with the fact that the "uses" or "behavioral responses" to plants are not so simple as they have been understood by many investigators. Assigning "functional equivalence" (Hays 1974; 1981) to plants is problematic when "use" and appropriateness of use may vary depending on specific contexts.

CONCLUSION

Ethnobiology is a rich, relatively unexploited domain that could yield important information on human ecology. But if the adaptive value of ethnobotanical knowledge is to be tested in any meaningful way, plant "use" must be analyzed as a text that derives part of its meaning from the cultural, natural and social context in which it occurs and serves its function. The complex of factors influencing resource perception described here forces us to recognize that meaningful investigation into the adaptive value of botanical resource use requires not only the collaborative efforts of botanical, ecological, biomedical, pharmacological, economic, and nutritional approaches, but also anthropological study of potentially adaptive functions of resources used in the social and politico-economic aspects of the human's ecosystem.

Despite recent redefinitions of ethnobotany to include linguistic, epistemological, and evolutionary approaches to plant-human interrelationships, ethnobotany quixotically remains an ill-defined discourse without a unifying theme (Ford 1978). More workers are bringing the techniques of their particular disciplines to bear on different aspects of plant-human interrelationships, but their fragmentary contributions are not being synthesized in a way that makes their results useful or meaningful to workers in other disciplines. A renewed focus on the useful plant lists that traditionally defined ethnobotany may provide the important and necessary starting point for the systematic, multidisciplinary inquiry that is the unrealized potential of ethnobotany. Understanding the dynamic process leading to the inclusion of plants in useful palnt lists provides the blueprint for work to flesh out the bare bones of these lists so that their potential contribution to human ecology can be fulfilled. Knowledge of the factors important to individuals' resource perception and the interrelationships between those factors structures a juncture about which multidisciplinary inquiry can articulate by coordinating the collection, interpretation, and integration of data gathered by workers using the approaches of their diverse disciplines. Such a multidisciplinary approach would mutually enrich the participating disciplines and add new depth for archaeological and linguistic interpretation of plant-related data.

On the applied level, the integration of such ethnobotanical inquiry with current efforts in peasant agricultural decision-making research (e.g., Barlett 1980) could make a significant contribution to the development of locally adapted sustained yield agroecosystems that provide appropriate resources to meet the needs generated by the physical, biological, social and politico-economic realities of the local ecosystem.

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NOTES

[1]For the general reader, Huastec words are spelled here as they would be in English. Vowel sounds are approximately those of Spanish. In addition, the colon (:) indicates an extended or lengthened vowel, and glottal stops after vowels and glottalized consonants are signified by the vertical apostrophe (ˈ). Spelling relects pronunciation in the Potosino dialect of Huastec. Plant names given are those in most common usage.

[2]The category of food resource was not chosen because food resource evaluation is very complex. Accurate measurements of food consumption by a representative sample of all age and sex groups of the population, reliable nutrient analysis of the food as it is prepared and served, and knowledge of the nutrient requirements of all sectors of the population would be necessary to make any meaningful statements about the empirical food value of particular species and species combinations. Furthermore food classification, dietary rules defining culturally appropriate meals, and the symbolic values of foods would require extensive investigation.

[3]Quantitive evaluation of the amount of firewood available and the amount of firewood used is difficult, however. The amount of firewood used varies according to the size of the family and the food being prepared. In addition, non-cooking usage of firewood (raw sugar production, pottery firing, charcoal making, heat, etc.) also varies widely. Because people can collect firewood from land not their own, it is difficult to circumscribe the area producing firewood to meet the needs of a given set of firewood users. In addition, firewood production per hectare varies according to the stand's age and management.