

species of the genus are known historically from Lanai, but both have purplish rather than yellow disk florets and from 4 to 60 rather than one flower head per branch (Lowrey 1999).

Tetramolopium remyi flowers between April and January. Field observations suggest that the population size of the species can be profoundly affected by variability in annual precipitation. The adult plants may succumb to prolonged drought, but apparently there is a seedbank in the soil that can replenish the population during favorable conditions. Such seed banks are of great importance for arid-dwelling plants to allow populations to persist through adverse conditions. Success in greenhouse cultivation of these plants with much higher water availability implies that, although these plants are drought-tolerant, perhaps the dry conditions in which they currently exist are not optimum. Individual plants are probably not long-lived. Pollination is hypothesized to be by butterflies, bees, or flies. Seed dispersal agents, specific environmental requirements, and other limiting factors of this species are unknown (Service 1995b; 56 FR 47686).

Historically, the species was known from the Lahaina area of West Maui and Lanai. Currently, *Tetramolopium remyi* is known from two occurrences on Lanai. It was last seen on Maui in 1944 until relocated in 2001 by Joel Lau of HINHP on State-owned land with an unknown number of plants in the Kuia area (GDSI 2001; HINHP Database 2001; Service 1995b; 56 FR 47686).

On Maui, *Tetramolopium remyi* occurs in lowland dry shrubland on dry, exposed ridges or flats at elevations between 52 and 550 m (171 and 1,804 ft). Associated plant species include *Bidens mauiensis*, *Bidens menziesii*, *Dodonaea viscosa*, *Eragrostis atropioides* (lovegrass), *Heteropogon contortus*, *Lipochaeta heterophylla* (NCN), or *Waltheria indica* (Service 1995b; 56 FR 47686; R. Hobdy, pers. comm., 2001).

Nothing is known of the threats to *Tetramolopium remyi* on the island of Maui (Service 1995b; 56 FR 47686).

Vigna o-wahuensis (NCN)

Vigna o-wahuensis, a member of the pea family (Fabaceae), is a slender, twining, short-lived perennial herb with fuzzy stems. Each leaf is made up of three leaflets which vary in shape from

round to linear. This species differs from others in the genus by its thin, yellowish petals; sparsely hairy calyx; and thin pods, which may or may not be slightly inflated (Geesink *et al.* 1999).

Little is known about the life history of *Vigna o-wahuensis*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Vigna o-wahuensis* was known from Niihau, Oahu, East Maui in Makawao, Waiakoa, and Haleakala, and at an unspecified site on West Maui. Currently, *V. o-wahuensis* is known from the islands of Molokai, Lanai, Kahoolawe, Maui, and Hawaii. On the State-owned island of Kahoolawe, there is one occurrence with an unknown number of individuals in the Makaala/Lua Kealialalo area. On Maui, there is a single occurrence of at least one individual on State-owned land at Kamanamana (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; C. Chimera, pers. comm., 2000).

On Kahoolawe and Maui, *Vigna o-wahuensis* occurs in dry to mesic grassland and shrubland at elevations between 0 and 50 m (0 and 164 ft) and containing one or more of the following associated plant species: *Chamaesyce* spp.; *Chenopodium* spp.; or *Sida fallax* (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The primary threats to *Vigna o-wahuensis* on Kahoolawe are competition with various nonnative plant species, fire, a risk of extinction caused by random environmental events, and reduced reproductive vigor caused by the small number of existing occurrences and individuals. The primary threats to this species on Maui are competition with the nonnative plant species *Cenchrus ciliaris* (buffelgrass) and *Lantana camara*, and herbivory by axis deer and goats (Service 1999; 59 FR 56333).

Zanthoxylum hawaiiense (Ae)

Zanthoxylum hawaiiense, a long-lived perennial, is a medium-sized tree with pale to dark gray bark and lemon-scented leaves in the rue family (Rutaceae). *Zanthoxylum hawaiiense* is distinguished from other Hawaiian members of the genus by several characters: Three leaflets all of similar size, one joint on the lateral leaf stalk,

and sickle-shaped fruits with a rounded tip (Stone *et al.* 1999).

Little is known about the life history of *Zanthoxylum hawaiiense*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996a; 59 FR 10305).

Historically, *Zanthoxylum hawaiiense* was known from the islands of Kauai, Molokai, Lanai, Hawaii, and the southern and southwestern slopes of Haleakala on Maui. Currently, *Z. hawaiiense* is extant on the islands of Kauai, Molokai, Maui, and Hawaii. This species is found on Maui in 9 occurrences with a total of 11 individuals on private and State (Makawao Forest Reserve and DHHL) lands at Kahakapao, and in the Hana District, north and south of the Jeep Trail and north of the Kula Pipeline (GDSI 2001; HINHP Database 2001; Service 1996a; 59 FR 10305).

Zanthoxylum hawaiiense on Maui is reported from open lowland dry or mesic *Nestegis sandwicensis*-*Pleomele auwahiensis* forests, *Acacia koa*-*Pleomele auwahiensis* forest, or montane dry forest at elevations between 869 and 1,540 m (2,852 and 5,051 ft) and containing one or more of the following associated native species: *Alectryon macrococcus*; *Alphitonia ponderosa*; *Charpentiera* spp.; *Diospyros sandwicensis*; *Dodonaea viscosa*; *Melicope* spp.; *Metrosideros polymorpha*; *Myrsine lanaiensis*; *Osteomeles anthyllidifolia*; *Pisonia* spp. (papala kepau); *Santalum ellipticum*; *Sophora chrysophylla*; *Streblus pendulinus*; or *Xylosma hawaiiense* (HINHP Database 2001; Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001).

The threats to *Zanthoxylum hawaiiense* on Maui include browsing, grazing, and trampling by feral goats and cattle; competition with the nonnative plant species, *Lantana camara*, *Melia azedarach* (chinaberry) and *Pennisetum clandestinum*; fire; human disturbance; risk of extinction from naturally occurring events; and reduced reproductive vigor caused by the small number of populations (Service 1996a; 59 FR 10305).

A summary of occurrences and land ownership for the 70 plant species reported from the islands of Maui and Kahoolawe is given in Table 2.