**Cordia subcordata** (kou)
Boraginaceae (borage family)

*anau* (Chuuk), beach cordia, sea trumpet (English), cordia, island walnut, kerosene wood (Papua New Guinea), *galu* (Yap), *ikoak* (Kosrae), *ikoik* (Pohnpei), ironwood (Australia), *kalau* (Palau), *koa* (Guam), *kanava* (*'Uvea, Futuna, Tokelau, Tuvalu*), *kou* (Hawai‘i), *motou* (Niue), *narawanawa* (Fiji), *niyoron* (Guam, Northern Marianas), *puataukanave* (Tonga), *tauanave* (Samoa), *te kanawa* (Kiribati), *tou* (Societies, Cooks, Marquesas, Tuamotus), *vaua asi* (Solomon Islands)

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**IN BRIEF**

**Distribution** Native throughout the Pacific as well as parts of the Indian Ocean and East Africa.

**Size** Reaches 7–15 m (23–49 ft), although typically seen smaller at about 5–7 m (16–23 ft).

**Habitat** Generally sea level to 30 m (100 ft), can grow at elevations up to 150 m (500 ft); rainfall 1000–4000 mm (40–160 in).

**Vegetation** Associated with species of coastal forests.

**Soils** Sandy and clay soils, rocky limestone or lava headlands; prefers neutral to alkaline soils.

**Growth rate** Early growth can be rapid on favorable sites, over 1 m/yr (3.3 ft/yr) for the first few years.

**Main agroforestry uses** Coastal protection, windbreak, homegardens.

**Main uses** Wood for crafts, ornamental, ceremonial.

**Yields** No data available.

**Intercropping** Compatible with many coastal species, although requires full sun.

**Invasive potential** Has potential to spread easily by seeds, but rarely does so; since it is native to Pacific islands, the tree is not considered invasive.

* Mature kou tree at Lahaina, Maui, Hawai‘i.
INTRODUCTION
Kou (*Cordia subcordata*) is an attractive small to medium-size tree that averages 7–10 m (23–33 ft) in height at maturity but may grow up to 15 m (49 ft). It prefers warm coastal areas on the leeward side of islands, and plentiful sunlight, but it can tolerate semi-moist inland forests. Kou has a native range including the Pacific, tropical Asia, and east Africa. While it is native to Hawai‘i, seeds were probably also carried to some Pacific islands by the early Polynesian settlers as part of their indigenous agroforestry systems.

There are many traditional uses of kou, including as a shade tree around homesteads, because it provides a broad, dense crown. The large, beautiful orange flowers are used to make leis. Leaves were used to dye tapa or combined to make medicinal products. The main product of the tree is its wood, which is lightweight, soft, easily workable, little-shrinking, long-lasting, and durable. In the past, kou would occasionally be used to make canoes (especially on atolls, “plank canoes”), but it was more often used for food vessels and utensils, as it has no strong flavor that would impart taste to food. Other objects such as paddles, boxes, small furniture, and carved figures were also often made from the wood. Today the wood is prized for handicrafts and carving of traditional figures by traditional artisans from Papua New Guinea through the Solomon Islands to the Cook Islands, and it provides a significant source of income in those places.

Environmentally, the tree is very useful in Pacific islands for shade and windbreaks. Kou prefers coastal areas and direct sunlight while easily withstanding frequent salt spray. Kou’s shallow and extensive root system makes it useful for the conservation of eroding coastal areas. Unfortunately, kou’s susceptibility to the kou leaf worm (*Ethmia nigroapicella*) has caused many horticulturists and ornamental growers in Hawai‘i to replace it with the non-native Geiger tree (*Cordia sebestena*). Losing the kou tree would mean losing part of the native culture in Hawai‘i.

DISTRIBUTION

Native range
Kou is native throughout Pacific, from tropical Asia through Melanesia, Micronesia, and Polynesia to the Marquesas and northward to Hawai‘i. Its native range includes the islands of the Indian Ocean and the eastern coast of Africa (Mueller-Dombois and Fosberg 1998).

Current distribution
Kou was probably one of the trees brought to Hawai‘i by the original Polynesian settlers, although it had naturalized in Hawai‘i previously (Wagner et al. 1999). It is now naturalized on all main Hawaiian islands except Moloka‘i and Ka‘holo‘awe. Throughout the Pacific, kou is increasingly rare, both from over-exploitation for carving and attacks from exotic pests. It is reported as disappearing in parts of its range (Clarke and Thaman 1993).

ORIGIN OF KOU IN HAWAI‘I
Kou had been thought for years to have been introduced to Hawai‘i by the early Polynesian navigators, along with candlenut (*Aleurites moluccana*, kukui), milo (*Thespesia populnea*), and kamani (*Calophyllum inophyllum*). However, in 1997 scientists excavating a sinkhole on Kaua‘i found abundant fossilized kou seed in sediment layers dating 5,000 years before present, millennia before the first people arrived in Kaua‘i. Kou is clearly a native plant to Hawai‘i (Burney et al. 2001).

BOTANICAL DESCRIPTION

Preferred scientific name
*Cordia subcordata* Lam.

Family
Boraginaceae (borage family)

Non-preferred scientific names
*Cordia orientalis* R.Br.
*Cordia moluccana* Roxb.
*Cordia rumphii* Blume

Common names
anau (Chuuk)
beach cordia, sea trumpet (English)
cordia, island walnut, kerosene wood (Papua New Guinea)
galu (Yap)
*ikoak* (Kosrae)
*ikoik* (Pohnpei)
ironwood (Australia)
kalau (Palau)
koa (Guam)
*kanava* (‘Uvea, Futuna, Tokelau, Tuvalu)
kou (Hawai‘i)
motou (Niue)
nawanawa (Fiji)
niyoron (Guam, Northern Marianas)
puataukanave (Tonga)
tauanave (Samoa)
te kanawa (Kiribati)
tou (Societies, Cooks, Marquesas, Tuamotus)
vavaa asi (Solomon Islands)

Size
Kou is a small evergreen tree with a broad, dense, wide crown that typically reaches 7–10 m (23–33 ft) in height. The canopy may spread 8 m (25 ft) across, often as wide as the tree is tall. The bark is pale gray and furrowed or flaky. The trunk is usually less than 40 cm (16 in) in diameter but may be larger in very old trees. The boles of the trees are often crooked and shaped by the wind. Through the 19th century in Hawai’i trees grew up to 15 m (50 ft) in height with stems 1 m (3.3 ft) across, and such giants may still be seen in remote areas in the Marshall Islands and perhaps elsewhere in the Pacific (McClatchey, pers. comm.), but today growth in Hawai’i is much reduced by defoliation caused by the kou leaf worm (Rock 1974).

Flowers
Kou bears clusters of orange flowers at the terminal ends of its branches and in leaf axils. The large, funnel-shaped flowers are 2.5–4 cm (1–1.5 in) long and broad, with five to seven slightly wrinkled lobes. The short-lived flowers are scentless.

Leaves
Kou leaves are alternate and broadly egg-shaped to elliptical with blunt-pointed ends. They are light green, shiny above and dull below, 8–20 cm (3–8 in) long and 5–13 cm (2–5 in) wide.

Fruit
Kou fruits are round or egg-shaped balls 2–3 cm (0.75–1.25 in) long, hard and woody when mature. They grow in clusters and turn brown and fall from the tree as they ripen. Kou fruits all year long; green and ripe fruits are often found on trees at the same time the trees are flowering.

Seeds
Each fruit contains four or fewer delicate, white, narrow seeds 10–13 mm (0.4–0.5 in) long. Kou fruits float easily and are carried from island to island on the ocean.

Similar or look-a-like species
Kou-haole or Geiger tree, Cordia sebestena L. is another ornamental tree that looks similar to kou. Cordia sebestena is smaller in size than kou with smaller, rough-textured leaves, darker orange flowers, and fleshy white fruit. Other ornamental species of Cordia include C. dichotoma, C. alba, C. glabra, and C. superba. Only C. dichotoma has naturalized in Hawai’i. C. alliodora is a much taller, straighter plantation timber tree. C. aspera is a forest tree in Samoa, and C. speciosa occurs in New Caledonia. There are about 250
species in the genus *Cordia*; most grow in the New World tropics.

**Species variability**
Variation is little known aside from minor variations such as in flower color. Kou has been identified as a priority species on several different Pacific islands for further genetic research by the South Pacific Regional Initiative on Forest Genetic Resources (SPRIG 1999).

**Known varieties**
No established varieties are known, although sometimes a sport with variegated leaves occurs.

**ASSOCIATED PLANT SPECIES**
Kou trees grow in coastal habitats, both in shrubby beach forests and lowland forests. The trees also occur on the inland edges of mangroves, although they are not a mangrove species. Kou is a frequent component of secondary forests and former habitations.

**In native habitat**
Kou trees are found in beach forests along with small trees and shrubs such as beach hibiscus (*Hibiscus tiliaceus*, hau), naupaka (*Scaevola sericea*), beach heliotrope (*Tournefortia argentea*), screwpine (*Pandanus* spp., hala), and Indian mulberry (*Morinda citrifolia*, noni), and in tall coastal forests along with milo (*Thespesia populnea*), kamani (*Calophyllum inophyllum*), *Pisonia grandis*, tropical almond (*Terminalia catappa*), beach she-oak (*Casuarina equisetifolia*), and fish poison tree (*Barringtonia asiatica*). Native herbaceous plants commonly include *Canavalia* spp., beach morning glory (*Ipomoea pes-caprae*), and beach pea (*Vigna marina*) (Mueller-Dombois and Fosberg 1998).

**As aboriginal introduction in Pacific islands**
Kou may be found growing alongside or mixed into coconut and breadfruit plantations, especially on atolls in Micronesia (Mueller-Dombois and Fosberg 1998). Kou trees frequently occur along with introduced coastal stands of *Casuarina* spp., tropical almond, beach heliotrope, and milo in Hawai‘i.

**ENVIRONMENTAL PREFERENCES AND TOLERANCES**

**Climate**
Kou most frequently grows in coastal forests and stands, but it may also occur along the margins of mangroves and mixed in with coconut and breadfruit plantations. It occasionally forms small pure stands or thickets. It is a tropical tree and does not grow at higher elevations.

**Elevation range**
Generally sea level to 30 m (100 ft); it may grow at elevations up to 150 m (500 ft).

**Mean annual rainfall**
1000–4000 mm (40–160 in)

**Rainfall pattern**
Grows in climates with summer, winter, or uniform rainfall patterns.

**Dry season duration (consecutive months with <40 mm [0.16 in] rainfall)**
3–4 months

**Mean annual temperature**
24–28°C (75–82°F)

**Mean maximum temperature of hottest month**
28–36°C (82–97°F)

**Mean minimum temperature of coldest month**
17–25°C (63–77°F)

**Minimum temperature tolerated**
12°C (54°F)

**Soils**
Kou grows in sandy and clay soils, and on rocky limestone or lava headlands. It prefers neutral to alkaline soils. Experience in Hawai‘i suggests that kou may not be suitable for use on acid soils, particularly former sugarcane lands.

**Soil texture**
The tree tolerates light to heavy soils (sands, sandy loams, loams, sandy clay loams, sandy clays, clay loams, and clays).

**Soil drainage**
Freely draining soils are required.

**Soil acidity**
Kou prefers neutral soils with pH 6.1–7.4.

**Special soil tolerances**
It can grow in saline soils.
Tolerances

Drought
Kou is moderately drought tolerant.

Full sun
The tree prefers full sun but can tolerate slight shade.

Frost
It does not tolerate frost.

Waterlogging
Kou grows in coastal areas and along the edges of mangroves where it is subject to occasional waterlogging.

Salt spray
Kou grows in exposed coastal areas where it tolerates steady winds and regular ocean spray.

Wind
Tolerates wind, although constant wind produces leaning and crooked trees (flagging).

Abilities

Regenerate rapidly
Kou is a prolific seeder and may naturally regenerate from seed.

GROWTH AND DEVELOPMENT
Kou is moderately fast growing when young, if established on a good site, in full sun, near the coast but sheltered from the wind, in rich neutral loamy or sandy soil, with sufficient water. Once the trees reach mature size, 7–10 m (23–33 ft) in height, growth is slow.

Growth rate
On good sites, trees may reach 1–1.5 m (3–5 ft) in height 1 year after planting, 4–5 m (13–16 ft) in 2-year-old plantations, and 7 m (23 ft) after 4 years. Growth is significantly slower in drier or more exposed sites, or if trees are attacked by the leaf worm.

Flowering and fruiting
Flowering may begin when the trees are 3–5
years old. Kou fruits all year long; green and ripe fruits are often found on trees at the same time the trees are flowering.

Yields
No data is available for wood yields.

Rooting habit
Kou has an extensive, shallow root system. It is adapted to shallow and sandy soils and drought.

Reaction to competition
Kou grows poorly in stands of dense, tall grasses.

PROPAGATION
Kou is propagated only by seed. Ripe fruits with viable seeds may be collected under mature trees or picked from the tree. Whole fruits may be sown directly into seedbeds or pots, or they may be soaked overnight. Clipping the ends of the fruits may hasten germination. Fresh seeds are usually used, but they may be stored for up to a year.

Seed collection
Kou seeds all year (most abundantly in the spring), and ripe fruits may be collected at any time. Seedlings may also be found growing under mother trees and may be transplanted if desired.

Seed characteristics
There are 560–700 fruits/kg (250–320 fruits/lb), each containing one to four seeds.

Seed storage
Kou seed is orthodox, meaning that the seed may be dried and stored for a long time. Whole fruits may be dried and stored in cool, dry conditions for up to a year, but viability decreases over time. Fresh seeds picked from trees may have 100% germination; seed picked off the ground may be less viable.

Pre-planting treatments
The woody fruits may be soaked overnight or for up to 2 days to hasten germination. The end of the capsule may be clipped off prior to soaking in water, which is also thought to hasten germination. Seeds are usually not removed from the fruits because it is difficult to do so without damaging them. Whole fruits are sown one to a pot; if multiple seedlings germinate, the extras must be transplanted or rogued out.

Growing area
Seedlings may be grown in partial shade, and some cover of the growing area is desirable to protect young seedlings from hard rains, but if shaded, seedlings must be hardened off in full sunlight for 4–6 weeks. Germinating seeds must be protected from rats.

Germination
Seeds will take 3–4 weeks to begin germinating, and most will germinate within 6 weeks. Whole fruits may be sown in a germination bed, and the newly-germinated seedlings may be transplanted to pots. Transplants of the seedlings may be made at the cotyledon stage.

Media
A well drained medium is best. A soilless mix of peat moss, perlite, and vermiculite is better drained and less apt to contain diseases than a potting mix containing garden soil. Potting media should be amended with slow-release fertilizers and compost.

Time to outplanting
Kou seedlings may stay in the nursery 6–8 months. Seedlings usually grow slowly for the first 6–10 weeks, then grow more rapidly. The rapid growth phase in the nursery may last 4–6 months, including hardening off in full sun during the last 4–6 weeks before planting.

Approximate size at time of outplanting
Seedlings ready for outplanting are approximately 40–50 cm (16–20 in) in height.
Guidelines for outplanting
Survival is typically high, although transplanted seedlings grow slowly at first and need to be protected from weeds until the tree canopies are well above the weeds.

Other comments on propagation
Seedlings may be susceptible to fungal diseases, especially if over-watered or grown in wet, cool areas. Watering in the early morning allows leaves to dry out during the day. Spacing seedlings widely in the nursery allows more light penetration into the canopy and better air circulation. Establishing the nursery in a coastal area may also help prevent diseases. Seedlings should be hardened off in full sun with infrequent watering before outplanting, and they should be kept in their containers until outplanting.

DISADVANTAGES
Kou is a hardy tree in coastal environments but unsuitable for uplands and acid soils. It is occasionally attacked and sometimes killed by the kou leaf worm. The heartwood is valuable, but the tree does not grow rapidly. Boles are small and often crooked. Kou trees seed prolifically, and the round, hard fruits may be a hazard for pedestrians when the tree is planted in urban areas.

Potential for invasiveness
Kou seeds prolifically and could become a weedy pest in new areas. It is native to almost the entire Pacific, though, and as such would not be considered an alien weed.

Diseases and pests
Kou is highly susceptible to damage from the kou leaf worm (Ethmia nigroapicella). The small moth has pinkish forewings with black spots and yellowish hind wings. Isolated trees in exposed areas may be killed by this pest. The tree was once more common in Hawai‘i before the introduction of the moth, which was first recorded there in 1883 (Swezey 1943). The wood is very termite resistant (Grace and Tome 1995). Large trees may develop heart rot.

Other disadvantages or design considerations
Kou has failed to survive or grow well in plantation trials in Hawai‘i on deep, acid soils at 380 m (1250 ft) elevation with 2000 mm (80 in) rainfall at ‘Opae‘ula, O‘ahu; on deep, acid soils with 2000 mm (80 in) rainfall at 150 m (500 ft) elevation at Maunawili, O‘ahu; on thin, acid soil derived from organic matter over ‘a‘a lava rock, at elevation 180 m (600 ft) and rainfall 4000 mm (160 in) at Waiākea, Hawai‘i; and on deep, acid soils at 125 m (415 ft) elevation with 1100 mm
Cordia subcordata

(43 in) rainfall in Kipū, Kaua‘i. All trials were fertilized and planted in single-species blocks.

AGROFORESTRY/ENVIRONMENTAL PRACTICES

Homegardens
Kou is frequently planted around homes, particularly for shade on the hot, leeward sides of islands.

Living fences
Kou trees are used for living fences and to mark boundaries and former settlement areas.

Boundary markers
In former times, kou trees marked settlements.

Windbreaks
Kou trees are fairly resistant to coastal winds and salt spray and are used for windbreaks. Because the crown on exposed trees may be sparse, other species should be combined with kou if good protection is needed. Naupaka (Scaevola sericea) would make a good, thick, low barrier if planted between kou trees while beach she-oak (Casuarina equisetifolia), where native, and milo (Thespesia populnea) would work well to create a denser windbreak.

Coastal protection
Kou’s tolerance of wind and salt spray, preference for sandy soils, and drought tolerance make it an excellent species for coastal protection. The abundant natural regeneration can form dense stands protecting coastal areas.

Ornamental
Kou is a favored ornamental tree in coastal areas in the Pacific because of its relatively small size, its salt and wind tolerance, and its beautiful flowers. The tree’s cultural importance also is another reason to plant it, even if it will never be harvested for wood.

USES AND PRODUCTS

Nut/seed
The seeds, carefully removed from the woody fruit, have been eaten in times of famine (Clarke and Thaman 1993).

Medicinal
The leaves have been reported to have medicinal properties.

Beautiful/fragrant flowers
The beautiful orange kou flowers have been used for leis, although they only last a short time.

Kou makes a very attractive ornamental in public areas and shopping centers. PHOTO: C. ELEVITCH
Animal fodder
Kou leaves have been used as fodder for pigs in Kiribati and elsewhere.

Fuelwood
Kou burns readily, and wood that is left over after the best pieces have been used for carving or other purposes may be used for fuelwood. The flammability of the wood has earned it the nickname “kerosene wood” in Papua New Guinea.

Craft wood/tools
Kou wood is light to moderately dense, ranging in specific gravity from 0.45 to 0.65. The sapwood is light tan colored, occasionally pinkish, while the heartwood is brown with dark brown to black streaks, sometimes with purple tones, often nicely figured. The wood is finely textured, moderately durable, shrinks little, and takes a fine polish. In ancient times the wood was used for cups, bowls, and calabashes. Small pieces were made into small storage boxes, containers, and lids for calabashes. Kou wood was favored because it was easily worked and did not impart a taste to the food. Ancient Hawaiians made large calabashes, called ‘umeke la’a, from kou for storing and fermenting poi. These could hold 8–16 liters (2–4 gal) of food (Abbott 1992). Today the wood is used for ornamental carving, turning, storage containers, small furniture, and carved figurines. In the Cook Islands the wood is used for carving traditional figures and making musical instruments.

Canoe/boat/raft making
Kou is sometimes used for canoes or paddles if large enough trees are found.

Body ornamentation/garlands
The bright orange flowers are traditionally favored for leis. The flowers have a wide floral tube that makes for easy stringing with the materials available to the ancients, such as beach hibiscus (Hibiscus tiliaceus, hau) fiber. It is easy to see how this lei was made in days of old without metal lei needles.

Tannin/dye
In old Hawai‘i, the leaves were used to dye kapa (bark) cloth tan and for coloring fishing lines to make them less visible (Abbott 1992).

Ceremonial/religious importance
The tree is significant culturally and in traditional religions in the Pacific. Kou groves were often planted around sacred places, and kou figures in Pacific island mythology.

URBAN AND COMMUNITY FORESTRY
In old Hawai‘i and other Pacific islands, kou trees were planted around houses and living areas to give shade in the hot coastal areas and provide wood for carving and flowers for leis. An introduced insect pest, the kou leaf worm, decimated kou populations in Hawai‘i a century ago, and the tree has become much less common. Overharvesting elsewhere in the Pacific has also contributed to the tree’s scarcity. Growing kou trees brings a native Pacific island tree back into the urban landscape and may in time create a supply of wood to perpetuate local wood carving traditions.

Size
In a landscape or homegarden setting, kou trees usually
reach only about 7–10 m (23–33 ft) in height and are often smaller in exposed environments. Canopy spread may be as wide as the tree is tall.

Rate of growth in a landscape
Kou trees may grow up to 1.5 m (5 ft) in height per year in the first few years, but height growth is more typically 1 m (3.3 ft) per year with stem diameter growth of 1.5–3 cm/yr (0.6–1.2 in/yr). The tree’s canopy may be sparse for the first few years.

Roots
Kou has an extensive, shallow root system. Its root system is probably very competitive with other plants nearby.

Products commonly used in a Pacific island household
The rich brown wood is easily worked and was traditionally used for carving calabashes and other food vessels. Unlike koa (*Acacia koa*), another prime Hawaiian timber used in woodcarving, and some other woods, kou wood does not impart a taste to food. Today kou wood is sought after by bowl turners and carvers. In areas where kou is abundant it makes excellent firewood. The bright orange, tubular flowers are strung into beautiful but short-lived leis.

Light requirements
Kou prefers full sun but will tolerate light shade.

Water/soil requirements
The tree grows in rocky or sandy soils along shorelines. It generally does not do well in heavy acid clay soils. Kou is tolerant of salt spray and is moderately wind tolerant.

Expected life span in a homegarden
Huge old kou trees are seldom seen in Hawai‘i and most Pacific islands today, but the trunk can grow to over a meter (3.3 ft) in diameter. Such giants must be over a century old.

Varieties favored for use in a homegardens or for street trees
Trees with green and white variegated leaves have been known to occur.

Seasonality of leaf flush, flowering, fruiting
Kou flowers and fruits year round.
Exceptional ornamental values
It is an attractive tree with smooth gray bark and dense foliage interspersed with bright orange flowers.

Use as living fence, hedge, or visual/noise barrier
Kou trees, planted densely, make an effective barrier or windbreak in coastal areas.

Maintenance requirements
Kou trees require care when transplanting. Root injuries or excessive wetness in transplanting sites can lead to diseases. Holes for transplanting should be dug twice as wide as the root ball but no deeper. Seedlings should not be root-bound; any roots curving along the bottom of the container should be gently unwound before planting. Seedlings grown in dibble tubes or specialized tree-growing containers are best for windbreaks or forestry projects. Larger trees up to 1.5 m (5 ft) tall grown in large containers may be planted for landscaping purposes. Trees benefit from initial applications of fertilizer or compost. Mulch helps retain water in dry areas and keeps down weeds. Young trees should be watered until they are well established, especially if they are planted in sandy soils with low water-holding capacity. Mature trees are moderately drought tolerant.

Kou trees are usually crooked and may have multiple stems. Proper pruning is necessary to establish good form. Young seedlings may be spindly for the first couple of years until the full canopy develops. Thickets of young trees may grow up from seeds around mature trees.

Special considerations regarding leaf, branch, and fruit drop
Kou trees can sometimes be difficult to establish and generally do not do well away from the coast. They grow best below about 30 m (100 ft) in elevation. The prolific regeneration under the trees may also pose a problem if other groundcovers are desired.

Nuisance issues
None.

Hazards
The trees seed prolifically and drop large quantities of hard, marble-sized fruits. People walking on streets or sidewalks with these fruits underfoot could easily slip—a very real hazard.

Common pest problems
The kou leaf worm (Ethmia nigroapicella) attacks and defoliates kou, and severe infestations may kill trees. Kou was much more common in Hawai‘i before the introduction of the leaf worm in the late 1800s. Today attacks seem to be less severe, and most healthy trees recover from occasional attacks of the moth.

Kou seedlings are susceptible to attack by several pathogenic fungi, including Pythium, Phytophthora, and Fusarium. These fungi can be controlled by avoiding both overwatering in the nursery and injuring the roots when the trees are transplanted.

Other comments
In plantings in urban areas in Hawai‘i, the true kou, Cordia subcordata, has often been replaced by the Geiger tree, Cordia sebestena, mainly because the Geiger tree is not attacked by the kou leaf worm. The Geiger tree has similar foliage to the kou tree but red instead of orange flowers and soft white fruits. While it is an acceptable ornamental, Geiger tree is native to the West Indies and has no traditional uses in the Pacific.

KOU LORE
In Tuamotuan mythology kou is believed to be one of the first trees created. In a Tongan legend, the demigod Maui discovered fire and hid it in the kou tree, the breadfruit, and the coconut. The tree is a clan totem in Kiribati (Neal 1965).

In Hawai‘i kou was traditionally planted around houses and the flowers were used for leis. One story is told of a young chiefess who saw an old woman at the seashore in ‘Ewa on leeward O‘ahu stringing a lei of kou blossoms. The girl asked for the lei, whereupon the old woman angrily told her to make her own. The girl went and bathed in the sea and returned, again asking for the lei. The third time she asked for the lei, the old woman angrily told her to make her own. The girl went and bathed in the sea and returned, again asking for the lei. The third time she asked for the lei, the old woman called for the sharks to come and eat her, and they heard the old woman and came and pulled the girl into the ocean and devoured her. The people of ‘Ewa since that time have refused to wear kou leis (Neal 1965).

A Hawaiian verse runs:

_The cold wind of Kahaloa_
_Scattering the blossoms of the kou,
Stringing them into garlands and carried,_
_To wreath the sea of Kapua._

(Handy et al. 1991)

In Melanesia the wood is used for fuel and fires reportedly may be started by rubbing two pieces of kou wood together, hence the name “kerosene wood” in Papua New Guinea.
COMMERCIAL PRODUCTS
While kou wood is valuable, stands of kou trees have seldom been planted for wood production. Rather, wood has been harvested from ornamental trees or those planted in homegardens. Kou’s value may be even more as a landscaping tree and cultural icon than for its wood.

Spacing for commercial production
When planting kou trees in a landscape setting, it should be kept in mind that the trees may grow to be broader than they are tall. Kou tends to be crooked, even when it grows in dense natural thickets, so close spacing of timber trees would be unlikely to produce straight boles. In a landscape setting, trees should be at least 6 m (20 ft) apart, while in a forestry setting they could be planted as close as 3 m (10 ft) apart.

Management objectives
Kou trees are intolerant of shading, and seedlings need to be kept weeded when they are young.

Design considerations
When using kou as a landscape tree, it should be planted far enough away from sidewalks so that the seeds do not fall on the sidewalk and cause a hazard for pedestrians. Kou tolerates light shade and may be grown in mixed gardens with coastal agroforestry trees such as breadfruit and coconut.

Yields
No data available.

Market
The markets for kou wood are usually local carvers, bowl turners, and artisans. In Hawai‘i the wood is often reserved for the most highly skilled carvers. A single large log could sell for thousands of dollars, but large logs are very rare.

INTERPLANTING/FARM APPLICATIONS
Example system 1
Location
Moloka‘i, Hawai‘i.

Description
An alley cropping demonstration was planted by the University of Hawai‘i on former agricultural land on the island of Moloka‘i in 1995 with kou, kamani (Calophyllum inophyllum), milo (Thespesia populnea), and kukui (Aleurites moluccana). The site is dry and windy, with only 460–530 mm (18–21 in) of rainfall annually, and is 150 m (500 ft) above sea level. The soil is classed as a typic Torrox in the USDA classification, with pH 6.5. Alfalfa for forage was grown between the trees until the canopies closed; after that a number of shade-tolerant crops were planted, including ornamental ginger, edible mushrooms, kava, and cacao.

Yields
Tree growth is satisfactory; kou trees averaged 7 m (23 ft) in height with the tallest growing 9 m (30 ft) in 7 years. The constantly high winds have caused the trees to lean over, however, and the effect of the stress on wood quality is unknown. Crop production is less than would be expected in full sun but is nonetheless significant.

Crop/tree interactions
Crop yield, even for the shade-tolerant crops (except for the edible mushrooms), is reduced because of shading. However, the trees also serve as windbreaks, without which fragile crops such as kava would not grow at all. The crops receive supplemental irrigation, which also benefits the trees.
Spacing/density of species
The trees were planted in wide rows 5 m (15 ft) apart with 3 m (10 ft) spacing within the rows.

Example system 2

Location
Aitutaki, Cook Islands.

Description
In an effort to conserve the increasingly rare trees, kou and milo have recently been planted along roadsides in coastal areas (Clarke and Thaman 1993).

Yields
Kou is used by local woodcarvers to make traditional figurines and musical instruments.

PUBLIC ASSISTANCE AND AGROFORESTRY EXTENSION
Extension offices for agroforestry and forestry in the Pacific: http://www.traditionaltree.org/extension.html

INTERNET
Photos of kou: Campus plants at the Mānoa Campus of the University of Hawaii‘i: <http://www.botany.hawaii.edu/faculty/carr/160webindex.htm>.
University of Hawai‘i College of Tropical Agriculture and Human Resources Landscape Series: <http://www2.ctahr.hawaii.edu/ctahr2001/PIO/FreePubs>.

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(☛ indicates recommended reading)

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Species Profiles for Pacific Island Agroforestry (www.traditionaltree.org)

Cordia subcordata (kou)

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Acknowledgments: The authors and publisher thank Heidi Bornhorst, Dietmar Braetigaum, Dale Evans, Heidi Johansen, Jim Hollyer, Art Whistler, and Ed Winkler for their input. The authors also thank the series editor for text suggestions and photographs and Rogerene Arce for contributing growth data.


Sponsors: Publication was made possible by generous support of the United States Department of Agriculture Western Region Sustainable Agriculture Research and Education (USDA-WSARE) Program; SPC/GTZ Pacific-German Regional Forestry Project; USDA Natural Resources Conservation Service (USDANRCS); Kaulunani, an Urban Forestry Program of the DLNR Division of Forestry and Wildlife and the USDA Forest Service; State of Hawai‘i Department of Land & Natural Resources Division of Forestry & Wildlife; USDA Forest Service Forest Lands Enhancement Program; and Muriel and Kent Lighter. This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, and Agricultural Experiment Station, Utah State University, under Cooperative Agreement 2002-47001-01327.

Series editor: Craig R. Elevitch

Publisher: Permanent Agriculture Resources (PAR), PO Box 428, Hōlualoa, Hawai‘i 96725, USA; Tel: 808–324–4427; Fax: 808–324–4129; E-mail: par@agroforestry.net; Web: <http://www.agroforestry.net>. This institution is an equal opportunity provider.

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