6. The modern collection of plant specimens

As outlined in the previous chapter, the reference collection of modern plants was built based both on specimens gathered in the field and herbarium specimens. The collection detailed below is organised by plant family and species and is presented before the identifications obtained for each of the analysed assemblages. This allows for an easier comparison between modern materials and the archaeological specimens (images of the reference specimens, with light microscope and SEM photographs, are given in appendix 21). A list of all specimens used as reference material and their provenience (field, herbarium or other) is presented in table 7.1. Short descriptions of their native range and distribution, evidence for their presence in the archaeological record, and their uses as edible plants follows.

Family	Taxon name	Provenience
Anacardiaceae	*Buchanania arborescens* (Blume) Blume	Herbarium
Anacardiaceae	*Dracontomelon dao* (Blanco) Merr. & Rolfe	A. Fairbairn
Anacardiaceae	*Mangifera indica* L.	Herbarium
Annonaceae	*Annona* sp. Juss.	Herbarium
Araceae	*Colocasia esculenta* var. *antiquorum* Schott & Endl.	V. Paz
Araceae	*Colocasia esculenta* (L.) Schott	E. Dotte
Arecaceae	*Areca catechu* L.	East Timor
Arecaceae	*Arenga pinnata* (Wurmb.) Merr.	East Timor
Arecaceae	*Borassus flabellifer* L.	A. Fairbairn
Arecaceae	*Cocos nucifera* L.	ANH
Arecaceae	*Corypha utan* Lam.	Herbarium
Arecaceae	*Metroxylon sagu* Rottb.	Herbarium
Bombacaceae	*Ceiba pentandra* (Linn) Gaertn.	Herbarium
Burseraceae	*Canarium indicum* L.	ANH
Burseraceae	*Garuga floribunda* Decne	Herbarium
Caesalpiniaceae	*Cassia fistula* L.	Herbarium
Caesalpiniaceae	*Intsia bijuga* (Colebr.) Kuntze	Herbarium
Clusiaceae	*Calophyllum inophyllum* L.	Herbarium
Combretaceae	*Terminalia catappa* L.	A. Fairbairn
Combretaceae	*Terminalia microcarpa* Decne.	Herbarium
Convolvulaceae	*Ipomoea aquatica* Forssk.	Herbarium
Cucurbitaceae	*Cucumis sativus* L.	Internet
Cucurbitaceae	*Lagenaria siceraria* (Molina) Standl.	Herbarium
Dioscoreaceae	*Dioscorea alata* L.	E. Dotte
Dioscoreaceae	*Dioscorea esculenta* (Lour.) Burkill	ANH
Dioscoreaceae	*Dioscorea hispida* Dennst.	V. Paz

Euphorbiaceae	*Aleurites moluccana* (L.) Willd.	East Timor
Fabaceae	*Cajanus cajan* (L.) Millsp.	Herbarium
Fabaceae	*Erythrina variegata* L.	Herbarium
Fabaceae	*Glycine max* (L.) Merr.	Herbarium
Fabaceae	*Inocarpus fagifer* (Parkinson) Fosberg	East Timor
Fabaceae	*Lablab purpureus* (L.)	ANH
Fabaceae	*Tamarindus indica* L.	East Timor
Fabaceae	*Vigna unguiculata* (L.) Walp. subsp. *Unguiculata*	Internet
Lecythidaceae	*Barringtonia procera* (Miers) R. Knuth	A. Fairbairn
Liliaceae	*Cordyline fruticosa* L. (Chev.)	Internet
Malvaceae	*Hibiscus tiliaceus* L.	Herbarium
Moraceae	*Artocarpus altilis* (Parkinson) Fosberg	A. Fairbairn
Moraceae	*Ficus* spp.	Herbarium
Musaceae	*Musa* L.	ANH
Pandanaceae	*Pandanus tectorius* Parkinson	ANH
Pedaliaceae	*Sesamum indicum* L.	Local
Piperaceae	*Piper betle* L.	East Timor
Poaceae	*Coix lacryma-jobi* L.	Herbarium
Poaceae	*Eleusine coracana* (L.) Gaertn.	Herbarium
Poaceae	*Oryza sativa* L.	Herbarium
Poaceae	*Saccharum officinarum* L.	Herbarium
Poaceae	*Setaria italica* (L.) P. Beauv.	Herbarium
Poaceae	*Sorghum bicolor* (L.) Moench	Herbarium
Poaceae	*Zea mays* L.	Local
Rhamnaceae	*Ziziphus mauritiana* Lam.	East Timor
Rhyzophoraceae	*Carallia brachiata* (Lour.) Merr.	Herbarium
Rutaceae	*Citrus maxima* (Burm.) Merr.	Local
Sapindaceae	*Pometia pinnata*	A. Fairbairn
Sapindaceae	*Schleichera oleosa*	East Timor
Sterculiaceae	*Sterculia foetida* L.	Herbarium
Tiliaceae	*Grewia* L.	Herbarium
Ulmaceae	*Celtis philippensis* Blanco	Herbarium

Table 7.1 (and previous page): List of modern reference plant specimens for comparative purposes. Herbarium = Australian National Herbarium, Canberra; ANH = Department of Archaeology and Natural History, ANU; Andrew Fairbairn, Victor Paz and Emilie Dotte = species provided by these authors; Local = locally acquired specimen; Internet = image downloaded from Internet source.

Buchanania arborescens (Blume) Blume (Anacardiaceae)

Little gooseberry tree (English)

The fruits of this tree, related to mango and native to Australia and Island Southeast Asia, are used as bush food in the Monsoonal zone of the Northern Territory, Cape York and Western Australia. (Russell-Smith *et al*. 1997:182). There is, however, no record of it being used as a food species in East Timor. Metzner (1977) mentions that "*Buchania*" (probably referring to

Buchanania) *arborescens* exists in riparian forests along riverbeds, in lowland and lower hills up to 300 metres high. It was not observed in the area investigated (pers. obs. 2005).

Dracontomelon dao (Blanco) Merr. & Rolfe (Anacardiaceae)

New Guinea/Pacific walnut (English)

Dracontomelon dao is possibly native to a wide region, from Southeast Asia to Melanesia. Charred nut fragments of *D. dao* were identified by Paz at Madai 1, in Sabah (Borneo), dated from between ca. 500 BP to the present (Paz 2001:241) and from 2200 to 1500 BP (Paz 2005:113). It is also present in Near Oceania from approximately 3800 BP (Hayes 1992; Kirch 1987, 1989). Both the fruit and the seed are edible, and said to be eaten mostly by children (Walter and Sam 2002:158). In New Guinea the flowers and the leaves are cooked and eaten as vegetables, while in the Moluccas these are used as condiments. Metzner (1977) notes that this species is present in largely deciduous forests, usually located in low rainfall areas up to 300 to 400 metres above sea level. It was not observed in the area investigated (pers. obs. 2005).

Mangifera indica L. (Anacardiaceae)

Mango (English); Has (Tetun)

The genus *Mangifera* is probably native to South and Southeast Asia, where the greatest number of species exists (Bally 2006). Remains of *Mangifera* spp. have been reported by Asouti and Fuller (not yet published, in Blench in press) in the western Ghats of Peninsular India, dated to the late Neolithic. In Eastern India and Burma alone there are over 500 domesticated varieties of *M. indica* species. This species is also widely cultivated around the world today. In East Timor, both *M. indica* and its relative *M. caesia* Jack are often planted in the "to'os" house gardens in the area investigated by Metzner (1977). It is common around springs in the area investigated (pers. obs. 2005).

Annona spp. (Annonaceae Juss.)

Annona (English); Ai ata (*A.muricata*, Tetun), Ai nona (*A. reticulata*, Tetun)

Although it is uncertain where *Annona squamosa* originated, it is widely cultivated in South America, and it is thus possible that it originated there. *Annona muricata* is probably native to Central and northern South America, and *Annona reticulata* is believed to have originated in the West Indies. Both *A. muricata* L. (soursop), *A. reticulata* L. (custard apple) and *A. squamosa* L. (sugar apple) are planted in the "to'os" gardens of the area investigated by Metzner (1977).

Although most species within this genus are of tropical American origins and must have been introduced to East Timor after the 16th century, native Annonaceae also exist in New Guinea and Southeast Asia (Richardson *et al*. 2004), and it was one of these (unidentified to genus) that was used as reference material. The three species referred to by Metzner are present in the area investigated (pers. obs. 2005).

Colocasia esculenta var. *antiquorum* Schott & Endl. (Araceae)

Wild taro (English)

Colocasia esculenta var. *antiquorum* is probably native to a wide region, from Southeast Asia to the Australasian region (Purseglove 1972; Matthews 1990; Lebot 1999:623-624). It is not mentioned by Metzner (1977) and although it is not known whether it exists in East Timor, it could be within its native area of dispersion. It was not observed in the area investigated (pers. obs. 2005).

Colocasia esculenta (L.) Schott (Araceae)

Taro (English); Talas/keladi (Tetun)

The original centre of domestication of *Colocasia esculenta* is still disputed (Matthews 1990; Lebot 1999:623-624), although microfossil evidence for its presence in New Guinea during the Early Holocene prompted the suggestion for a Melanesian domestication, followed by human translocation into Island Southeast Asia and the Pacific (Denham 2003; *Denham et al*. 2003; Denham and Barton 2006; Fullagar *et al*. 2006). *C. esculenta* is one of the several tubers identified by Metzner (1977) and planted in the "to'os" house garden. It was also observed under cultivation in the area investigated (pers. obs. 2005).

Areca catechu L. (Arecaceae)

Betelnut (English); Bua (Tetun)

Possibly native to Southeast Asia, based on phytogeographical and linguistic grounds (Lichtenberk 1998), *Areca catechu* is widely distributed today, extending from East Africa to the Pacific (Staples and Bevacqua 2006). As macrobotanical evidence its presence in the archaeological record is elusive. Teeth stains resulting from *A. betel* chewing dated to ca. 2400 – 2000 BP have been reported from Vietnam (Oxenham *et al*. 2002) and from the last 1000 years in the Mariana Islands (Hocart and Fankhauser 1996). Waterlogged remains of this species from New Guinea initially dated to ca. 5500 BP have now been established as a modern intrusion (Fairbairn and Swadling 2005). The fruits of *A. catechu* are used all across

East Timor as a masticatory stimulant, chewed together with *Piper betel* (betel) and lime powder. It is widely documented by Metzner (1977) in the area of study, and it is planted in close proximity to most houses in the Osso Ua/Uaisa area (pers. obs.).

Arenga pinnata (Wurmb.) Merr. (Arecaceae)

Gamuti/sugar palm (English); Ai tua metan (Tetun)

Native to the Indo-Malaysian tropics, *Arenga pinnata* is a sugar palm known for its multiple uses (Purseglove 1972:419; Mogea *et al*. 1991). Metzner (1977) reports the presence of this species in semi-deciduous and riparian forests, as well as in gardens. In the area of study, *A. pinnata* is planted along the stream that runs 2 kilometres West of Osso Ua/Uaisa village. The trunk is used locally to produce an alcoholic beverage (*tuak*, in Tetun) and is a source of starch-rich sago, and the leaves (*gamuti*, in Tetun) are used for construction, baskets and as general wrapping material.

Borassus flabellifer L. (Arecaceae)

Lontar/Palmyra palm (English); Akadirun (Tetun)

Borassus flabellifer is another sugar palm native to subtropical areas of Asia known for its multiple uses (Purseglove 1972:421; Mogea *et al*. 1991). Metzner (1977) reports the presence of this species in palm savannahs and woodlands. In the area of study, *B. flabellifer* is planted in the "to'os" garden around houses. The trunk is used locally to produce *tuak*, and the leaves are used for construction, baskets and as general wrapping material. Local people identify two types of *B. flabellifer*: "akadirun mane" (the male tree, which does not yield fruits) and "akadirun fetu" (the female, fruit-bearing tree). Although known to be eaten in the Indonesian island of Madura (Fox 1977:226) and in India (Fox 1977:231), these fruits are not known to be eaten locally.

Cocos nucifera L. (Arecaceae)

Coconut palm (English); Nu (Tetun)

Of probable Southeast Asian/Melanesian origin (Harries 1978, 1990), *Cocos nucifera* is today a palm with a pan-tropical distribution (Chan and Elevitch 2006). It is probably the most important of all palms worldwide, and it has multiple uses. This species has been reported from mid-Holocene contexts in New Guinea (e.g. Fairbairn and Swadling 2005) and the Pacific (e.g. Hayes 1992; Kirch 1987; Spriggs 1984 for a review of finds in the Pacific, although there have been further finds in the last 20 years). It was documented in East Timor as early as the

17th century (Cinatti 1964:13). In the area of study, Metzner (1977) reported the presence of *C. nucifera* planted in groves close to villages. Its fruits are used as a main food staple there (pers. obs. 2005).

Corypha utan Lam. (Arecaceae)

Gebang palm (English); Ai tali/Acar (Tetun)

Corypha utan has a wide distribution in open and drier environments across Asia (FAO 1998), where it is probably native. In East Timor, it is part of the semi-deciduous and forest-savannah environments, growing on the northern coast of the area investigated by Metzner (1977) from 400 to 1000 metres above sea level. It is sparse in the landscape, and it is usually spared by farmers when clearing new land for cultivation. *C. utan* is planted along the stream that runs 2 kilometres West of Osso Ua/Uaisa village, and is probably the most important sago-producing palm in the study area (pers. obs. 2005). Its trunk is also used to produce *tuak*, and the leaves are used for construction, baskets and as general wrapping material.

Metroxylon sagu Rottb. (Arecaceae)

Sago palm (English); Rombia (Tetun)

Metroxylon sagu is probably native to the lowlands of the New Guinea region, although today it is distributed across Island Southeast Asia and much of the Pacific (Flach 1997; Lebot 1999; McClatchey *et al*. 2006; Kennedy and Clarke 2004). Although evidence of *M. sagu* in the archaeological and palaeobotanical records is elusive (e.g. Gillieson *et al*. 1985, in layers dating back to the mid- to late-Holocene), recent microfossil research on starch residues is opening up new possibilities to identify this species (e.g. Torrence *et al*. 2004; Barton 2007). Metzner (1977) refers to the presence of *M. sagu* in swamp areas of the southern coast but it has not been located in the area investigated. The stem of this tree is an important source of starch-rich sago, considered a famine staple, and the leaves are used for construction, baskets and as general wrapping material. It was not observed in the area investigated (pers. obs. 2005).

Ceiba pentandra (Linn.) Gaertn. (Bombacaceae)

Kapok tree (English)

Ceiba pentandra var. *pentandra* is a cultivated tree of West Africa and Asia. According to Purseglove (1968:36) it reached Java by the 10th century AD and it is likely that it was translocated by humans. It has been recorded in East Timor from the beginning of the 20th century (Cinatti 1964). According to Metzner (1977) *C. pentandra* is amongst the more

prominent plants cultivated in house gardens. Apart from providing cotton, the fruits of *C. pentandra* are also eaten uncooked or mixed with food, and the seeds are also edible (Ochse and van der Brink 1977:81; Burkill 1966:510). It was not observed in the area investigated (pers. obs. 2005).

Canarium indicum L. (Burseraceae)

Canarium/Native almond (English); Ai kiar (Tetun)

Canarium indicum is probably native to the lowlands of Melanesia, where in some areas it is still a main food staple (Thomson and Evans 2004; Walter and Sam 2002; Yen 1996, 1990). *C. indicum* nutshell and seed remains have been found in several late-Pleistocene and Holocene archaeological contexts in Melanesia and Island Southeast Asia (Fairbairn pers. comm.; Maloney 1996 for a review of the archaeobotanical and pollen record of *Canarium* spp.). *C. indicum* is one of the fruit trees referred to by Metzner as being planted in permanent house gardens of the area he investigated (Metzner 1977). The taxonomy of Canarium spp. is very complex and notwithstanding Metzner's observations, this could in fact be *C. vulgare* (Kennedy pers. comm.; Kennedy and Clarke 2004:16-18 for a revision of the genus). *C.* vulgare (referred to as *C. commune*) was reported in Timor for the first time by Pigafetta (1969, originally published in 1525). C*. asperum* (not recorded as a food species) is also recorded by Metzner (1977) in swamp forests of the southern coast. No *Canarium* spp. were observed in the area investigated (pers. obs. 2005).

Garuga floribunda Decne (Burseraceae)

Garuga (English); Ai kfeu (Tetun)

Garuga floribunda is distributed from South and Southeast Asia, across northern Australia and the Pacific. In East Timor, *G. floribunda* is part of the semi-deciduous monsoonal forest growing between 400 and 1000 metres above sea level on the northern coast. It is also present in deciduous forests located on both sides of the Baucau Plateau, along the Manoléden and Seiçal streams (Metzner 1977). The fruit of *G. floribunda* is edible (ICRAF 2008), although there is no record documenting its use as a food species in East Timor. It was not observed in the area investigated (pers. obs. 2005).

Cassia fistula L. (Caesalpiniaceae)

Golden shower (English); Aai arus/Ai suku/Ai fetu/Ai lalima (Tetun)

Cassia fistula is native to tropical Asia, although today it has a worldwide distribution across the tropics. Remains of poss. *Cassia* sp. were identified at Leang Burung, in Sulawesi, in layers dated to 3000 – 2000 BP (Paz 2001, 2004). The first mention of its presence in East Timor dates back to the 18th century (Cinatti 1964:13). Metzner (1977) states that this species is present in largely deciduous forests on both sides of the Baucau Plateau, along the Manoléden and Seiçal streams. It is also part of the *Acacia leucophloea* savannah. The seeds of *C. fistula* are eaten in some parts of Asia (Sundriyal *et al*. 2004), although there is no record that this is so in the area under study. It was not observed in the area investigated (pers. obs. 2005).

Intsia bijuga (Colebr.) Kuntze (Fabaceae)

Moluccan ironwood/Borneo teak (English); Ai bessi (Tetun)

Intsia bijuga is native to lowland areas of a wide region from Madagascar to Island Southeast Asia, northern Australia, New Guinea and the Pacific (Thaman *et al*. 2006). In the area investigated by Metzner (1977), it is located in cultivated gardens. The seeds of *I. bijuga* are edible, although they need to be soaked in water for 3/4 days and then boiled before being eaten (Thaman *et al*. 2006).

Calophyllum inophyllum L. (Clusiaceae)

Alexandrian laurel/Beach mahogany (English); Ai champló/Ai to (Tetun)

Calophyllum inophyllum is native within an arc from East Africa, through India and Southeast Asia to the Philippines, Taiwan, and the Marianas (Friday and Okano 2006). It has been recorded (with different degrees of confidence) in archaeological contexts in New Guinea and Melanesia dating back to the mid-Holocene (Hayes 1992; Swadling *et al*. 1991; Kirch 1989). In the area of study, this species is part of the beach vegetation described by Metzner (1977). Although the fruits of *C. inophyllum* are edible, they can be mildly poisonous (Friday and Okano 2006; Burkilll 1966:414). In East Timor, the seeds are crushed to produce oil that is burnt and used for illumination (Cinatti 1950b). It was not observed in the area investigated (pers. obs. 2005).

Terminalia catappa L. (Combretaceae)

Beach/Sea/Indian almond (English); Ai calessi (Tetun)

Terminalia catappa has a worldwide coastal distribution and could be native to tropical regions of South and Southeast Asia and Melanesia (Thomson and Evans 2006; Morton 1985). It has been recorded in archaeological contexts in Melanesia dating back to the mid-Holocene (Kirch 1989; Hayes 1992). The tree has multiple uses and the kernels are eaten throughout Island Southeast Asia and Melanesia (Morton 1985:107; Walter and Sam 2002:255-256). Other species of *Terminalia* are also widely eaten in New Guinea. *T. catappa* was first reported in East Timor by Pigafetta (1969, originally published in 1525) and is described by Metzner (1977) within the area of study as being part of the beach vegetation. It was not observed in the area investigated (pers. obs. 2005).

Terminalia microcarpa Decne. (Combretaceae)

Indian Mahogany (English)

Terminalia microcarpa has edible fruits known to be eaten in the Philippines (*kalumpit*, in Tagalog), as well as in New Guinea (Russell-Smith *et al*. 1997:184). This tree is described by Metzner (1977) as being part of the riparian forest on lowlands and lower hills, up to 300 metres high: However, there is no record of it being used as a food resource in the area under investigation. It was not observed in the area investigated (pers. obs. 2005).

Ipomoea aquatica Forssk. (Convolvulaceae)

Water spinach (English); Kanku (Tetun)

A semi-aquatic vine with a worldwide distribution, *Ipomoea aquatica* is probably native to Southeast or South Asia (Austin 2007). It is cultivated for its edible leaves, which are eaten as salad (Ochse an van der Brink 1977:161; Purseglove 1968:78-79). Although it is not referred to by Metzner (1977), *I. aquatica* is very common in East Timor, and within the area of study it is planted near water sources.

Cucumis sativus L. (Cucurbitaceae)

Cucumber (English); Kaha ulun moras (Tetun)

Existing wild in the Himalayan foothills, *Cucumis sativus* is a domesticated species possibly native to northern India (Fuller 2006:39). It has a worldwide distribution today, and it is usually consumed fresh or cooked. The young leaves are also eaten raw (Ochse and van der Brink 1977:194; Burkilll 1966:707; Purseglove 1968:114). *C. sativus* is planted in the area

investigated in the small permanent gardens around houses (Metzner 1977). It was also observed in the area investigated (pers. obs. 2005).

Lagenaria siceraria (Molina) Standl. (Cucurbitaceae)

Bottle gourd (English)

Of probable African and/or Asian origin (Clarke *et al*. 2006), *Lagenaria siceraria* is known as a domesticated species in Asia since the early Holocene (Fuller *et al*. 2007; Crawford 1992:28). Earlier finds of Cucurbitaceae remains in New Guinea previously identified as *L. siceraria* (Golson *et al*. 1967) have now been reinterpreted as *Benincasa hispida* (Golson 2002). Although it is not described by Metzner (1977) as existing in the area under investigation, charred remains identified as poss. *Lagenaria* sp. were reported from Uai Bobo 1, in layers described as possibly pre-dating the 16th century (Glover 1986:230). The fruits of *L. siceraria* may be eaten (Ochse and van der Brink 1977:201) and are widely used as food and water containers (Purseglove 1968:125). It was also observed in the area investigated (pers. obs. 2005).

Dioscorea alata L. (Dioscoreaceae)

Greater/white/winged yam (English); Uhi (Tetun)

Originally thought to have originated in Southeast Asia, *Dioscorea alata* is a cultigen of probable New Guinea origins where its centre of genetic diversity lies (Lebot 1999:624-625; Allaby 2007:186 for a review). Today it has a wide distribution throughout the tropics (Burkilll 1966:826-828; Purseglove 1972:100-101). Remains of *D. alata* have been identified in Sabah, Borneo, dated to ca. 2200 – 1500 BP (Paz 2005:113). *D. alata* is referred to by Metzner (1977) as being planted in gardens around houses for its edible underground root, together with other tubers, cereals and pulses. It was also observed in the area investigated (pers. obs. 2005).

Dioscorea esculenta (Lour.) Burkill (Dioscoreaceae)

Lesser/Chinese yam (English); Kumbili/Uhi? (Tetun)

Dioscorea esculenta is probably native to Mainland Southeast Asia and it is not widely grown outside Asia and the Pacific (Purseglove 1972:106). Evidence of *D. esculenta* in the archaeological record has remained elusive. Recent microfossil research on starch residue places this species in Melanesia within mid-Holocene Lapita contexts (e.g. Horrocks and Nunn 2007). Metzner (1977) notes that *D. esculenta* is planted in house gardens together with other

root crops, maize and beans. *D. esculenta* is cultivated for its edible and starch-rich underground tuber (Burkill 1966:831; Ochse and van der Brink 1977:222-226). It was also observed in the area investigated (pers. obs. 2005).

Dioscorea hispida Dennst. (Dioscoreaceae)

Asiatic/bitter/wild yam (English); Kuân (Tetun)

Dioscorea hispida is a wild yam of probable Southeast Asian origins, known to have been used for its edible properties since the Pleistocene (Barker *et al*. 2007; Paz 2005). It is also known as intoxicating yam, and needs to be detoxified before consumption (Ochse and van der Brink 1977:252-255; Burkilll 1966:833; Purseglove 1972:106). Metzner (1977) records *D. hispida* as being cultivated in gardens in the area under investigation. It was also observed in the area investigated (pers. obs. 2005).

Aleurites moluccana (L.) Willd. (Euphorbiaceae)

Candlenut (English); Kami (Tetun)

Aleurites moluccana is probably native to Southeast Asia (Burkilll 1966:92). Archaeological remains of *A. moluccana* have been reported from East Timor (Glover 1986) in layers recently re-dated to the mid- and early-Holocene (Selimiotis 2006). Not a major staple food due to its toxicity, the seed of *A. moluccana* is nonetheless used as a condiment after cooking (Ochse and van der Brink 1977:260-262; Burkilll 1966:93). Its oily kernels have medicinal properties and are also known to have been used for illumination, as they burn easily (Ochse and van der Brink 1977; Burkilll 1966; Elevitch and Manner 2006). Metzner (1977) states that this species is often planted in permanent gardens around houses, which was widely confirmed in field observation during this project (pers. obs. 2005).

Cajanus cajan (L.) Millsp. (Fabaceae)

Pigeon pea/Red gram (English)

Cajanus cajan is a cultivar native to the Indian peninsular region, where its wild progenitor *C. cajanifolia* occurs (Fuller *et al*. 2004:120; Fuller and Harvey 2006:225). Remains of *C. cajan* have been documented in archaeological contexts in southern India dating back to ca. 3500 BP (Fuller *et al*. 2001). It is widely distributed in tropical regions today, and its seeds are used as a food staple (Ochse and van der Brink 1977:370-371; Burkill 1966:399). In the area investigated by Metzner (1977), *C. cajan* is widely planted in permanent gardens. It was also observed in the area investigated (pers. obs. 2005).

Erythrina variegata L. (Fabaceae)

Coral tree (English); Ai dik di'na/Ai dik fuik (Tetun)

Erythrina variegata is native to the Old World tropics, possibly to India or Malaysia (Whistler and Elevitch 2006). It is widely cultivated across the tropics today. Both seeds (after boiling or roasting) and leaves of *E. variegata* are edible (Ochse and van der Brink 1977:388; Burkill 1966:964). Metzner (1977) described its presence in the area investigated in riparian forests of lowland and lower hills up to 300 metres high. It was not observed in the area investigated (pers. obs. 2005).

Glycine max (L.) Merr. (Fabaceae)

Soybean (English); Dele (Tetun)

Glycine max is a legume native to East Asian (northeast China and possibly Korea and Japan) where it was presumably domesticated from the wild *G. soya* (Hymowitz 1970, 1976). Archaeobotanical evidence for its presence in Asia dates back to approximately 3000 BP (Crawford & Lee 2003; Crawford *et al*. 2005; Crawford 2006). The seeds of *G. max* are still a main staple in many areas of East and Southeast Asia today, and the leaves are edible too (Ochse and van der Brink 1977:390-392; Burkill 1966:1099-1104; Purseglove 1968:265). According to Metzner (1977), *G. max* is planted in house gardens together with other pulses and root crops. It was not observed in the area investigated (pers. obs. 2005).

Inocarpus fagifer (Parkinson) Fosberg: (Fabaceae)

Polynesian/Tahitian chestnut (English); Ai ano (Tetun)

Inocarpus fagifer is probably native to the Melanesian region, and it is today widespread from Island Southeast Asia to Oceania (Walter and Sam 2002; Pauku 2006b). *I. fagifer* has not been documented by Metzner (1977) in the area under investigation, but East Timor is within this species' current distributional range. Macrobotanical remains of possible *Inocarpus* sp. have also been reported from Uai Bobo 2, in a context bracketed by two mid-Holocene radiocarbon dates (Glover 1986:230). The fruits of *I. fagifer* are edible after boiling or roasting, and this is the only edible species in the genus (Burkill 1966:1260; Walter and Sam 2002:186). It was not observed in the area investigated (pers. obs. 2005).

Lablab purpureus (L.) (Fabaceae)

Bonavist/hyacinth bean (English); Kutuk? (Tetun)

Lablab purpureus occurs wild in East Africa and it was probably domesticated there (Fuller 2003:244-246). It is present in archaeological contexts in South Asia since the 2nd millennium B.C., where it is planted for its edible seeds (Fuller *et al*. 2007). *L. purpureus* was first noticed in East Timor by Forbes, who described it as famine food (Forbes 1989:438, originally published in 1885). In the study area, it is usually planted in the home gardens together with other pulses and tubers (Metzner 1977). Seeds, young leaves and inflorescences of *L. purpureus* are edible (Ochse and van der Brink 1977:383). It was not observed in the area investigated (pers. obs. 2005).

Tamarindus indica L. (Fabaceae)

Tamarind (English); Ai sukair (Tetun)

Tamarindus indica is of probable western African origins (Burkill 1966:2159) but it has been documented through charred remains in India at least since ca. 3300 BP (ref. in Blench 2006). In the area under investigation, *T. indica* is present in the largely deciduous forests located on both sides of the Baucau Plateau. Metzner (1977:138) suggested that the fruits of *T. indica* are a wild staple consumed in East Timor; however, the specimens observed in Osso Ua/Uaisa village were planted around houses (pers. obs. 2005). The pods are usually chewed and the seeds eaten raw, roasted, or used as a condiment (Ochse and van der Brink 1977:433).

Vigna unguiculata (L.) Walp. subsp. *unguiculata* (Fabaceae)

Cowpea (English); Kutuk? (Tetun)

Vigna unguiculata was probably domesticated in West Africa, although it is present in archaeological contexts in southern Asia shortly after 4000 BP (Fuller and Harvey 2006). This species is widely distributed through the tropics today, and in some areas its seeds and leaves are main staples (Ochse and van der Brink 1977:438-439; Burkill 1966:2273; Purseglove 1968:322). According to Metzner (1977), *V. unguiculata* is planted in gardens in the area under study, together with other pulses and tubers. It was also observed in the area investigated (pers. obs. 2005).

Barringtonia procera (Miers) R. Knuth (Lecythidaceae)

Cutnut (English)

Barringtonia procera is native to the tropical lowland forests of New Guinea and Melanesia, where it is an important edible species (Bourke 1996; Walter and Sam 2002; Pauku 2006). *B. procera* and *B. edulis* both have edible fruits and are not always easy to distinguish. In the area under investigation, Metzner (1977) reported the presence of *Barringtonia* sp. as part of the beach vegetation and the swamp forest (on the southern coast). This could be *B. edulis*, as this species seems to have a more coastal distribution, or even *B. asiatica* (also a beach species, non-edible and used as fish-poison). However, only a specimen of *B. procera* was available as reference herbarium material and was therefore used for identification. It was not observed in the area investigated (pers. obs. 2005).

Cordyline fruticosa L. (Chev.) (Liliaceae)

Ti plant (English)

Cordyline fruticosa is possibly native to Southeast East Asia or New Guinea (where the largest diversity within the species occurs) and it is today widespread throughout the Pacific (Barrau 1965). Metzner (1977) describes *C. fruticosa* as a wild plant in East Timor although that may just reflect cultivation rather than domestication. The young leaves of *C. fruticosa* are cooked and eaten in Southeast Asia (Ochse and van der Brink 1977:460; Burkill 1966:672). The fibrous and sweet roots used to be eaten in the Pacific, especially in Polynesia (Barrau 1965:289). It was not observed in the area investigated (pers. obs. 2005). As there was no herbarium specimen available and it could not be acquired locally, an internet image was used as reference for identification.

Hibiscus tiliaceus L. (Malvaceae)

Sea/Beach hibiscus (English); Ai faui/ Ai kfau (Tetun)

Hibiscus tiliaceus has a worldwide coastal distribution across the tropics and it may be native both to tropical Asia and the Americas (Elevitch and Thomson 2006). In the area under investigation, it is part of the vegetation growing along the beach (Metzner 1977). Young leaves, flowers, seeds and roots of *H. tiliaceus* are amongst the famine foods harvested in Australia and the Pacific (Miller *et al*. 1993:74; Elevitch and Thomson 2006:9). However, there is no record of its consumption in East Timor. It was not observed in the area investigated (pers. obs. 2005).

Artocarpus altilis (Parkinson) Fosberg (Moraceae)

Breadfruit (English); Kulu (Tetun)

The domesticated and virtually seedless *Artocarpus altilis* is native to the small Pacific islands of Micronesia and Polynesia, whereas its presumed wild and seeded ancestors are native to New Guinea (Walter and Sam 2002; Ragone 2004; Zerega *et al*. 2005; Kennedy and Clarke 2004 for a review of the genus). Fruits of other domesticated *Artocarpus* spp. (*A. champeden* and *A. heterophyllus*) are eaten in Southeast Asia. Evidence for the presence of *Artocarpus* spp. in the archaeological record remains poorly documented. There are modern macrobotanical remains in New Guinea (Gorecki 1989:170) and in Micronesia (Athens *et al*. 1996), and pollen (reference in Maloney 1994:145 but disputed by Athens *et al*. 1996). In the area under investigation, the seedless *A. altilis* is planted in permanent gardens around houses (Metzner 1977). Several cultivars were observed during fieldwork in 2005 and these are given different local names: *Kulu fatuk*, *Kulu kama*, *Kulu ruma*, *Kulu tunu*, *Kulu Timor*, etc. The fruits of *A. altilis* are used as a main staple food and the leaves and inflorescences are also edible (Ochse and van der Brink 1977:491-492; Burkill 1966:251-253, also listing many other uses).

Ficus spp. Burm. f. (Moraceae)

Fig (English)

Various *Ficus* spp. of probable Southeast Asian and Melanesian origins have edible properties (both the fruits and in some cases the leaves) and have been reported in East Timor. Metzner (1977) described the presence of *F. ampelas* in patches of riparian forest that still exist in lowland and lower hills up to 300 metres above sea level. The fruits of *F. ampelas* are edible, although there is no information that it is eaten in the area under investigation. Although common in East Timor, *F. benjamina* ("hali" in Tetun) was not reported by Metzner (1977). Its fruits are edible and are known to be used as a vegetable in India (Sundriyal *et al*. 2004:636). Meijer Drees reported the presence of *F. hispida* in the back plains of the southern coast of East Timor (in Metzner 1977:314). Although there is no ethnographic information confirming their use as a food staple in East Timor, the fruits of *F. hispida* are known be eaten in Nepal (Joshi *et al*. 2007). Although no archaeobotanical remains of *Ficus* sp. have so far been found in Island Southeast Asia or Near Oceania, they have been reported elsewhere from late-Pleistocene archaeological layers (Kislev *et al*. 2006; see Denham 2007b for a discussion on its wild or domesticated state). Other *Ficus* spp. are reported by Metzner (1977) for which no herbarium specimens were available. No *Ficus* spp. were observed in the area investigated but some are common in the Baucau town centre and in Dili (pers. obs. 2005).

Musa L. (Musaceae)

Bananas and plantains (English); Hudi (Tetun)

The genus *Musa* is taxonomically complex. It contains four sections and edible bananas belong to two of them: Australimusa (the Fehi bananas found only in the Pacific, most probably domesticated in New Guinea) and Eumusa (containing the staple bananas and commercial bananas found world-wide, which have complex hybrid origins and originated both in New Guinea and Southeast Asia from wild seeded Musaceae) (Simmonds 1962; Purseglove 1972:343-384; Lebot 1999:621-622; Kennedy and Clark 2007:22-27; Kennedy 2008 for a review of the genus). Recent archaeological work in New Guinea by Denham *et al*. (2003) provided microfossil evidence for early-Holocene bananas of Eumusa section in contexts suggestive of cultivation and confirmed this region as a most probable centre of domestication for the species. Metzner (1977) references the presence of banana varieties in permanent gardens of the area investigated, probably including both cooking bananas and those eaten raw. Both wild and cultivated bananas are widely used as staple foods in Southeast Asia, New Guinea and the Pacific (the fruits, inflorescences and stems), as well as having many other uses (Ochse and van der Brink 1977:511-522; Burkill 1966:1532-1543, also listing all other uses). Various Musa spp. were observed in the area investigated but none identified (pers. obs. 2005).

Pandanus tectorius Parkinson (Pandanaceae)

Screwpine (English); Heda (Tetun)

Pandanus tectorius is native to coastal Southeast Asia, northern Australia and the Pacific islands (Stone 1976, 1982; Thomson *et al*. 2006). Macrobotanical remains of *P. tectorius* have been reported from near Oceania dated to ca. 1200 and 800 BC (Kirch 1987). There are remains of montane *Pandanus* spp. from late-Pleistocene and mid-Holocene contexts in New Guinea, where several such species are important domesticates (Fairbairn 2005; Christensen 1975; Bulmer 1975, but see reference to status of identification in Bulmer 2005 previously noted; and Kennedy and Clarke for a review of the genus). *Pandanus tectorius* is referred to by Metzner (1977) as part of the beach vegetation and patches of riparian forest along river beds. In the area investigated it grows close to the coast, but it does not seem to be planted. The fruits of *P. tectorius* are edible (Burkill 1966:1673). Local accounts in the area under investigation suggest that its seeds were once eaten as a famine food, which had already been reported by Metzner (1977:112). *P. tectorius* was observed along the coast in the area investigated (pers. obs. 2005).

Sesamum indicum L. (Pedaliaceae)

Sesame (English)

Domesticated *Sesamum indicum* probably originated from wild populations of *S. malabaricum* (or *S. mulayanum*) existing in the western Indian Peninsula (Bedigian and Harlan 1986; Bedigian 1998; Bedigian 2004). Remains of *S. indicum* have been reported in the archaeological record of the Indian peninsula dating back to ca. 4000 BP (Tengberg 1999; Fuller 2002 for a review). According to Metzner (1977), *S. indicum* is one of the crops planted as a ground cover in the permanent "to'os kiik" gardens. Its seeds are used in salads, in soup or in baking and are also an important source of oil (Ochse and van der Brink 1977:584; Burkill 1966:2030-2031; Purseglove 1968:430-431). It was not observed in the area investigated (pers. obs. 2005).

Piper betle L. (Piperaceae)

Betel pepper/vine (English); Malus (Tetun)

Piper betle is possibly native to South and Southeast Asia, and it is today widely cultivated across Island Southeast Asia and parts of Melanesia. In the area investigated by Metzner (1977), *P. betle* is planted as ground cover in permanent gardens around houses. *P. betle* is mainly used together with the stimulant *Areca catechu* and chewed (Ochse and van der Brink 1977:437; Burkill 1966:1767-1772). *P. betle* is common and was observed in the area investigated (pers. obs. 2005).

Coix lacryma-jobi L. (Poaceae)

Job's tears (English); Delé (Tetun)

Coix lacryma-jobi is considered to be native to South and East Asia (van den Bergh & Iamsupasit 1996), although today it has a pantropical distribution both as a cultigen and a weed. Remains of *C. lacryma-jobi* have been reported from mid-Holocene archaeobotanical assemblages in China (e.g. at Hemudu, in Fuller *et al*. 2007). Although it has not been described by Metzner (1977) in the area he investigated, remains of *C. lacryma-jobi* were reported by Glover from layers in Uai Bobo dated to 17,385 – 14,206 cal BP (Glover 1986:230). The seed of *C. lacryma-jobi* can be ground into flour and used in the same manner as other cereals (Burkill 1966:638-639; Purseglove 1972:134; Arora 1977). It was not observed in the area investigated (pers. obs. 2005).

Eleusine coracana (L.) Gaertn. (Poaceae)

Finger millet (English)

Eleusine coracana was domesticated from wild populations in the Eastern African Highlands (Hilu, de Wet and Harlan 1979), and it has been a cultivar in South Asia since *circa* 3000 BP (Fuller 2003; Fuller *et al*. 2004). Although *E. coracana* was not reported by Metzner, the close weedy relative *E. indica* is referred to as being part of the *Casuarina junghuhniana* savannah in the Baucau area (Metzner 1977). *E. coracana* is only found domesticated and is possibly more relevant as a food source but both species are said to be eaten raw or steamed (Ochse and van der Brink 1977:311-313; Burkill 1966:931-932; Purseglove 1972:146-148). It was not observed in the area investigated (pers. obs. 2005).

Oryza sativa L. (Poaceae)

Rice (English); Neli/Fos/Etu (unmilled, milled, and cooked, Tetun)

Japonica and *indica* cultivars of *Oryza sativa* were probably domesticated during the early- to mid-Holocene (Zhao 1998; Zhang & Wang 1998; Crawford and Shen 1998; Lu 1999; Jiang and Liu 2006). According to some authors, they represent separate domestication events from different wild progenitors in both South China and South/southwestern Asia (Londo *et al*. 2006; Fuller *et al*. 2007). *O. sativa* is one of the most important food crops in the world today and archaeobotanical evidence documenting its use through time in this part of the world is abundant (see chapter 3, above). *O. sativa* was first described in East Timor in by Pigafetta (1969, originally published in 1525). In the area he investigated, Metzner (1977) noted the presence of both dry-land rice (in small gardens) and wet-rice cultivation, less common. This was also confirmed in the area investigated (pers. obs. 2005).

Saccharum officinarum L. (Poaceae)

Sugarcane (English); Tohu (Tetun)

Saccharum officinarum was probably domesticated in New Guinea (its area of diversity) from *S. robustum*, distributed in the wild from Southeast Asia to Melanesia (Simmonds 1976; Daniels and Daniels 1993; Lebot 1999). Macrobotanical remains of *S. officinarum* found in a mid-Holocene context in New Guinea (Bulmer 1975:31) have been disputed (Yen 1998:168) and evidence of this species in the archaeological record remains elusive. *S. officinarum* was first documented in East Timor by Pigafetta in the 16th century (Pigafetta 1969, originally published in 1525). Metzner (1977) noted the presence of *S. officinarum* in permanent mixed gardens around houses. It is an edible species eaten raw or cooked (Ochse and van der Brink

1977:337; Purseglove 1972:216; Burkill 1966:1959-1974 for a review on its history and uses). It was not observed in the area investigated (pers. obs. 2005).

Setaria italica (L.) P. Beauv. (Poaceae)

Foxtail millet (English)

Setaria italica was probably domesticated in the early- to mid-Holocene in the lower Yellow river, from its wild ancestor *S. viridis* (Lu 1998). Archaeobotanical finds of *S. italica* across that region have recently become more common (e.g. Lu 1999, 2006; Shelach 2000; Lee *et al*. 2007; see chapter 3, above, for a brief historical review) and seem to be present in Taiwan around 3000 BC (Tsang 2005:70-71). Although it was not documented by Metzner (1977) in the area under investigation, remains of possible *S. italica* were reported from Uai Bobo in East Timor, and tentatively attributed to ca. 3500 BP (Glover 1986:230). This species is still widely cultivated in East and Southeast Asia for its edible seeds (Burkill 1966:2034; Purseglove 1972:256-257) but it was not observed in the area investigated (pers. obs. 2005).

Sorghum bicolor (L.) Moench (Poaceae)

Sorghum (English)

Sorghum bicolor is native to Africa, either from the sub-Saharan region or from Ethiopia (de Wet and Huckabay 1967; Harlan 1971; Doggett 1976). It seems to have been present in South Asia from ca. 3500 BP (Fuller 2002:281-282 and 2003:251-256 for reassessments of previous identifications). *Sorghum* sp. was reported for the first time in East Timor in 1624 (Cinatti 1964:10-11). Metzner notes that *S. bicolor* is planted in the smaller permanent gardens around houses, but it was not very common in the area he investigated (Metzner 1977). This species still is an important cereal food in many dry regions of the world (Purseglove 1972:261-263). It was not observed in the area investigated (pers. obs. 2005).

Zea mays L. (Poaceae)

Maize (English); Batar (Tetun)

Zea mays was domesticated in Mesoamerica in the mid-Holocene (Smith 2001) and it was probably brought to East Timor in the 16th century by the Portuguese. *Z. mays* was first mentioned in Timor in 1624 (Cinatti 1964:10-11) and it soon became a main food staple there (Dampier 1729; Wallace 1962, original work from 1869; Forbes 1989, original work from 1885). In the area under investigation it was described by Metzner (1977) as the main crop identified in the “to'os” (the garden)”. This was also confirmed in the area investigated (pers. obs. 2005).

***Ziziphus mauritiana* Lam. (Rhamnaceae)**

Indian jujube (English); Ai lo'ok/Ai bubur-fuik (Tetun)

Ziziphus mauritiana is possibly native to peninsular India, and is today spread from that region to China, Southeast Asia and Australasia (Fuller 2006). According to Metzner (1977), *Z. mauritiana* is part of the *Acacia leucophloea* savannah, located on both sides of the Baucau Plateau below 300 metres. Metzner also suggests that this is a wild species in East Timor. The ripe fruits of *Z. mauritiana* are edible (Burkill 1966:2347). This species was also observed in the area investigated (pers. obs. 2005).

***Carallia brachiata* (Lour.) Merr. (Rhizophoraceae)**

False kelat/Billabong tree (English)

Carallia brachiata is possibly native to Southeast Asia and the Australasian region, which today is its natural range (Burkill 1966:453). It is listed by Metzner (1977) as being part of the semi-deciduous forest of the northern coast of East Timor, from 400 to 1000 metres above sea level. Although there is no reference to it being used there as a food resource, the fruits of *C. brachiata* are edible (Burkill 1966:454) and are listed as wild harvested indigenous food in Australia (Russell-Smith, J. *et al*. 1997; Miller *et al*. 1993:130). It was not observed in the area investigated (pers. obs. 2005).

***Citrus maxima* (Burm.) Merr. (Rutaceae)**

Pummelo (English); Jambua (Tetun)

This main ancestor of the grapefruit is probably native to Mainland Southeast Asia and today has a wide distribution from southern China to the Pacific (Burkill 1966:577; Morton 1987). Both *C. maxima* and other *Citrus* spp. were amongst the fruits described by Pigafetta in Timor in the sixteenth century (Pigafetta 1969, originally published in 1525). According to Metzner (1977) *C. maxima* is one of the most prominent fruit trees planted in permanent gardens around houses in the area he investigated. The fruit is eaten after peeling the thick endocarp that surrounds it (Purseglove 1968:502). This species was also observed in the area investigated (pers. obs. 2005).

***Pometia pinnata* J. R. Forst. & G. Forst. (Sapindaceae)**

Oceanic/island lychee (English); Ai atakai (Tetun)

Pometia pinnata is either native to a broad region from South Asia to Melanesia (Thomson and Thaman 2005) or more specifically to the low montane regions of New Guinea (Yen 1996:37).

Yen (1996) describes *P. pinnata* as an important food resource in coastal lower altitude environments in New Guinea, from where it may have been introduced into the Pacific around 3000 BP (Kirch 1989:236). Anaerobically preserved remains of *P. pinnata* were recovered from archaeological contexts in Near Oceania dated to ca. 3000 BP (Kirch 1987). The fruits and roasted seeds are also an edible resource in Southeast Asia (Burkill 1966:1828). It was neither mentioned by Metzner (1977) as present in the area under investigation nor observed during fieldwork in 2005 (pers. obs. 2005).

Schleichera oleosa (Lour.) Oken (Sapindaceae)

Ceilon oak/Macassar oil tree (English); Ai dak (Tetun)

Schleichera oleosa is native to Indo-China and was probably introduced into Island Southeast Asia, where it is occasionally cultivated (www.worldagroforestrycentre.org). Metzner (1977) reports its presence in largely deciduous forests typical of low rainfall areas (up to 300 to 400 metres above sea level) located on both sides of the Baucau Plateau. The young shoots of *S. oleosa* can be eaten raw or steamed (Ochse and van der Brink 1977:652). This species was observed in the area investigated (pers. obs. 2005).

Sterculia foetida L. (Sterculiaceae)

Indian almond/Java olive (English); Ai nitas/Ai bano (Tetun)

Sterculia foetida is a native to the Indian continent and it has today a wide distribution across the tropics (Dorr 2004). According to Metzner (1977), it is part of the semi-deciduous monsoonal forest that grows from 400 to 1000 metres above sea level on the northern coast. The seeds of *S. foetida* are eaten raw or cooked and also produce useful cooking oil (Burkill 1966:2116). This species was observed in the area investigated (pers. obs. 2005).

Grewia spp. L. (Tiliaceae)

Grewia (English)

Grewia is a genus with species found in different parts of the tropics (e.g. *G. asiatica*, native to South and Southeast Asia; *G. retusifolia*, native to the Australasian region). It includes some species with edible fruits which are commonly eaten (Burkill 1966:1129). Although Metzner (1977) reported the presence of *Grewia* sp. as part of the beach vegetation, it was not observed in the area investigated (pers. obs. 2005).

Celtis philippensis Blanco (Ulmaceae)

Hackberry (English); Quiri fatuk (Tetun)

Celtis philippensis is probably native to South and Southeast Asia and is common throughout India, Indonesia and the Philippines (Burkill 1966:513). *Celtis* spp. seeds are ubiquitous in archaeological sites throughout Southeast Asia and Melanesia even when other plant materials do not preserve (e.g. at Pamwak, in Near Oceania, cf. Fredericksen *et al*. 1993) because they accumulate high concentrations of silica and calcium carbonate and mineralize (Cowan *et al*. 1997). Metzner (1977) described the presence of *C. philippensis* in largely deciduous forest typical of lowlands and low rainfall areas on both sides of the Baucau Plateau, as well as in tropical montane cloud forest (usually located higher than 1500 metres above sea level). There is no direct evidence that *C. philippensis* seeds are eaten in Timor but its fruits are edible, which may account for its presence in archaeological sites. This species was not observed in the area investigated (pers. obs. 2005).