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ORIGINAL PAPER

Cacao in Eastern Guatemala—a sacred tree with ecological significance

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Abstract Since at least 600 BC, cacao (*Theobroma cacao* L.) has occupied a place of cultural importance in Mesoamerica. In many Maya groups its importance as a ritual food plant is second only to maize (*Zea mays* L.). The Ch'orti' Maya and their culturally non-indigenous Ladino neighbours in Eastern Guatemala continue to use cacao for culinary and ceremonial purposes. Of particular importance are cacao uses in Ch'orti' rain ceremonies, which are strongly connected to local environmental knowledge. The protection of cacao as a sacred tree may help to limit slash-and-burn maize agriculture to sustainable levels.

Keywords Agrarian rituals · Ch'orti' Maya · Ethnobotany · *Theobroma cacao* · Spiritual ecology · *Zea mays*

Introduction

Cacao in Mesoamerica

Cacao (*Theobroma cacao* L.) has been consumed in Mesoamerica since at least 600 BC (Hurst, Taraka, Powis, Valdez & Hester, 2002, Powis, Valdez, Hester, Hurst & Taraka, 2002). The fact that cacao residues have been identified in precious vessels deposited in Maya burials dating from the Pre-Classic period (900 BC–250 AD), as

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well as abundant iconographic and epigraphic evidence from the Classic (AD 250–900) and Post-Classic periods (AD 900–1500) demonstrates that from the earliest evidence of its use, cacao has occupied a place of cultural importance in Mesoamerica (e.g. Martin, 2006, Schele & Mathews, 1998, Stuart, 1988). From the Colonial period to the present, cacao has continued to hold a special niche in the life of Mesoamericans while conquering new markets throughout the world (Coe & Coe, 1996; McNeil, 2006; Millon, 1955; Thompson, 1956). Its importance as a ritual food plant among many Maya groups is second only to maize (*Zea mays* L.). Whereas the special relationship between Mesoamericans and their main staple maize is not surprising, the reasons for the particular role cacao plays are less obvious. Great attention has been given to the phytochemistry of cacao, especially to the search for psychoactive compounds. Intoxicating and aphrodisiac properties have been ascribed to cacao from early Colonial times on (Hernandez, 1959(2), Sahagun, 1950–59(6), both cited in Coe & Coe, 1996), but with the exception of stimulating caffeine (and theobromine), research for the psychoactive principle in cacao could not identify any compounds in sufficient concentration for having an effect on the central nervous system (Smit, Gaffan & Rogers, 2004). The stimulant effect of cacao preparations is small but significant, hence its use as a ceremonial drink may be interpreted along similar lines as that of other caffeine-containing beverages such as tea or coffee, which are also consumed ceremonially in areas where they have been used for many centuries. Other factors related to the chemical properties of cacao may also contribute to its popularity as a food plant, particularly its pleasant sensory qualities and health benefits (due to antioxidant compounds) which have long been postulated by folk usage, but were confirmed by bioscience only recently (Weisburger, 2001). On many ritual and socially significant occasions in Mesoamerica, coffee, which contains more caffeine than cacao, has replaced cacao as a ceremonial drink (e.g. Adams, 1987). As a ritual offering not consumed by humans, however, cacao does not appear to have been replaced by coffee to the same extent, presumably because other motives, especially the symbolism of cacao, predominate in this context (Kufer & Heinrich, 2006).

In Mesoamerica, the cultural importance of cacao has an additional dimension because the indigenous groups of this region have known the living cacao tree since the very early stages of their civilisation. In this paper, we explore the links between the ecological characteristics of the cacao tree, its place in Maya mythology and religious thinking, Maya ecological knowledge and the potential these links offer for developing strategies of biodiversity conservation and sustainable resource use.

Ch'orti' and Ladinos in Eastern Guatemala

The Ch'orti' Maya live in Eastern Guatemala and Western Honduras, near the Maya archaeological site of Copan (Metz, 1995). The region commonly referred to as ''Ch'orti' area'' includes the Guatemalan *municipios* of Jocotán, Camotán, San Juan Ermita and Olopa, altogether comprising approximately 100 000 inhabitants. In the neighbouring *municipio* of Quetzaltepeque, the use of the ancestral language has recently disappeared, while other elements of Ch'orti' culture, particularly rain ceremonies, continue to be practised. Unlike Maya groups in the western highlands of Guatemala, the Ch'orti' have lived for centuries largely isolated from other indigenous groups, and in close contact with settlers of European origin. Thus,

pressure towards cultural adaptation has been particularly strong (Metz, 1998). While this has caused rapid cultural erosion, many aspects of Ch'orti' culture continue to survive (Dary, Elias & Reyna, 1998; Kufer, Förther, Pöll & Heinrich, 2005, Kufer & Heinrich, 2006; Metz, 1995). The relationship between Ch'orti' and Ladinos is complex and dynamic, and a clear distinction between the two ethnic groups is not always possible (Metz, 1998). The total number of Ch'orti' speakers is estimated to be between 20 000 and 50 000, the latter figure including speakers with only partial knowledge of the ancestral language. In this paper, we use the term Ch'orti' to refer to people from families in which the Ch'orti' language is still spoken or was spoken as a mother tongue by the parents of the oldest living generation.

The Ch'orti' live in a fragile environment, which requires skilful management. Their ancestral lands were once fertile and productive, as can be concluded from colonial tribute lists and other documents (Metz, 1995). As late as the mid-19th century, the Ch'orti' country still included extended areas of mountain forest which struck the traveller with its beauty (Stephens, 1969). Today, deforestation and soil erosion have reached an unprecedented scale, paralleling the ongoing cultural erosion. In the recent past, there have been initiatives trying to redress cultural loss (Metz, 1998), as well as environmental projects, but no serious attempts to link the two have been undertaken so far.

Methods

Field data on cacao uses were collected during 5 weeks in March/April 2003 and between November 2001 and February 2002. Previous fieldwork focusing on medicinal plant uses in the area was conducted during 12 months starting in March 2000 (Kufer et al., 2005). Data were collected using participant observation (documenting different ways of preparing cacao consumables and a rain ceremony in April 2003), unstructured and informal interviews with Ch'orti' from various hamlets of the *municipios* Jocotán and Camotán (interviews mostly with well-known key informants about processing of cacao and maize, current and former state of cacao cultivation, and notions about sacred places and plants), with Ladinos living in the towns of Jocotán, Olopa and Quetzaltepeque (about cacao preparations), and with members of the Confraternity of St Francis the Conqueror in Quetzaltepeque (about the processing of cacao for ritual purposes and the meaning of ritual activities). Informed consent was obtained from all research participants.

Results and Discussion

The disappearance of cacao cultivation in the Ch'orti' area

Colonial tribute lists show that cacao was once produced in significant amounts in the study area (Feldman, 1985, cited in Metz, 1995). In the 16th and part of the 17th-century it was the predominant product in many pueblos of the region (Fuentes y Guzmán, 1933[1699]). By the early-19th century, its production in the area was limited to the indigenous population and it was only cultivated on a small scale (Dary et al., 1998). Today, local people recall that cacao grown in the study area could still be purchased in local markets as late as the first half of the 20th century.

While cacao has had a revival as a cash crop among at least one Maya group in recent times (Steinberg, 2002; Emch, 2003), only a few scattered trees with low productivity remain in the Ch'orti' area, and their owners reported losing most of the fruit to squirrels before maturity.

Cacao requires deep soil and continuous humidity for good yields. While a higher degree of irradiation improves short-term productivity, it also shortens the tree's life span and makes it more vulnerable towards plagues. Shaded production systems for cacao require less investment than non-shaded systems and are therefore economically viable at lower yields (Zuidema et al., 2005). When a canopy composed of different tree species is used for shading, the production of cacao has a potential for supporting higher levels of biological diversity than most other tropical crops (Rice & Greenberg, 2000). For Maya farmers, planting cacao under a canopy of other useful tree species offers an opportunity to produce a valuable product with the added benefit of obtaining additional important resources from the shade trees, while protecting the soil from erosion. This contrasts the production of maize (and beans) through slash-and-burn agriculture, which is potentially unsustainable if fallow periods are too short. A conceptual link between maize and cacao in Maya cosmology, as indicated by the use of both in ritual offerings, may thus represent the two important elements of a successful shifting cultivation system—healthy open fields and a healthy diverse forest.

The natural environment and economic strategies of Ch'orti' and Ladinos

The Ch'orti' area ranges in altitude from 300 m to > 1500 m (Dary et al., 1998). The lowlands of this area are dominated by dry savannah vegetation, while cloud forest and humid subtropical forest once covered the higher areas. Today, very little forest cover remains, and soil erosion severely affects agricultural production (Dary et al., 1998). Insufficient rainfall has devastating consequences, as could be seen in 2001, when a major drought affected most of Central America and caused a major famine in the Ch'orti' area.

Economic strategies and the values attributed to work differ between the two ethnic groups. In comparison, the Ch'orti' are more subsistence-oriented and single out *milpa* work as sacred, while Ladino economy is more cash-oriented and open towards non-traditional activities promising economic gain, even if this promise comes with a considerable risk.

Ch'orti' economy focuses on the subsistence production of mainly maize and beans. The hard manual labour required by their agricultural methods is regarded as a sacred duty whose skilful and dedicated fulfilment is a source of pride and ethnic identity for Ch'orti' men, especially when the crop they plant is maize. In the words of a local, ''maize is the joy of the working man'' (Dary et al., 1998). This work ethic is reflected in the use of the term ''working men'' for the rain gods. As a consequence, Ch'orti' men are motivated to invest a maximum of effort in order to achieve the best possible harvest from their often marginal lands. During the 2001 drought, people in some of the culturally most conservative Ch'orti' hamlets reported to have suffered a less severe harvest loss than people in more ''ladino-ised'' hamlets of the area. In a statement that expresses the views of many Ch'orti', one informant attributed this to the fact that in his hamlet ''people know how to work'' and focus on the production of staples rather than on cash crops. Animal husbandry

is largely limited to poultry (chickens, turkeys and sometimes ducks). Many families, especially land-poor ones, also try to supplement their income with handicraft production and wage labour, but these options offer only limited possibilities to generate income (Dary et al., 1998).

In contrast, Ladinos are more oriented towards a cash economy and have developed more lucrative economic strategies. Work in the *milpa* is only one option among many and is readily given up in favour of economically more rewarding or less strenuous activities, such as trade, cash crop cultivation (especially coffee), and animal husbandry (pigs and cows in addition to poultry). Often a substantial surplus is produced for sale. While these strategies are more lucrative and some Ladinos have managed to accumulate sufficient wealth to buy extended areas of land, they involve a considerable risk for the less wealthy. This became apparent during the 2001 drought, which coincided with a drop in the world market price for coffee, which eliminated the possibility of income supplementation through wage labour and affected small-scale coffee producers, many of whom had converted a significant part of their land to coffee production only recently. The loss of income through coffee appears to have been an equally or even more important factor contributing to the subsequent famine than the drought itself.

Ch'orti' religious ideas, agrarian rites and the protection of natural resources

In the study area as in other parts of Latin America, Catholicism and pre-contact religious ideas have merged to form a syncretistic system. Pre-contact Maya religion used many symbols, which are also important in Christian faith, such as the cross. Contemporary Maya often interpret Catholic symbols along their own lines of thinking and continue to practice many elements of their ancestral religion within a superficially Christian context (Christenson, 2001). In the Ch'orti' area, rain ceremonies and other rites of the agrarian cult continue to be carried out by the religious confraternity of Quetzaltepeque (for details, see Kufer & Heinrich, 2006). Detailed information about Ch'orti' agrarian rites in the 1940s and 50s has been published (Girard, 1962), and their continuity with Classic Period practices has been discussed recently (Looper, 2003). The agrarian cult is mainly concerned with asking for copious rainfall during the rainy season (May-October) and paying the Holy Earth, as well as the ''angels'' (rain gods) their dues in a grateful and respectful manner. One of the most important ceremonial events of the agricultural year is the Great Inaugural Rain Ceremony in late April, locally called *traída del invierno* ('fetching of the rain'), which includes a ritual meal next to a sacred spring in the mountains, the sacrificial offering of black *chilate* (a cacao-and-maize gruel) and a pair of turkeys to this spring, and the invocation and feeding of the rain gods with black *chilate* at the confraternity building (Girard, 1962; Kufer & Heinrich, 2006).

The Ch'orti' are very aware of the importance of protecting sources of water, and this awareness is firmly rooted in their religious thinking and practices. Informants in their fifties or older recall the times when certain springs of water, especially those found high up in the mountains, were not allowed to be used for domestic purposes such as washing and cooking, but reserved as ''Virgin Water'' (*Agua Virgen*) for ritual use only. According to one informant, the exploitation of such a sacred spring for the provision of water to the Department capital Chiquimula (by the town's Ladino administration that did not consult the Ch'orti' residents of the hamlets nearest to the spring) resulted in a complete drying up of this important source of

water. The protection of springs extends to the accompanying vegetation and may include particular taxa or entire biological communities, in a similar way as has been reported from other parts of the world (Gadgil, Berkes & Folke, 1993). In 1934, a Guatemalan lawyer noticed that the Ch'orti' protected the mountain forest from which the main water sources of the area originate because they regarded it as ''the seat of the angels'' (Dary et al., 1998). Since the Ch'orti' refer to the rain gods, who bring the clouds, as ''angels'', this belief is in fact a poetic expression of the knowledge that deforestation causes climatic changes. While it applies to trees in general, the ''angels'' are said to prefer certain species such as the *amate* tree, which grows mostly next to rivers (Dary et al., 1998). Interestingly, this tree belongs to the genus *Ficus* whose species are regarded as sacred in many parts of the Old World and at the same time considered a keystone resource significant to the conservation of overall biodiversity (Gadgil et al., 1993).

Cacao uses in Eastern Guatemala

Although the local production of cacao has fallen to insignificant amounts, the dried beans are traded in the markets and used for culinary and ritual purposes in ways specific to the area. The use of cacao-containing beverages on ritual and ceremonial occasions demonstrates that cacao continues to be culturally important even though it has lost its economic importance.

Uses by Ladinos

Ladinos in the study area continue to prepare two kinds of drinks containing cacao. The first is hot chocolate, for which the gently parched beans are peeled, ground and mixed with sugar and cinnamon. It is used as a festival drink, especially on Christmas and New Year, and used to be an important part of women's postpartum diet. In the town of Jocotán, Ladinos also use chocolate as a filling for a type of flat cake made for Christmas and New Year.

The other culinary use of cacao by Ladinos in the area is for making *tiste*, a refreshing cold drink containing cacao, sugar, cinnamon, and *achiote* (*Bixa orellana* L.) which gives it a red colour. It is said to possess a cooling and refreshing effect on the stomach and the urinary system (see section 'The hot/cold dichotomy in ch'orti' ethnomedicine and ritual'), as well as a mild diuretic action. The most important occasion for drinking *tiste* is around Easter, during the hottest part of the year.

Culinary uses of cacao by the Ch'orti'

Hot chocolate prepared by the Ch'orti' in some hamlets of Jocotán significantly differs from the Ladino recipe: Dry cacao beans are toasted on the griddle (*comal*), but not peeled, and ground with an equal amount of heavily toasted maize. Unrefined cane sugar and water are added. This chocolate was and continues to be an important food gift exchanged between parents and godparents at baptism (cf. Wisdom, 1940), and hot chocolate is occasionally still used as a festival drink. Ground cacao beans are sometimes also added to coffee and *pinol*, particularly on festive occasions. *Pinol*, also called 'maize coffee', is made from heavily toasted, ground maize, sweetened with unrefined cane sugar and often seasoned with spices

like cinnamon, allspice and anise. It is particularly recommended for the postpartum period and supposed to stimulate lactation (López García, 2003; McNeil, 2006; Popenoe, 1919). Further cacao uses by the Ch'orti' will be discussed in the next section.

Uses of cacao in the context of Ch'orti' agrarian rites

Cacao is used as a main ingredient in two different ritual drinks also containing maize which are both locally called *chilate* but vary in their mode of preparation. One kind of *chilate* is made from ground maize and water, boiled and filled hot in *jícaras* (cup-shaped calabash dishes made from fruits of *Crescentia alata* H.B.K.). Before serving it to pilgrims and participants in rituals, a blob of chocolate, made from toasted cacao and maize, is added to the individual vessels. The other kind, black *chilate*, is made by mixing ground maize and cacao (without toasting) with cold water, resulting in a dark brown, thick liquid. This is filled in *guacals*, bowl-shaped calabash dishes made from a different species of calabash tree (*C. cujete* L.) and destined for ritual offerings. Another cacao drink used during the rain ceremonies is called *fresco de cacao*. Like the second type of *chilate*, it is prepared with cold water and ground cacao beans without parching. It is a refreshment which helps the ritual specialists to keep cool while they carry out the rituals of the Great Inaugural Rain Ceremony in late April.

Differences in cacao uses according to ethnicity

Cacao uses in Eastern Guatemala differ significantly according to ethnicity, a fact which is partly obscured by the use of the term '(hot) chocolate' for different preparations. Only the Ch'orti' add ground maize to their chocolate, whereas only Ladinos use chocolate as an ingredient in solid food (chocolate bread). Of particular importance for the Ch'orti' are the uses of cacao in rituals of the agrarian cult, especially rain ceremonies. In this context, the symbolism of cacao plays an important role, which will be explored in the next section.

The symbolism of the cacao tree

The symbolism of cacao is complex and includes a number of different aspects which are related to biological and ecological characteristics of the cacao tree.

The anthropomorphic cacao tree

Many of the plants considered sacred by the Maya have an anthropomorphic structure. Some are upright like a human body, for example palms (Christenson, 2001) and banana plants, others have large, head-like fruits, like the squash (*Cucurbita moschata* Duchesne), and the most human-like plants have both an upright ''body'' and head-like fruits born on the trunk and larger branches. The idea that humans are reborn as fruit trees has been documented among contemporary and Classic Period Maya (Christenson, 2001; Schele & Mathews, 1998). Seeds of head-like fruits, such as squash and *sapote* (*Pouteria sapota* (Jacq.) H. Moore & Stearn) are added to ritual maize drinks. Calabashes, which grow on trees (*Crescentia cujete* L. and *C. alata* H.B.K.), are made into vessels in which these ritual

drinks are served or offered. An explicit reference to large fruits being likened to a human head is made in the 16th-century K'iche' epic Popol Vuh, in which the skull of the mythical hero Hunahpu is placed into a tree where it transforms into a calabash fruit (Tedlock, 1996).

The Maya cosmological principle of paired opposites and the hot/cold dichotomy

The symbolism of cacao also includes aspects connected to another Mesoamerican concept central in Maya religious thought: a cosmological order based on the structural principle of paired opposites (Miller & Taube, 1997). These opposites are complementary rather than competing, because a balance between both partners of a pair is considered essential for the continuation of human civilisation and the periodical recreation of the world. The most important pairings include male and female, day and night, sky and earth, life and death and fire and water. These individual pairings of opposites may be grouped into complexes, with one side representing day, sun, male and fire, whereas the other represents night, moon, female, and water. The opposition between field and forest is another aspect of this cosmological order. The field is an open space where sunlight reaches the ground, hence it belongs to the sun–day–light complex, whereas the cool, damp shade of the forest is associated with the complex moon–dark–night (Taube, 2003). The idea of balance between the two opposites here supports an understanding of the necessity to protect the woodlands in order to ensure the continued fertility of the fields.

The classification of food, medicines, and illnesses into ''hot'' and ''cold'' is an important ethnomedical concept throughout Latin America. Since this classification does not always refer to thermal qualities of the classified entities, but includes other criteria and is related to the dry/wet dichotomy, its prevalence in Latin America has been interpreted as a simplified version of the Hippocratic theory of four humours, resulting from the introduction of these ideas by the Spaniards (Foster, 1994). However, given the importance of binary oppositions in Mesoamerican cosmology, it seems likely that such a basic dichotomy as the hot/cold one should already have been important in Mesoamerican thinking before contact with the Europeans, ''hot'' forming part of the symbol complex sun–light–day–male and ''cold'' belonging to the complex moon–dark–night–female.

The hot/cold dichotomy in Ch'orti' ethnomedicine and ritual

The maintenance of balance between ''hot'' and ''cold'' is generally regarded as desirable and essential for human health in most areas where the hot/cold dichotomy is in use[1]. In the hot lowlands of Eastern Guatemala, illnesses associated with fever and pain are a major health problem and generally treated with ''cool'' remedies. In the context of women's reproductive health, however, ''cold'' is regarded as the principal danger and the maintenance of body warmth with the help of ''hot remedies'' is seen as essential for female fertility (Kufer et al., 2005). Spicy and/or dry foods, as well as plants growing in sunny, dry areas are generally classified as

[1] Researchers working with highland Maya groups have found a bias in favour of the ''hot'' side, i.e. the maintenance of body warmth and complete expulsion of pernicious ''cold'' is regarded as the principal requirement for a healthy body in the highlands (e.g. Groark, 2005 and citations therein). This may be related to the highland Maya's daily experience of cold, windy and often humid weather conditions.

''hot'', whereas unripe, sour and juicy fruits, mucilaginous and fatty substances, diuretics and plants growing in wet, shady places are classified as ''cool'' (*fresco*).

In the context of Ch'orti' rain ceremonies, it is of prime importance for the ritual specialists to keep their bodies and environment ''cool'' in order to attract the rain. Besides abstention from the ''heat'' of sexual activity and avoidance of the ''warm'' colours red and yellow in ritual clothing, ''cool'' plants are indispensable requisites to keep dangerous heat at bay. Plants used for the ritual adornment of the confraternity altar in Quetzaltepeque are collectively referred to as *verdío* (greenery) and comprise taxa which grow in wet places and/or have outstandingly bright green leaves (Kufer & Heinrich, 2006).

The ''cool'' character of cacao

The cacao tree and its products are classified as ''cool'', mainly because the tree grows under shade trees and shows a preference for humid places. The fatty consistency of the seeds and their diuretic action, caused by theobromine content, may further contribute to this classification. The ''cool'' character of cacao is generally seen as beneficial, which is reflected in the use of the word *fresco* (cool, fresh) to describe it, while a pernicious cold quality is usually referred to as *helado* (icy). In contemporary highland Maya myths, the cacao tree uses these beneficial qualities to provide protection and shade for the sun/maize deity: According to the Tz'utujil Maya of Santiago Atitlan, the Sun takes a rest every day at noon under the cacao tree that grows in the umbilicus of the sky (Prechtel, 2001). In a K'iche' myth from Chichicastenango, Jesus Christ, who often takes the place of the sun/maize god in contemporary versions of Maya myths, finds refuge from his persecutors under the cacao tree and subsequently gives his blessing to it (Bunzel, 1967[1952]).

Some preparations containing cacao, such as hot chocolate and *pinol* with cacao, are classified as ''hot'' and even recommended specifically for the postpartum period when all ''cool'' foods and drinks are banned. However, the ''hot'' quality of these beverages originates not from the cacao bean itself, but is achieved by parching the beans (which reverses their ''cool'' nature), adding spicy hot condiments such as cinnamon, cloves or allspice, and boiling the beverages.

Cacao and maize

Maize and cacao form a pair of opposites based on opposing biological and ecological characteristics of the two plants (Kufer & Heinrich, 2006). Maize grows in the full sun on fields, while cacao grows in the cool shade under other trees. Maize is an annual plant and only requires water during the few months of its lifecycle, while the cacao tree lives many years and requires a certain degree of humidity all year. At the same time, the arrangement of seeds in a cacao pod resembles a maize ear, which is reflected in the use of the Spanish word *mazorca* for both. This may be one of the reasons why cacao is the most prominent of the ''anthropomorphic'' fruit trees in Maya mythology (Martin, 2006). The special relationship between cacao and maize also becomes apparent in the similarity between processing methods of cacao beans and maize grains for the preparation of ritual drinks (Meskell & Joyce, 2003).

Given the importance of fallow periods for continued soil fertility in a shifting cultivation system, it seems plausible that a conceptual pairing should exist between

the main staple maize, for which the forest must be cut down, and the cacao tree, which requires the forest to grow well. Thus the pairing of maize and cacao represents two important aspects of a successful agricultural economy—healthy open fields and a healthy diverse forest. Using the environmental requirements of these two plants as a guide, the Maya may have limited their impact on the environment to a sustainable level.

Conclusions

In Eastern Guatemala, the cultivation of cacao has gradually disappeared due to environmental degradation which paralleled cultural erosion. Nevertheless, remnants of its cultural importance have continued to survive to this day in the form of ritual and ceremonial uses, especially within the context of agrarian rites. Like other elements of Ch'orti' religious thought, the sacred character of cacao is connected to an understanding of ecological processes which has been accumulated over many centuries. In a fragile environment where deforestation rapidly causes soil erosion and climatic changes, which are likely to affect agricultural productivity, protection of the cacao tree and the humid habitats it needs to thrive may be an effective way to limit staple production through slash-and-burn maize agriculture to sustainable levels. The ecological knowledge associated with local religious practices and ideas deserves more recognition and should be integrated into programs for environmental conservation.

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