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WHY IS MAIZE A SACRED PLANT? SOCIAL HISTORY AND AGRARIAN CHANGE ON SUMBA

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ABSTRACT.—Why has maize, a plant with origins in the New World, become ritually important in an indigenous Southeast Asian religion? While environmental conditions and agricultural economics are key determinants of everyday resource management practices in insular Southeast Asia, it is necessary to consider ethnic identity, political economy, and social structure in order to understand the religious significance of natural resources in contemporary society. Linguistic, cosmological, and horticultural data are combined with an analysis of local perceptions of culture and environment. This information is used to explain the transformation of an introduced plant into an indigenous sacrament. Ethnographic data, including a brief case study of the role of maize in ***marapu*** 'ancestor worship' and the cultural history of the Kodi people who live on the Indonesian island of Sumba, are the basis for a discussion of agrarian change and social history in Kodi. The data are also used to explore the possibility of using information about contemporary Sumbanese society to gain a better understanding of historical processes in eastern Indonesia.

Key words: cultivar diffusion, agrarian change, maize, sacred plants, Sumba.

RESUMEN.—¿Por qué se ha convertido el maíz, una planta originaria del Nuevo Mundo, en una planta ritualmente importante para una religión indígena del Sudeste Asíatico? Este trabajo examina datos lingüísticos, cosmológicos, y agronómicos y analiza las percepciones del cultivo y del medio ambiente con el fin de ofrecer una explicación de la transformación cultural del maíz desde una planta exótica a una planta sagrada indígena. La pieza clave de este trabajo es un breve estudio de caso del papel del maíz en el culto ***marapu*** a los ancestros y en la historia cultural de los Kodi que viven en la isla indonesia de Sumba. Los datos etnográficos se han utilizado como base para el análisis del cambio agrario y de la historia social de Kodi que se presenta en este artículo. Los datos también se han usado para explorar la posibilidad de usar la información sobre la sociedad Sumbanesa contemporánea para obtener una mejor comprensión del proceso histórico del este de Indonesia.

RÉSUMÉ.—Étant donné l'origine du maïs située dans le Nouveau-Monde, on peut se demander pourquoi cette plante est devenue importante pendant certains rituels religieux d'une Première Nation de l'Asie du Sud-Est. Cet article examine les données horticoles, cosmologiques et linguistiques et rend compte des perceptions locales de la culture et de l'environnement afin de proposer une explication de la transformation du maïs en tant que plante introduite en une plante ayant une fonction sacramentale indigène. La brève étude portant sur le rôle du maïs dans le ‹‹culte des ancêtres›› ***marapu*** constitue, avec l'étude de l'histoire culturelle du peuple kodi vivant sur l'île de Sumba (Indonésie), la pièce maîtresse de cet

article. Les données ethnographiques sont utilisées afin de structurer la discussion présentée dans cet article quant aux changements agraires et à l'histoire sociale au Kodi. Les données sont également utilisées afin d'explorer la possibilité d'utiliser l'information à propos de la société sumbanaise contemporaine pour mieux comprendre les processus historiques en jeu dans l'est de l'Indonésie.

CULTIVAR DIFFUSION ON SUMBA

Cultivar diffusion is a mechanism of agrarian change on Sumba, yet little is known about its role in social change on the island. The mosaic landscapes of Sumba contain mixtures of native plants and introduced crops that have been filtering into the island's ecosystems for many millennia. Sumbanese farmers cultivate plants indigenous to eastern Indonesia as well as plants whose origins are in other parts of Asia, Africa, and the Americas. An examination of the management of indigenous and introduced crops and of the concepts of 'local' and 'foreign' plants can lead to a better understanding of ethnic identity and the long-term development of Sumbanese societies.

Sumbanese perceptions of self and environment are clues to bigger processes of agrarian change and culture history. Sumbanese culture and horticulture are manifestations of a long history of plant introductions. There are several types of verbal records of cultivar diffusion including plant names, myths, and ritual speech. In addition to the plants themselves, material records of cultivar diffusion include artifacts and historical documents from Sumba and neighboring islands. Together, this evidence reflects some of the historical processes that created the present complicated relationship between plant origins and ethnic identity, political economy, and religion.

An analysis of maize (*Zea mays* L.) is particularly helpful for sorting through the present complicated situation to learn more about agrarian change and social history on Sumba. Researchers in Indonesia frequently characterize rice as a sacred item, but rarely mention the religious significance of maize. Ethnographic reports from Sumba often categorize maize as a mundane subsistence food in contrast to rice, which is frequently categorized as sacred, but the relationship between maize and rice is not so black and white on Sumba. Like rice (*Oryza* spp. L.), maize is an ordinary food source in everyday contexts and a sacred object in many ritual contexts.

Maize and rice differ markedly in their antiquity in the region. Rice has been associated with Austronesian societies in eastern Indonesia for at least 6,000 years and is considered to be an indigenous plant (Bellwood 1985). Maize, which is indigenous to the Americas, was introduced to eastern Indonesia in the 1500s. During the past 400–500 years, it has become not only a staple crop, but also a sacred symbol. Some farmers in eastern Indonesia consider maize, like rice, to be indigenous. It is difficult to untangle the process through which maize became ''indigenous'' and sacred because the history of the diffusion and adoption of maize cultivars is mostly unwritten for Sumba. I approach this interesting topic by asking, ''Why is maize a sacred plant?''

A component of ethnic politics on Sumba is the denial of cultural history. People from Waingapu, Waikabubak, Weimangura, and other districts on Sumba

talk disparagingly about the people who live in Kodi, saying that they are insular and mired in tradition. The experiences I gained in the course of studying agrarian ecology in Kodi (lat. 9°36′ S, long. 119°01′ E) from June 1997 to May 1998 caused me to distrust the allegation that history bypassed this supposedly dark corner of the island. Material evidence to support my opinion that Kodi people are open to novel ideas and eager for new technologies is present in their gardens, fields, and orchards as well as in the curiosity they express. Experiments with new techniques abound and plants from all around the world are being grown. Table 1 lists some common garden plants[1] in Kodi, their place of origin, and the approximate time of their arrival in Indonesia. This table shows that Kodi farmers have integrated crops from all over the world into their gardening practices. Agricultural innovations have been accompanied by changes in cosmology as evident by the fact that maize is now a sacred plant.

Why would other Sumbanese represent Kodi people as backward? Is it because they are not very familiar with Kodi? Or is this prejudice part of a broader pattern? Numerous anthropologists throughout Indonesia have witnessed conversations in which discussants juxtapose concepts of modern and traditional, where the former is more highly valued and the latter is belittled (e.g., Tsing 2003). Ethnographers on Sumba have seen the national dialogue articulated in a variety of forms (Forth 1981; Hoskins 1993; Kuipers 1990). In his analysis of the construction of local identity in Anakalang, Keane (1997) notes that some Sumbanese define others as traditional in order to portray themselves as modern and thereby boost their prestige. In the context of religious change, Anakalangese use the concept of 'traditional' to define their place in history (Keane 1995). The mosaic landscape of Kodi, where traditional and modern or 'local' and 'foreign' are brought together, reflects broader historical processes that define ethnic identity.

Horticultural, linguistic, and archaeological evidence helps us understand why maize has become a character in origin myths and an offering in rituals. In the myths and rituals that are transcribed below maize appears as a sacred item. The importance of maize cultivation for household subsistence is demonstrated in descriptions of horticultural practices in Kodi in relation to local environmental conditions. Linguistic data illustrate how maize is classified within the plant taxonomy of an indigenous language. First, however, I present some archaeological information to locate the place of maize within the history of grain production in eastern Indonesia.

SOME ARCHAEOLOGICAL INFORMATION ABOUT CROPS IN EASTERN INDONESIA

Archaeological excavations at a cave site on Timor uncovered remains of mammals, reptiles, fish, and plants dating between 14,000 and 5000 BCE. Plant remains include areca nut (*Areca* sp.), bamboo (*Bambusa* sp.), betel vine (*Piper* sp.), candlenut (*Aleurites* sp.), hackberry (*Celtis* sp.), and Polynesian chestnut (*Inocarpus* sp.) (Glover 1977). Evidence of bottlegourd (*Lagenaria* sp.), coconut (*Cocos* sp.), mangosteen (*Garcina* sp.), and soursop (*Annona* sp.) appears after 3000 BCE. In addition to remains of crops that reproduce vegetatively, there is evidence of the early use of native seed crops in regions with long dry seasons. For example,

TABLE 1.—The origins of a selection of crops in Kodi.

Kodi plant name	Latin plant name	Origin of plant*	Additional notes
huli	*Colocasia esculenta* L.	Asia	—
huli dawa	*Xanthosoma* spp. L.	Tropical Americas	—
iliyoho	*Saccharum officinarum* L.	New Guinea	Known since 6000 BCE; spread through Malay archipelago from 1000 BCE
jambu	*Psidium guajava* L.	Tropical Americas	Introduced to Moluccas circa 1515 by the Portuguese
kabota	*Amorphophallus* spp. Roxb.	Old World	*A. konjac* has been cultivated for 2000 years
kaha	*Tamarindus indica* L.	Africa and West India	Present in Southeast Asia prehistorically
kalogho	*Musa* spp. L.	Southeast Asia	—
kalogho dawa	*Carica pubescens* L.	New World	Introduced to Indonesia via the Philippines by Spanish explorers
kamba	*Gossypium* spp. L.	Old and New World	Spaniards introduced upland cotton from Mexico about 1700; hybrid varieties introduced more recently
kamengheho	*Coix lacryma-jobi* L. var. *mayuen* (Rom. Caill.) Stapf	Mainland Southeast Asia and China	In East Timor by 3000 BCE
kamengheho udi	*Coix lacryma-jobi* L. var. *agrestis*	Maybe eastern Indonesia	—
kanobo	*Indigofera* spp. A. Rich	*I. arrecta* native to East and South Africa; *I. hirsuta, I. tinctoria*, and *I. spicata* may be native to Asia; *I. suffructosa* native to South America	
kapadi	*Canna edulis* Ker-Gwal.	West Indies and South America	Naturalized in Asia
kembe tana	*Arachis hypogaea* L.	Southern Bolivia and northwest Argentina	Spaniards introduced to the western Pacific and it spread to China, Indonesia, and Madagascar; the Dutch probably also took it from Brazil to Indonesia by the mid-17th century
ketimun	*Cucumis sativus* L.	Africa	Spread through India; recorded in Egypt in 1900 BCE; present in China in 6th century CE

TABLE 1.—Continued.

Kodi plant name	Latin plant name	Origin of plant*	Additional notes
krabu	*Lagenaria* sp.	Asia	—
krabu dawa	*Sechium edule* Jacq. and *Cucurbita* sp.	Americas; introduced to Java circa 1880	—
langa	*Sesamum orientale* L.	Africa	Present in Egypt in 1300 BCE; present in China in 1st century CE; unknown dates of diffusion to Southeast Asia
lentoro	*Leucaena* spp. Lam.	Not available	In 1930s Dutch planted *L. glauca* to combat spread of weedy *L. camara* in Nusa Tenggara
malimbi	*Averrhoa carambola* L. and *A. bilimbi* L.	Maybe eastern Indonesia	
malimbi dawa	*Anacardium occidentale* L.	Northeastern Brazil	Portuguese introduced it to India and East Africa and it spread to Sri Lanka, Malaysia, and Indonesia; Spaniards took it to the Philippines in the 17th century CE
mbaku	*Nicotiana tabacum* L.	South America	Introduced to Manggarai, Flores in 1700s or 1800s
ngalir	*Amaranthus tricolor* L.	Southeast Asia	—
nganda	*Capsicum* sp. L.	Central America	In another Sumbanese dialect chili pepper is known as 'tobacco from Savu' (***mbaku hau***); Verheijen (1984) concludes that tobacco was present on Sumba before chili
niyo	*Cocos nucifera* L.	Southeast Asia and Melanesia	—
ngagha or ***pari***	*Oryza* spp. L.	China	On Sulawesi by 6000 BP; wet-rice farming introduced to Sumba by Japanese in WWII
panda piyo	*Pandanus* spp.	Southeast Asia/Melanesia	—
panda dawa	*Ananas comosus* L.	South America	—
poyo	*Mangifera indica* L.	India	—
rapu	Specimen not collected	Specimen not collected	—
rapu dawa	*Ipomoea batatas* L.	Tropical Americas	Spread to Polynesia and New Zealand in Pre-Columbian times

TABLE 1.—Continued.

Kodi plant name	Latin plant name	Origin of plant*	Additional notes
ro meke	*Mimosa invisa* L.	Unknown	Introduced to Manggarei, Flores, around 1930 for soil conservation and green manure
rongo	*Bombax ceiba* L.	Southeast Asia	—
rongo dawa	*Ceiba pentandra* L.	Tropical Americas	Wild species spread to Africa, then Asia
ro wula ngoro wodo	*Orthosiphon aristatus* Benth.	India	Spread to Malaysia and Australia
toro mangalawa	*Lycopersicon lycopersicum* Mill.	South America	—
toro piyo or ***toro bokolo***	*Solanum melongena* L.	Southeast Asia	Introduced to Flores within the past half-century
wotoro	*Zea mays* L.	Mexico and Central America	Portuguese introduced it to Southeast Asia in 1500s
wotoro piyo	*Sorghum bicolor* L.	Northeastern Africa	Transported by traders and seafarers to China, Burma, and rest of Southeast Asia

* Information on crop origins is from the following references: Flach and Rumawas 1996; Grubben and Soetjipto 1996; Purseglove 1968, 1972; Vavilov 1951; Verheijen 1984; Westphal and Jansen 1989; Wilkes 1989; Yen 1969.

excavations on Timor unearthed the remains of Job's tears (*Coix lacryma-jobi* L.) dating between 14,000 and 5000 BCE. On Sulawesi, rice (*Oryza sativa* L.) remains were found in sites dating back to at least 6000 BP (Glover 1977). Millet (*Setaria* sp.) appears after 3000 BCE. Stone flakes from Sumba dated at 4500 BCE have silica remains on the edges suggesting that early inhabitants were harvesting grass seeds. Maize and peanuts (*Arachis hypogaea* L.) appear in the top horizon of the Timorese sites representing the colonial era beginning in the early to middle 1500s.

Even when the linguistic, historical, and ethnohistorical evidence are combined, uncertainty remains about the specific dates when maize was introduced to Sumba. Regardless of the competing hypotheses, it appears that maize was cultivated throughout eastern Indonesia by the late seventeenth century (Verheijen 1984). Thus, people in eastern Indonesia have been consuming Job's tears for 12,500–3500 years longer than maize, rice for about 4500 years longer than maize, and foxtail millet (*Setaria italica* L.) for about 1500 years longer than maize. In Kodi, foxtail millet and Job's tears still play a minor role in contemporary ritual performances, but they are insignificant compared to the more celebrated crops such as rice and maize. Over the past 500 years, maize has surpassed these ancient grains to become the most important crop for household subsistence. Although maize is an introduced crop, it has acquired the status of 'native' along with a role in Kodi myths and rituals.

Have maize rituals and symbols been created *in situ* or have they also been borrowed from other cultures? To answer this question, it would be necessary to determine exactly how maize was introduced to Sumbanese communities. This is difficult because of the complexity of available data. We can assume that the introduction of maize differed from the introduction of rice. In particular, the earliest Austronesian agriculturalists who migrated to Sumba probably introduced rice, along with a set of symbols and rituals. In the case of maize, it seems likely that the names, symbols, ritual uses, and variations on cultivation techniques were invented after its introduction to eastern Indonesia.

MAIZE IN MYTHS AND RITUALS

Analyses of the rituals and myths of contemporary Indonesian farmers have been used to gain insight into historical processes. For example, Dove (1999) endows crops with their own history by projecting back through time his readings of the role of archaic plants in the contemporary myths and rituals of swidden farmers on Borneo. Fox (1991) uses evidence from contemporary ritual practices on several islands in eastern Indonesia to suggest that millets and Job's tears predate other grains. I use methods similar to Dove's and Fox's to find out more about the history of agriculture in Kodi.

Maize in Origin Myths.—The myth of Biri Koni describes the transition from hunting-gathering to horticulture. In the myth, introduced cereals—maize, sorghum (*Sorghum bicolor* L.), and cassava (*Manihot esculenta* Crantz)—are companions of archaic grains (Job's tears and rice) that both come from the body of the little girl Biri Koni. The story represents maize and several other introduced plants as in-

digenous to Kodi. The following version of the Biri Koni myth highlights some of the common threads in the many variations of the story that exist:

> Lord Myabok and his brother Lendo were the first immigrants to Sumba. Myabok and Lendo arrived at Cape Sasar via the stone bridge that connects Sumba to other islands. When the two brothers parted ways, Myabok went to West Sumba and Lendo went to East Sumba. While Lendo never married, Myabok married Lady Kengor and settled in the place that is now known as Kengor, which some people claim is the center of Kodi. The couple had one child, Biri Koni. Myabok decided that he did not want to continue eating wild foods, so he made a garden to cultivate plants.
>
> Myabok devised a plan for getting seeds since he did not have any of his own. His plan was to sacrifice his daughter Biri Koni and bury parts of her body around the garden. Biri Koni's body became all of the crops that grow in Kodi nowadays. Her big white eyes became Job's tears. Her teeth became maize. Red sorghum sprouted from her blood. Her lower legs became cassava. Her hair became leafy greens. Rice grew from the mother's milk that was inside the little girl's stomach.

The Biri Koni myth identifies the crops that are native to Kodi. The crops that are listed in the myth emerged from the body of an indigenous child. The myth expresses and perpetuates the belief that Kodi farmers have been planting maize and cassava for as long as they have planted rice. Maize gains spiritual significance because it has a long local history.

An oral history about the founding of the village of Tossi, one of the major ceremonial sites on the coast of Kodi, also expresses the view that maize is an indigenous crop. In this story, maize is such an ancient grain that it was grown even before people knew how to use fire. In the story of Tossi's creation, a prestigious man from the lowlands engages in ***mandara wotoro***[2] 'horseback trading of maize' with his uplands brother. Later, his uplands brother travels to the lowland ceremonial village of Mete to offer maize and rice in exchange for magic baskets and cooking pots that have the power to transform a single seed into a full basket of grain. Later, the uplands brother and his family go to a rice festival in an ancestral village on the coast. This story describes two ancient traditions that continue nowadays. One, every year in coordination with the rice harvest, patrilineal kin groups gather in their ancestral coastal villages for ***pasola***, the 'seaworm festival', to celebrate with elaborate rituals and feasts. Two, upland farmers and their lowland relatives engage in a form of reciprocal exchange called ***mandara*** throughout the year and especially during the hungry season that precedes the rice harvest. The story of Tossi emphasizes the importance of the reciprocal exchanges that are so vital to social structure and political economy in Kodi.

The following version of the story of Tossi was narrated by a man from the Kodi uplands:

> ''A long time ago people made a garden and planted rice and maize. These crops grew very well. People gave them the names ***wotoro ndore*** ['red maize'] and ***pari lolo*** ['vine rice']. As soon as the maize matured,

> the farmer's older brother, who was a white man, came for a visit. He ate half of the maize together with his younger brother, the farmer. At that time Kodi people had not learned how to use fire to cook so they ate the maize raw. The rice soon became ripe. The garden yielded more grain than the sparse population of Kodi could consume. Nevertheless, the people were not satiated by the season's harvest. So the maize and rice farmers traveled to their ancestral home of Mete and asked their white, older brother for a large ***sokal*** basket for rice storage. The people of Mete gave their brothers a ***sokal*** plus a smaller ***bokot*** harvest basket and the uplanders returned to their garden hamlet. After a while, the younger brothers went back to Mete and asked for another large basket and another smaller harvest basket. The Mete brothers obliged.
>
> ''All of the people in this story—the brothers from Mete and the brothers from the upland gardens—belong to one ***uma*** ['house' or 'lineage/sub-clan'] with roots in the ancestral village of Tossi. Their ***uma*** is one among several sub-clans within a single ***kabisu*** ['patriclan']. The members of this traditional ***uma*** wanted to sponsor a rice ceremony to honor the ***pari lolo*** that sprouted from tree roots. They invited many people to gather at their large ***uma*** in Tossi. At the ceremony they gave the village the name of Tossi and they gave the rice the name of Biri Ndadi Pieha, Koni Wu Kaniha.''

Maize in Seed Saving Rituals.—Seed saving is a common practice in most Kodi households. Seeds are saved in both ritual and non-ritual contexts. In everyday practice, farmers save seeds of maize, rice, foxtail millet, sorghum, Job's tears, sesame (*Sesamum orientale* L.), and other garden and orchard plants. Seeds are shared between households, and among affines and allies. They are also purchased in markets and stores when a household wants to experiment with new varieties or when it does not have enough of its own saved seeds to plant a new crop. Some seeds, including many rice and maize varieties, have been provided at little or no cost by development organizations and government agencies. Ritual seed saving usually involves rice and maize and less frequently millet, sorghum, and Job's tears.

Formal ceremonies are conducted for planting rice and for harvesting rice and maize. The ceremonies that mark stages in the production of rice are much more elaborate than those for maize. Job's tears, sorghum, proso millet (*Panicum* sp. L.), and foxtail millet are sometimes handled with ritual when they are harvested, but not as often. Some farmers hang millet spikes and sorghum panicles on altars along with rice panicles and ears of maize. Many of the prayers that are recited during rice harvest ceremonies, which occur later in the season than maize, mention maize and acknowledge the ***Marapu Wotor*** 'Maize Spirit'.

Ceremonies are not held when maize is planted, but minor rites of first fruit offerings known as ***padolo wotoro*** are performed on the day before the maize harvest when the first ripe ears are distributed among a sequence of altars in the garden, home, village gate, and village lawn. It is taboo to eat maize from the garden before the offerings are given. An example of a first fruits ceremony takes place on the village lawn, where a ritual elder hangs two or four ears of maize

in honor of the ancestral spirits who inhabit the Lord of the Land tree. Indian silk-cotton (*Bombax ceiba* L.) and hau (*Hibiscus tiliaceus* L.) are the species that are used as the Lord of the Land. After hanging the maize, the ritual leader chants the following verse to the altar spirits:

Ronggo papa mula	Indian silk-cotton standing tall
Watu papa ndende	Stone standing upright
Lebba watu ndende	Lebba, upright stone
Mondo ronggo rara	Mondo, yellow Indian silk-cotton
Kadeilo wula pari	Protect the rice panicles
Kadangha wula wotor	Guard the corn tassels

When the maize is hung from the altars in the home, several kernels are plucked from the ears and tossed off the front porch as an offering to Kodi ancestors. The ears that hang from one of the altars in the home contain seeds reserved for ritual purposes; they may not be planted until the next planting season. In many houses, maize ears that are not ritually significant are hung above the kitchen hearth for planting in next season's gardens. On one or more of the altars, some families place specially prepared corn cakes that consist of maize grits pressed together, wrapped in a husk, and boiled in water. Other ears stay on the altars until it is time to plant again. Some people take a few maize ears that are hung on the house altars together with the first fruits of rice, betel leaves, areca nuts, plus chickens and pigs to use as offerings at ***pasola***, an annual celebration when Kodi people travel to the ***uma*** of their patrilineages on the western coast, where they gather with kin to ceremonially honor their ancestors. During the ***pasola*** rites, they place these offerings on the megalithic gravestones of their ancestors who are buried in the ancestral villages. They also give some grains to the ***marapu***[3] priests and ritual elders to compensate them for their religious services.

The examples of the appearance of maize in contemporary myths and rituals included here demonstrate that maize has a symbolic value greater than many other foods. Without a doubt, the sacred value of rice supersedes that of maize, but the sacred value of maize supersedes that of other archaic grains and many other garden plants.

THE ENVIRONMENTAL CONTEXT FOR FARMING

Sumba is one of the driest islands in Indonesia. Annual precipitation in Waingapu, the capital of the regency of East Sumba, is 809 mm. The northeasterly Asian monsoon causes most precipitation between November and March. Dry, southwesterly monsoons blow from May through September. The wet season lasts just under six months and the dry season lasts a bit more than six months. There are significant intra-island variations in precipitation patterns. East Sumba is the driest part of the island and is mostly covered in grasslands that are used for cattle ranching. The central and western regions of Sumba have greater forest cover and more land is used for horticulture. Within the regency of West Sumba, there are significant differences in precipitation, fresh water supplies, and elevation between the coastal lowlands and the interior uplands.

On a smaller scale, there are significant differences within the district of Kodi. On the eastern boundaries of Kodi, wet deciduous and semi-evergreen tropical forests grow on limestone hills that rise to about 500 m above sea level. On the western boundaries of the district are arid coral reef terraces and thorn/scrub and dry deciduous forests near sea level. Annual precipitation rates in Kodi vary from less than 809 mm on the western edges of the coastal plains to less than 2000 mm/year on the inland borders of the district.

Variations in the seasonality and amount of precipitation produce agricultural cycles in the lowland coastal region that differ slightly from those of the uplands. The growing season on the coastal plains is shorter than in areas up to about 15–20 km from the coast, because inland areas have higher precipitation and a greater supply of fresh water. Precipitation determines planting and harvesting schedules and the wet season overlaps with the growing season. As soon as the spring rains begin, people plant maize. They plant rice a month or two later when rainfall is sufficiently reliable. The hungry/dry season begins when the monsoons are over and all of the staple crops have been eaten or traded. Forest tubers, such as yams, cassava, taro (*Colocasia* spp. L. Schott and *Xanthosoma* spp. L. Schott.), and other famine foods are critical during the hungry season because they are available when many other crops are not. Rainfall patterns are key to the timely transition between the hungry season and the full season.

Differing agricultural cycles between the uplands and lowlands have implications for social relations and the political economy. In typical years, households on the coastal plains engage in reciprocal exchange with inland households to compensate for food shortages. In very difficult years, such as 1997 when El Niño caused an extended drought, ***mandara***, the local institution of reciprocal exchange between the lowlands and uplands, saves the lives of people at risk of famine. In the 1997–1998 growing season, some upland households were harvesting early-maturing varieties of maize before many lowland households began planting. Upland households also began harvesting pumpkins, legumes, peppers, and rice before lowland households. Since the wet season begins earlier and the growing season lasts longer in the uplands, lowland households suffer from annual food shortages for a longer period of time than upland households.

The relationship between micro-environmental differences and farming strategies is particularly apparent in the aggregate of cultivars in gardens, fields, and orchards. Throughout the district, Kodi farmers grow a common set of plants, but cultivar diversity varies spatially. The distance from the hamlet of Tossi on the far western coast to Karendi on the far eastern border of Kodi is approximately 15–20 km. Diversity is higher in the inland hamlets among cultivars that demand more water for growth. The number of banana cultivars (*Musa* spp. L.) per hamlet ranges from nineteen in Tei Kowewar in Karendi to five in lowland Kalanga Lulu (Figure 1). Diversity is higher among heat tolerant and drought resistant cultivars in lowland hamlets. For instance, farmers in Tei Kowewar grow two foxtail millet cultivars as compared to farmers in Mogha Kawongo and Kalanga Lulu who grow eight and seven, respectively (Figure 2).

Maize tolerates a wide range of temperatures, precipitation rates, and soil conditions. Maize and dryland rice are roughly equivalent in terms of land area in production and yield (Table 2). Fewer hectares are used to grow paddy rice

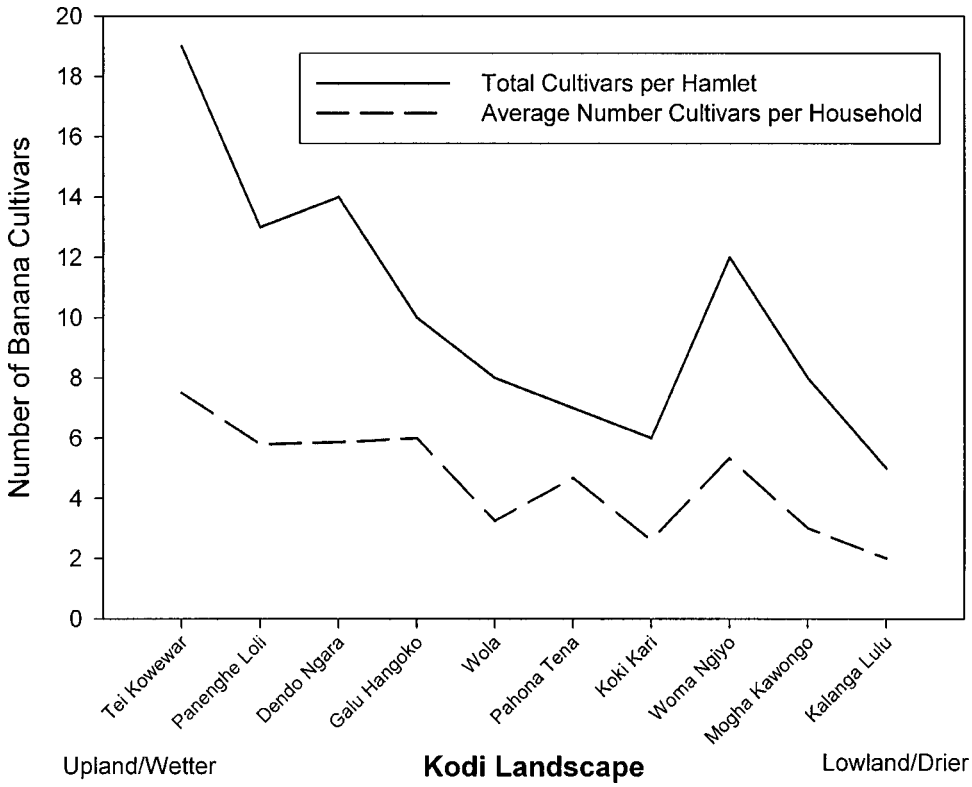

FIGURE 1.—Banana (*Musa* spp. L.) cultivar diversity per hamlet in Kodi. Graph prepared by Patricia Outcalt (USDA Forest Service, Southern Research Station).

and the amount harvested is lower. Kodi farmers produce more maize and upland rice than Job's tears, foxtail millet, and sorghum.

Maize contributes significantly to household food supplies and increases overall food security. The grain can be dried and stored on or off the cob for delayed consumption. Maize is an economical crop to grow because it produces its own seed. Hybrid varieties that do not produce viable seed are available but are not widely grown because of the high investment price. Two criteria that Kodi farmers use when selecting seeds for planting are that the ears of maize are ''big'' and the kernels on the ears are ''big.'' This may be explained by Alcorn's (1984) proposition that Huastec Mayan farmers select maize seeds on the basis of the size of ears and kernels because they produce cobs that provide more food per plant.

Another reason maize is so important is that it is a valuable trade item. It is a prominent feature of ***mandara***. In addition, many Kodi farmers sell or barter maize in marketplaces. During the 1997 drought when food supplies were very low, a large portion of the rice harvest was sold in the market to earn cash for purchasing less expensive foods such as cornmeal and other household necessities such as kerosene, rather than consumed within the household. Whereas people tended to sell rice during the food shortage, they tended to consume maize within

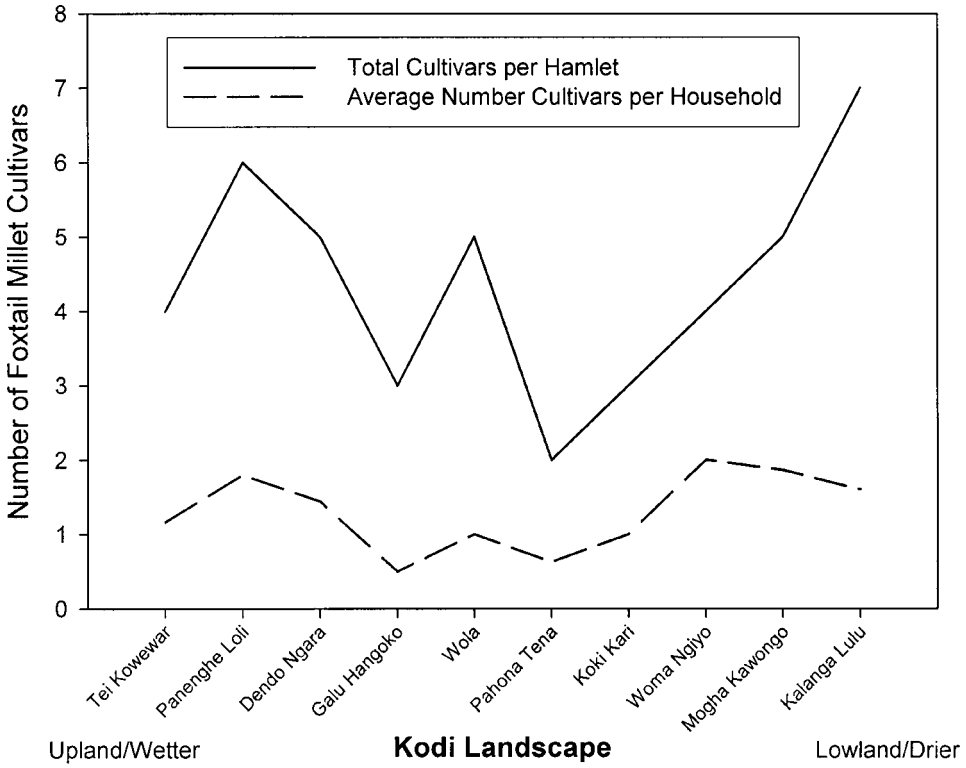

FIGURE 2.—Foxtail millet (*Setaria italica* L.) cultivar diversity per hamlet in Kodi. Graph prepared by Patricia Outcalt (USDA Forest Service, Southern Research Station).

the household or give it to needy lowlander households rather than sell it in the market.

LINGUISTIC CLUES TO THE HISTORY OF CROPS IN EASTERN INDONESIA

In arid and semiarid areas like Sumba, native crops are more likely to be retained (Nabhan 1989) and folk varieties conserved (Bellon 1991; Brush 1996; Dennis 1987; Richards 1986; Salick et al. 1997). In the course of agrarian change, exotic crops have not completely replaced native crops, but they have caused shifts in the roles of native crops. Often, a native crop that is similar in function to an

TABLE 2.—Number of hectares in production and harvest rates of maize and rice in Kodi (source: BPS 1996).

	Maize		Dryland rice		Paddy rice	
Year	Area in production (ha)	Yield (tons)	Area in production (ha)	Yield (tons)	Area in production (ha)	Yield (tons)
1994	4,955	13,577	5,677	11,788	166	537
1995	5,739	11,512	5,157	10,716	99	304

introduced plant is retained while its role in agricultural and cultural systems becomes more specialized (Dove 1999). In Kodi, for instance, archaic grains such as foxtail millet and Job's tears continue to be cultivated mainly for household subsistence, but are rarely used in contemporary rituals. This may be because the archaic grains became less valuable as the importance of maize increased. Dove (1999) refers to Conklin's (1957) suggestion that vernacular plant names can reveal information about the pre-European dispersal of crops in Southeast Asia. In this section, I describe some aspects of Kodi plant taxonomy, focusing on the vernacular names for maize and several other cultivated grains.

The Kodi language is one of about fifty Sumbanese dialects. Vernacular names for numerous cultivars reflect Proto-Austronesian forms. The names for two archaic grains—Job's tears and foxtail millet—are relevant to this discussion. ***Kamengheho***, the Kodi term for Job's tears, reflects the Austronesian protoform ****keqo***. ***Kamengheho*** is the term for Job's tears in other contemporary eastern Indonesia languages, including languages in the Ngadha-Lio group and on Savu (Verheijen 1984). The Austronesian protoform for millet is ****baCad*** and the Kodi term for foxtail millet is ***mballa***. These taxonomic features link contemporary Kodi farmers to the first Austronesian speakers who colonized eastern Indonesia after 3000 BP.

Kodi people use the term ***kodi*** to identify their society, their language, and their territory as well as to tag items that are 'local' or 'native'. Its opposite is the term ***dawa***, referring to 'foreign' or 'exotic' things and ideas. ***Dawa***, the geographical and cultural 'other', refers to anything beyond the borders of the district of Kodi or Sumba. In Kodi crop taxonomy the terms ***kodi*** 'native' and ***dawa*** 'foreign' are commonly used to distinguish among genus, species, and cultivars. ***Kodi*** and ***dawa*** usually mark pairs of crops where one plant is believed to be native and the other foreign (Table 3). Members of a pair usually resemble one another in terms of morphology, taste, or function.

It is interesting to compare what scientific biogeography says about a cultivar's origins to what Kodi people say about plant origins as indicated by the use of ***kodi*** and ***dawa***. Plant biogeography can also be used to determine where a cultivar labeled ***dawa*** 'foreign' actually originated. In some cases, biogeography agrees with Kodi terminology; for example, ***malimbi dawa*** (*Anacardium occidentale* L.) originated in northeastern Brazil and its counterpart ***malimbi kodi*** (*Averrhoa carambola* L. and *A. bilimbi* L.) may be native to eastern Indonesia. Other examples are ***rongo*** (*Bombax ceiba* L.), which originated in Southeast Asia, and ***rongo dawa*** (*Ceiba pentandra* L.), which originated in the American tropics. In other cases, scientific biogeography disagrees with Kodi taxonomy. Such is the case with ***nganda kodi*** (*Capsicum* sp.) and ***wotor kodi*** (*Zea mays* L.), which both originated in the Americas. In many cases, maize is referred to simply as ***wotor***. But when paired with ***wotor piyo*** (*Sorghum bicolor* L.) it is called ***wotor kodi*** 'native ***wotor***'. ***Piyo*** can be translated as 'cultivated.' The counterpart to ***piyo*** is ***waio***, which describes wild or naturalized cultivars. ***Ro utta piyo***, for example, is betel vine (*Piper betle* L.) that has been planted from seed or transplanted from cuttings taken from ***ro utta waio*** 'wild betel vine' that grows in forests.

Wotor may be an ancient eastern Indonesia term referring to cereals (Fox 1991). The term is used nowadays to classify a set of plants that includes the more ancient crops of Job's tears and foxtail millet as well as the introduced crops of

TABLE 3.—Native:exotic crop pairs.

Native crop		Exotic crop	
Kodi name	Latin name	Kodi name	Latin name
mbala pala kodi	*Setaria italica* cv. L.	***mbala pala wejewa***	**Setaria italica* cv. L.
nganda kodi	*Capsicum* sp. L.	***nganda bima***	*Capsicum* sp. L.
huli	*Colocasia* sp. L. Schott	***huli dawa***	*Xanthosoma* sp. L. Schott
kalogho	*Musa* sp. L.	***kalogo dawa***	*Carica pubescens* L.
kamba kodi	*Gossypium* sp. L.	***kamba dawa***	*Gossypium acuminata* L.
karara uta	*Artocarpus* sp.	***karara piyo***	*Artocarpus altilis* Park
krabu kodi	*Lagenaria* sp.	***krabu dawa***	*Sechium edule* Jacq. and *Cucurbita* sp.
lugha	*Dioscorea alata* L.	***lugha dawa***	*Manihot esculenta* Crantz
mbaku kodi	*Nicotiana* sp.	***mbaku dawa***	*Nicotiana* sp.
munde wu maroto	*Citrus aurantium* L.	***munde dawa***	*Citrus grandis* L.
munde wu paruto	*Citrus hystrix* DC.		
ngalir kodi	*Amaranthus* sp.	***ngalir dawa***	*Amaranthus* sp.
panda piyo	*Pandanus* spp.	***panda dawa***	*Ananas comosus*
rongo kodi	*Bombax ceiba* L.	***rongo dawa***	*Ceiba pentandra* (L.) Gaert. (syn. *Bombax pentandrum* L.)
wotoro kodi (numerous cultivars)	*Zea mays* L.	***wotoro dawa***	*Zea mays* L.
wotoro piyo kodi	*Sorghum* sp. L.	***wotoro piyo dawa***	*Sorghum* sp. L.

* Crops with differing vernacular names that are identified as the same species represent cultivars of that species.

maize, sorghum, and sesame (Figure 3). The maize taxa includes cultivars known as 'native maize' ***wotor kodi*** and those known as 'foreign maize' (***wotor dawa***). Sub-varieties of 'native maize' include 'yellow maize' (***wotor rara***) and 'white maize' (***wotor kaka***). Subvarieties of 'foreign maize' include 'hybrid maize' (***wotor sebrida***), 'Arabian maize' (***wotoro karabia***), and 'long-haired maize' (***wotoro kahawa longe***).

In the district of Rindi in East Sumba, maize is referred to as ***wataru*** 'foreign ***wataru***' and sorghum is referred to as ***wataru hamu*** 'indigenous ***wataru***'. Forth (1981) uses a technique similar to the one suggested by Conklin (1957) to conclude

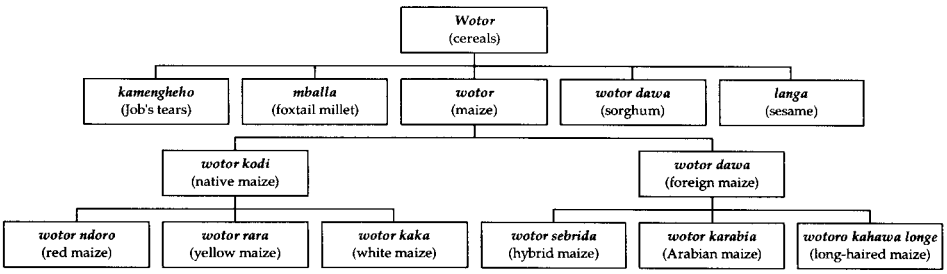

FIGURE 3.—A diagram of ***wotoro*** taxa. Figure by Cynthia Fowler.

that sorghum was introduced before maize in Rindi. Following Forth's methodology, Fox (1991) proposes that sorghum preceded maize on the island of Roti. The Roti term ***pela*** refers to Job's tears and reflects the Austronesian protoform; sorghum is ***pela hik*** 'true Job's tears' and maize is ***pela sina*** 'black-flecked Job's tears' (Fox 1991). This naming pattern suggests a timeline for crop introduction: Job's tears is the oldest of the three; sorghum is the second oldest; maize is the most recently introduced cultivar. In contrast to the situation in Rindi and on Roti, Verheijen (1984) contends that maize was introduced before sorghum on the island of Flores.

If these methods and logic linking crop taxonomy to the chronology of cultivar diffusion are reliable, then maize was introduced prior to sorghum in Kodi. A further conclusion would be that sorghum was introduced prior to maize on the eastern end of Sumba and maize was introduced prior to sorghum on the western end of the island. The vernacular names of these crops imply that when maize and sorghum first became available during the early colonial era, Kodi farmers were more closely related to people in some regions than in others. Kodi may have had better trade relations with western Flores or Sulawesi, where the vernacular names for maize and sorghum reveal a similar chronology, than with Roti or Rindi, where the taxonomy and chronology is different. Flores and Sulawesi may have had more political and economic influence on Kodi at that time than the eastern Sumbanese domains. An alternative explanation is that the generic term for cereals is also the term for maize rather than any of the other archaic or introduced plants, because it is more important for food and in rituals, not because of its historical precedence. Sumbanese may have independently classified maize and sorghum as types of ***wotor*** or they may have imitated the classificatory scheme of other eastern Indonesians. It is not clear who introduced maize or sorghum to Sumba. One possibility is that it was introduced through trade with Makassarese from Sulawesi (Needham 1983).

This overview of vernacular plant names in Kodi reveals that the adoption of new cultivars was not uniform throughout eastern Indonesia. Further, it reveals that Kodi has been linguistically and agriculturally influenced by its trading partners.

The trading partners who were most influential may not have been located on Sumba, but may have been from other islands. The diversity of Sumbanese dialects and the historical arrangement of scattered, independent political units across the island support the notion that there was some degree of intra-island political and economic competition. It would be mistaken to assume that analyses of plant names will yield specific dates and pathways of diffusion, but they may yield some more general information about the chronology of cultivar diffusion and social relations. Combined with analyses of the role of archaic grains in contemporary culture, analyses of vernacular plant names can assist with attempts to reconstruct a history of agriculture.

MAIZE IN THE CONTEXT OF KODI'S POLITICAL ECONOMY, SOCIAL STRUCTURE, AND RELIGION

The information presented in this article can help answer the question ''Why has maize become sacred in Kodi?'' Kodi people view maize not only as sacred,

but also as native. The case of maize represents the phenomenon of indigenization, which is common in Southeast Asia and Oceania (Hau'ofa 2000). Indigenization is the transformation of foreign materials and concepts into native ones. The indigenization of maize in Kodi is apparent by its presence in ritual performances, its placement in the folk taxonomy, and its function in horticulture. Combined with analyses of the role of archaic grains in contemporary culture, analyses of vernacular plant names can assist with attempts to reconstruct a history of agriculture.

In the past 400–500 years, the increasing importance of maize as a food crop has been accompanied by the development of maize's cosmological significance. Nowadays, maize, like the more ancient grains, has multiple roles and its value is multifaceted. Job's tears, foxtail millet, and rice may be the prototype cereals that provided a paradigm for absorbing, or indigenizing, maize. Maize is similar to the ancient grains in a number of practical ways: Job's tears, foxtail millet, rice, maize (and sorghum) are in the Poaceae family, having comparable plant structures and growing habits; all are relatively drought and heat tolerant; the typical planting sequence involves clearing swidden and using a dibble stick to bury seeds; the typical post-harvest sequence involves threshing, drying, storing, winnowing, pounding, and boiling; all are important staple foods; all are valuable trade items.

Maize is so adaptable to local environmental conditions that farmers are able to produce a small surplus by intensifying the cropping cycle. Two crops of maize can be produced each year—in contrast to rice, which only produces one crop per year—by increasing labor input and reducing fallow length. Surplus maize can be used to pay tribute to ***marapu*** elders during the seaworm festival and on other ritual occasions. It may be advantageous for traditional leaders to sanctify maize and to perpetuate its sacred value when they tell myths and orchestrate rituals. ***Marapu*** elders encourage intensification by demanding tribute to reinforce their authority. Maize has been or is being absorbed into religious institutions because it supports the political economy, the social structure, and the ideological system. Thus, the culture history of Kodi resembles those of many other societies in eastern Indonesia and throughout the Austronesian-speaking world where agricultural intensification is accompanied by the development of ideological structures reliant on surplus production (Kirch 2000). Agrarian change over the long term becomes much clearer when data from contemporary society are contextualized in broader social structures.

To sort out the agrarian history of Kodi is to reconstruct a history of contact and exchange between Kodi and the rest of the world. Kodi has a long history of trade with neighboring islanders and voyagers from more distant locations. Gardens, fields, and orchards provide evidence that Kodi farmers have been experimenting with plants for generations. The ways Kodi farmers manage and code natural resources represent their perceptions of their identity which is bound up with local 'tradition,' history, and contemporary events. I interpret their representations to say that culture and agriculture in Kodi are overlapping, hybrid systems constructed during several millennia of movement and exchange.

Over the past several hundred years, a hybrid or syncretic horticultural system has developed that includes both native and introduced materials, practices,

and symbols. A key finding of this is that the indigenization of plants has multiple causes including environmental conditions, economic practices, social relations and ideology. Indigenization is a form of agrarian change that highlights some links between agricultural and social history in Kodi.

NOTES

[1] The plants mentioned in this article were identified by the Bogor Herbarium in Bogor on the Indonesian island of Java. All voucher specimens were retained by the Herbarium.

[2] Vernacular terms follow orthographic conventions established by the linguists Onvlee and Kapita and continued by Janet Hoskins (1993).

[3] ***Marapu*** is the name of the indigenous religion in Kodi. ***Marapu*** is an ancestral religion. A majority of the Kodi population are still followers of ***Marapu***.

ACKNOWLEDGMENTS

This article is presented in honor of the people of Indonesia: to those who were victims of the Asian Tsunami, to those who survived, and to those who are helping in the recovery of people's lives and resources. This article is also offered to the people of Hilo, Hawaii whose landscapes are periodically transformed by tsunamis. On the first working day of every month, Hawaii's tsunami sirens are tested, reminding everyone that at any moment, they may need to flee inland and upland to escape a massive wave. Hopefully, an appropriate and effective warning system will be developed to keep Southeast and South Asians safe from future tsunamis.

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