

Family: *Fabaceae*

Taxon: *Leucaena KX2-Hawaii*

Synonym: (*L. pallida* x *L. leucocephala* ssp. *glabrata*) **Common Name:** KX2-Hawaii

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation: EVALUATE
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score 3
101	Is the species highly domesticated?		y=-3, n=0	n
102	Has the species become naturalized where grown?		y=1, n=-1	
103	Does the species have weedy races?		y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"		(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)		y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates		y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?		y=-2, ?=-1, n=0	y
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs		y=1, n=0	n
402	Allelopathic		y=1, n=0	
403	Parasitic		y=1, n=0	n
404	Unpalatable to grazing animals		y=1, n=-1	n
405	Toxic to animals		y=1, n=0	
406	Host for recognized pests and pathogens		y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans		y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		y=1, n=0	
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0	y
411	Climbing or smothering growth habit		y=1, n=0	n

412	Forms dense thickets	y=1, n=0	
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	y
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	
705	Propagules water dispersed	y=1, n=-1	
706	Propagules bird dispersed	y=1, n=-1	
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

Designation: EVALUATE

WRA Score 3

Supporting Data:

101	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Is the species highly domesticated?? No] "KX2-Hawaii (Reg. No. CV-281, PI 647963) (<i>Leucaena</i> hybrid) is a tropical, multipurpose, woody forage legume developed at the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii. It was derived from hybrids made in 1976 between <i>Leucaena leucocephala</i> (Lam.) de Wit and <i>L. pallida</i> Britton & Rose, followed by six cycles of recurrent mass selection. Each cycle involved 2- to 4-yr growth of ~2000 plants pollarded quarterly. All trees were eliminated except self-sterile segregants with high forage-regrowth vigor and with high tolerance of the psyllid (<i>Heteropsylla cubana</i> Crawford). Approximately 120 remaining trees were chosen as parents for the next cycle of selection. KX2-Hawaii was released by CTAHR in 2007." ... "KX2-Hawaii was derived from a hybrid of <i>L. leucocephala</i> and <i>L. pallida</i> . Accession K8 (PI 263695) of <i>L. leucocephala</i> is the parent of KX2-Hawaii and was collected in 1959 by H. S. Gentry near Moyohua in Zacatecas, Mexico. It represents the arboreal subspecies <i>glabrata</i> (Rose) S. Zarate." ... "The other parent of the KX2-Hawaii population was 'K376' of <i>L. pallida</i> Britton and Rose that was collected by the author north of Oaxaca City, Mexico, in 1967. This highland Mexican species was chosen for its resistance to the psyllid insect." [A fairly recently developed cultivar which may still possess traits of the parent lineage]
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Species suited to tropical or subtropical climate(s) 2-High] "KX2-Hawaii (Reg. No. CV-281, PI 647963) (<i>Leucaena</i> hybrid) is a tropical, multipurpose, woody, forage legume released by the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii (Honolulu). It was derived from an interspecific hybrid in 1976 between <i>Leucaena leucocephala</i> (Lam.) de Wit and <i>L. pallida</i> Britton and Rose."
202	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Quality of climate match data? 2-High] "KX2-Hawaii (Reg. No. CV-281, PI 647963) (<i>Leucaena</i> hybrid) is a tropical, multipurpose, woody, forage legume released by the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii (Honolulu). It was derived from an interspecific hybrid in 1976 between <i>Leucaena leucocephala</i> (Lam.) de Wit and <i>L. pallida</i> Britton and Rose."
203	1994. Wheeler, R.A./Chaney, W.R./Cecava, M.J./Brewbaker, J.L.. Forage yield and compositional analysis of <i>Leucaena</i> species and hybrids adapted to cool sites. <i>Agroforestry Systems</i> . 25(3): 263-274.	[Broad climate suitability (environmental versatility)? Yes] "Four species of <i>Leucaena</i> (<i>L. leucocephala</i> , <i>L. diversifolia</i> 2n and 4n, and <i>L. pallida</i>) and three interspecific hybrids KX1 (<i>L. diversifolia</i> × <i>L. pallida</i>), KX2 (<i>L. leucocephala</i> × <i>L. pallida</i>), and KX3 (<i>L. leucocephala</i> × <i>L. pallida</i>) were evaluated for forage yield on a cool upland site at the Mealani Research Station on the island of Hawaii (900 m elevation). Two month-old seedlings were planted at a density equivalent to 40,000 trees/ha and coppiced (harvested) every six months for a two-year period." ... "Results indicate that varieties and hybrids of <i>Leucaena</i> are adapted to cool sites and produce good yields of high quality forage." ... "Because KX2 produced higher forage yields, plantings on cool sites would favor the use of KX2 over K636 if animal acceptability and rumen retention of dry matter are not problems."
203	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Broad climate suitability (environmental versatility)? Yes] "KX2, KX3 and K1000 hybrids generally possess some cold adaptation in comparison to <i>L. leucocephala</i> , although light frosts will kill leaf and very heavy frosts will kill stems back to ground level. Require temperatures of 25-30°C for optimum growth. Growth ceases at 14-15°C."
203	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Broad climate suitability (environmental versatility)? Yes] "KX2-Hawaii is tolerant of cool temperatures, inherited from the <i>L. pallida</i> parent. The cold tolerance has been evaluated since 1990 in trials at the Mealani Research Station in Hawaii, elevation of 900 m and mean annual temperature of 17°C. Austin et al. (1997) reported forage dry-matter yields of 1.28 and 0.27 t ha ⁻¹ and 3-yr heights of 13 and 3 m for KX2 and <i>L. leucocephala</i> , respectively." [Broader climate suitability with respect to other <i>Leucaena</i> cultivars]
204	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "KX2-Hawaii (Reg. No. CV-281, PI 647963) (<i>Leucaena</i> hybrid) is a tropical, multipurpose, woody, forage legume released by the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii (Honolulu). It was derived from an interspecific hybrid in 1976 between <i>Leucaena leucocephala</i> (Lam.) de Wit and <i>L. pallida</i> Britton and Rose."

205	2006. Shi, X./Brewbaker, J.L.. Vegetative propagation of <i>Leucaena</i> hybrids by cuttings. <i>Agroforestry Systems</i> . 66: 77–83.	[Does the species have a history of repeated introductions outside its natural range? Yes] "KX2 is now cloned and planted widely for forage in Vietnam,..."
205	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . <i>Journal of Plant Registrations</i> . 2(3): 190-193.	[Does the species have a history of repeated introductions outside its natural range? Yes] "Early cycles of selection of this hybrid were distributed as 'KX2' in the late 1980s to seven countries to examine forage yields and psyllid resistance. It was later distributed internationally by the Australia Council of International Agricultural Research."
301	2012. WRA Specialist. Personal Communication.	[Naturalized beyond native range? No] No evidence of naturalization found.
302	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. <i>Tropical Forages: an interactive selection tool</i> , [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Garden/amenity/disturbance weed? No evidence to date, but potential exists] "Other <i>leucaena</i> hybrids are known to be shy seeding and are commonly self-incompatible, thereby reducing their weed potential. Where trees are permitted to seed, segregation among the resultant seedlings may re-establish self compatibility, higher seed production, and higher weed risk." [No evidence to date]
303	2003. Weber, E.. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Agricultural/forestry/horticultural weed? No] " <i>Leucaena leucocephala</i> " ... "The shrub forms extensive and dense thickets displacing the original vegetation and reducing species richness." [No evidence, but one parent used to create KX2 is a well-documented weed. KX2 may therefore possess weedy traits inherited from <i>L. leucocephala</i>]
304	2003. Weber, E.. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Environmental weed? No] " <i>Leucaena leucocephala</i> " ... "The shrub forms extensive and dense thickets displacing the original vegetation and reducing species richness." [No evidence, but one parent used to create KX2 is a well-documented weed. KX2 may therefore possess weedy traits inherited from the <i>L. leucocephala</i>]
305	2003. Weber, E.. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] " <i>Leucaena leucocephala</i> " ... "The shrub forms extensive and dense thickets displacing the original vegetation and reducing species richness."
401	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . <i>Journal of Plant Registrations</i> . 2(3): 190-193.	[Produces spines, thorns or burrs? No] No evidence
402	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. <i>Tropical Forages: an interactive selection tool</i> , [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Allelopathic? Unlikely] "Compatibility (with other species) Compatible with a range of grass and legume species. Can be difficult to establish <i>leucaena</i> into existing grass pastures without clean cultivation or removal of competition. Height management is essential to prevent rapidly growing hybrids from growing out of reach of grazing livestock. This can be achieved through a combination of grazing and slashing. Companion species <input type="checkbox"/> Top Grasses: Hybrids have been grown experimentally with signal grass (<i>Brachiaria decumbens</i>) in Papua New Guinea and wet tropical Australia and with <i>imperata</i> (<i>Imperata cylindrica</i>) in Indonesia and the Philippines. Normally grown as a hedgerow with grasses or crops grown between hedgerows. Can be grown as a sole species in a forage bank."
402	2010. Youkhana, A.H./Idol, T.W.. Growth, Yield and Value of Managed Coffee Agroecosystem in Hawaii. <i>Pacific Agriculture and Natural Resources</i> . 2: 12-19.	[Allelopathic? Unlikely] "Abstract: Coffee can be cultivated under various management schemes from heavy shade to full sun. Higher yields are generally achieved in full sun but often at the expense of smaller beans and greater requirements for water and nutrients. We compared growth, yield, bean size, and total value in a coffee agroecosystem in Hawaii grown in full sun or at two shade levels (30 and 50%) under <i>Leucaena</i> variety KX2 trees. Coffee under full sun had more fruiting nodes per lateral and more beans per node, resulting in significantly greater yields. Bean size, however, increased with shade level. For both low and medium shade, the majority of the yield fraction was in the largest size class (≥ 19 mm). As a result, there was no significant difference between low shade and full sun in the total value of the beans. Within a mechanized production system, the low shade treatment with <i>Leucaena</i> -KX2 represents an optimum trade off between yield and bean size." [Unlikely to be allelopathic. Used as a cover crop for coffee]
403	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . <i>Journal of Plant Registrations</i> . 2(3): 190-193.	[Parasitic? No] Fabaceae

404	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Unpalatable to grazing animals? No] "KX2 F1, Ohana, KX3, Rendang and Bharu are used primarily for forage production but also for fuelwood production and as shade trees." ... "Ability to spread - Will not normally spread under grazing as cattle, goats and sheep relish young seedlings." ... "KX2 F1 is highly palatable to most grazing animals, especially compared to other forage tree legumes such as Calliandra calothyrsus and Gliricidia sepium . KX2 F1 ranked together with L. leucocephala accessions as being highly palatable to sheep and cattle in cafeteria trials in Australia and the Philippines. K1000 is probably the least palatable of the hybrids due to the low palatability of the L. esculenta parent."
404	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid Leucaena. Journal of Plant Registrations. 2(3): 190-193.	[Unpalatable to grazing animals? No] "Animal-grazing trials of kikuyugrass (Pennisetum clandestinum Hochst. ex Chiov.) pastures supplemented with KX2-Hawaii are ongoing in this region. At an elevation of 900 m in Haiti, the dry biomass yields of a Florida selection of KX2 averaged about 3 t ha ⁻¹ yr ⁻¹ between 1997 and 2001, somewhat less than the best entries of L. leucocephala (Isaac et al., 2006). Plants were in hedgerows spaced 4 m apart and interplanted with corn (Zea mays L.), and psyllid infestation was not reported."
405	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Toxic to animals? Potentially, but less so than L. leucocephala] "Contains mimosine, a non-protein amino acid that has antimitotic and depilatory effects on animals. Concentrations in the edible fraction of KX2 F1 ranged from 2-3% mimosine, considerably lower than for L. leucocephala . Mimosine is acutely toxic to animals but is normally converted to 3-hydroxy-4(1H)-pyridone (DHP) upon ingestion. DHP is goitrogenic and, if not degraded, can result in low serum thyroxine levels, ulceration of the oesophagus and reticulo-rumen, excessive salivation, poor appetite and low liveweight gains, especially when the diet contains more than 30% leucaena. In most countries in the Americas and southeast Asia, rumen microbes can completely detoxify DHP and specific DHP-degrading bacteria have been identified and transferred to Australia, USA, Africa and China." ... "Relatively few animal production experiments have been conducted with hybrid accessions. In subtropical Australia, cattle grazing KX2 F1 hybrid leucaena produced liveweight gains of 0.5 kg/head/day over a 4-month period, in comparison to L. leucocephala and L. pallida , which supported liveweight gains of 0.6 and 0.3 kg/head/day respectively. In northern Vietnam, lactating goats maintained milk production when concentrate feeds were replaced with KX2 F1 hybrid forage ."
406	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Host for recognized pests and pathogens? No] "Many hybrids were initially bred for resistance to the psyllid , Heteropsylla cubana, a small aphid-like sucking insect that reduces production of all L. leucocephala cultivars and accessions. KX2 F1 and K1000 hybrids are highly psyllid -resistant, whereas some of the advanced generation hybrids have only moderate resistance. Newly emerged nursery and field-grown seedlings are susceptible to damping-off diseases caused by the fungal species Pythium or Rhizoctonia. Soil insects such as earwigs, scarab beetles, termites and cutworms can cause serious damage to emerging seedlings and should be controlled. Seed production can be reduced by the flower-eating larvae of the moth Ithome lassula, and by seed-eating bruchid beetles. Other pests and diseases that attack L. leucocephala may also attack Leucaena hybrids."
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No] No evidence
408	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Creates a fire hazard in natural ecosystems? Unknown] "Mature plants are tolerant of moderate intensity fires, regrowing readily from burnt stumps."
409	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Is a shade-tolerant plant at some stage of its life cycle? Presumably yes] "Unknown, but likely to be similar to L. leucocephala , being productive under moderate shade to 60% of photosynthetically active radiation (PAR)."
410	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Tolerates a wide range of soil conditions? Yes] "Soil requirements In their native range, Leucaena spp. Grows on shallow limestone soils, coastal sands and seasonally dry, self-mulching vertisol soils of pH 7.0-8.5. In exotic locations they require well-drained soils with pH above 5.5, or above 5.0 where aluminium saturation is very low. Some hybrids have improved acid soil tolerance cf. L. leucocephala , but, in general, the hybrids are intolerant of soils with low pH, low P, low Ca, high aluminium saturation, and are sensitive to high salinity and waterlogging."

410	2005. Purwantari, N.D.. Forage Production of Some Lesser-Known <i>Leucaena</i> Species Grown on Acid Soils. Indonesian Journal of Agricultural Science. 6(2): 46-51.	[Tolerates a wide range of soil conditions? Yes] " <i>Leucaena</i> KX2 hybrid has also shown their superiority on alkaline limestone soil, black alluvial of West Timor (Nulik et al. 2004); fertile volcanic soil of Lombok, West Nusa Tenggara (Panjaitan unpubl.)." ... "This study implies that <i>Leucaena</i> KX2 hybrid is adaptable to acid soil; therefore it can be grown in wider areas throughout Indonesia."
411	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Climbing or smothering growth habit? No] "KX2-Hawaii grows to a mature height of about 13 m in 4 yr, with regrowth of 3 to 5 m per year"
412	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Forms dense thickets? Unknown] " <i>Leucaena leucocephala</i> " ... "The shrub forms extensive and dense thickets displacing the original vegetation and reducing species richness." [Unknown for KX2, but since it is a hybrid derived from <i>Leucaena leucocephala</i> and <i>L. Pallida</i> , it may possess ecological traits similar to the parental lineage]
501	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Aquatic? No] Terrestrial
502	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Grass? No] Fabaceae
503	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Nitrogen fixing woody plant? Yes] Fabaceae
504	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "KX2-Hawaii grows to a mature height of about 13 m in 4 yr, with regrowth of 3 to 5 m per year"
601	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Evidence of substantial reproductive failure in native habitat? Not Applicable] "KX2-Hawaii (Reg. No. CV-281, PI 647963) (<i>Leucaena</i> hybrid) is a tropical, multipurpose, woody, forage legume released by the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawaii (Honolulu)."
602	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Produces viable seed? Yes] "KX2 F1 hybrids are self-incompatible, but segregate strongly in subsequent generations with many individuals becoming self-fertile. They generally flower into shortening days and produce only light seed crops."
602	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Produces viable seed? Yes] "KX2-Hawaii is an open-pollinated population representing six cycles of recurrent selection from hybrids made in 1976. For each breeding cycle, approximately 2000 trees were planted and coppiced quarterly over a period of two or more years to allow selection based on the following major criteria: (i) psyllid resistance, (ii) forage regrowth vigor, and (iii) self-sterility due to S allele– type incompatibility. Recurrent selection cycles were established at the Waimanalo Research Station of the University of Hawaii at sea level on Oahu in 1985 (F1 trees), 1987 (F2 trees, Cycle 1 of selection), and then in 1989, 1992, 1996, 2003, and 2007 (Cycle 6). Additional plantings at an elevation of 800 m grew very well (Austin et al., 1997) but failed to produce seeds. Approximately 120 trees were selected each cycle to serve as seed parents (other trees were killed), and panmixia is assumed. Seediness is an undesirable trait associated with the highly self-fertile common variety of <i>L. leucocephala</i> and led to our emphasis on self-sterility. Some self-fertile trees continue to segregate in KX2 Hawaii as a result of the competition interaction among S alleles characteristic of many polyploid plant species (Brewbaker, 1954). Seed harvest will continue among selected trees in Cycle 6 from orchards at CTAHR's Waimanalo Research Station on Oahu, Hawaii."
603	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Hybridizes naturally? Unknown] "Advanced generation hybrids are generally less productive than F1s."
603	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Hybridizes naturally? Unknown] "KX2-Hawaii is an open-pollinated population representing six cycles of recurrent selection from hybrids made in 1976." [An artificially created hybrid that may have the potential to backcross with parental stock]
604	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Self-compatible or apomictic? No] "KX2 F1 hybrids are self-incompatible, but segregate strongly in subsequent generations with many individuals becoming self-fertile. "

604	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Self-compatible or apomictic? No] "Since individual plants of KX2-Hawaii are usually self-sterile, it has been of interest to refine methods of cloning outstanding individual plants as high-value forage or timber (Shi and Brewbaker, 2006), and this has been practiced in Vietnam (Anon., 2002). Such plantings should be seedless and attractive environmentally."
605	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Requires specialist pollinators? No] "KX2-Hawaii is an open-pollinated population representing six cycles of recurrent selection from hybrids made in 1976." [Although irrelevant if KX2 is sterile]
606	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Reproduction by vegetative fragmentation? No] "KX2 F1 hybrids do not breed true to type and are moderately difficult to produce from stem cuttings. "
606	2006. Shi, X./Brewbaker, J.L.. Vegetative propagation of <i>Leucaena</i> hybrids by cuttings. Agroforestry Systems. 66: 77–83.	[Reproduction by vegetative fragmentation? No] "Rooting ability of <i>Leucaena</i> hybrids basically depended on genotypes. Different hybrids consistently showed dramatic differences in rooting percentage and root qualities. The results were in accordance with those of Austin (1995) and Sun (1996), who concluded that KX4 is a hybrid that is easy to root, whereas hybrids like KX2 and species like <i>L. pallida</i> are difficult to root." [Also difficult to root from cuttings]
607	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Minimum generative time (years)? 2] "KX2-Hawaii grows to a mature height of about 13 m in 4 yr, with regrowth of 3 to 5 m per year (Fig. 1). It flowers within 2 yr and matures seed in 90 d." ... "In central Queensland, Australia (27°S) peak flowering of KX2 occurs from February to April, although trees may not flower in their first year. Little known regarding the potential seed yields, but they are expected to be as low as 100 kg/ha/year."
701	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Differences also occur in the frequency of pods. Single flowering heads of <i>L. leucocephala</i> will bear from 5 to 20 pods, while multiple pods are very rare in heads of both KX2-Hawaii and its <i>L. pallida</i> parent. Populations of the hybrid are variable in many traits since the trees derive from outcrossed seed among self-sterile plants. About 20% of the seeds of KX2-Hawaii abort, but plump viable seeds are comparable in weight to the K8 parent." [Unlikely. Seeds rarely produces and lack a means of external attachment]
702	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Propagules dispersed intentionally by people? Yes] Since individual plants of KX2-Hawaii are usually self-sterile, it has been of interest to refine methods of cloning outstanding individual plants as high-value forage or timber (Shi and Brewbaker, 2006), and this has been practiced in Vietnam (Anon., 2002). Such plantings should be seedless and attractive environmentally."
703	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Propagules likely to disperse as a produce contaminant? No] " <i>Leucaena leucocephala</i> " ... "seeds glossy brown, ellipsoid or ovoid, laterally flattened, 6-9 mm long, 3.5-5.5 mm wide, 0.8-2 mm thick, with a pleurogram ca. 4 mm long and 1.5 mm wide." [Similar sized seeds relatively large and unlikely to be a produce contaminant]
703	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Propagules likely to disperse as a produce contaminant? No] Differences also occur in the frequency of pods. Single flowering heads of <i>L. leucocephala</i> will bear from 5 to 20 pods, while multiple pods are very rare in heads of both KX2-Hawaii and its <i>L. pallida</i> parent. Populations of the hybrid are variable in many traits since the trees derive from outcrossed seed among self-sterile plants. About 20% of the seeds of KX2-Hawaii abort, but plump viable seeds are comparable in weight to the K8 parent." [Unlikely. Seeds rarely produces. Seeds probably similar in size to <i>L. leucocephala</i>]
704	2003. Shelton, H.M./Dalzell, S.A./McNeil, F.L.. A survey of the weed status and management of <i>Leucaena leucocephala</i> (Lam.) de Wit in Queensland, Australia. Plant Protection Quarterly. 18(2): 42-47.	[Propagules adapted to wind dispersal? Possibly] " <i>Leucaena leucocephala</i> " ... "Mechanisms of seed dispersal were reported to be water, wind, animals and via cattle dung." [Unknown for KX2]
704	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Propagules adapted to wind dispersal? Possibly] "Differences also occur in the frequency of pods. Single flowering heads of <i>L. leucocephala</i> will bear from 5 to 20 pods, while multiple pods are very rare in heads of both KX2-Hawaii and its <i>L. pallida</i> parent." [Although not specifically adapted for wind dispersal, pods could be blown by wind as has happened in the parent plant <i>L. leucocephala</i>]
705	2003. Shelton, H.M./Dalzell, S.A./McNeil, F.L.. A survey of the weed status and management of <i>Leucaena leucocephala</i> (Lam.) de Wit in Queensland, Australia. Plant Protection Quarterly. 18(2): 42-47.	[Propagules water dispersed? Possibly] " <i>Leucaena leucocephala</i> " ... "Mechanisms of seed dispersal were reported to be water, wind, animals and via cattle dung." [Unknown for KX2]

706	1985. Smith, C.W.. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	[Propagules bird dispersed? Unknown] "The seeds are not actively dispersed except occasionally by rodents and alien granivorous birds." [<i>L. leucocephala</i> may be bird-dispersed. Unknown for KX2]
707	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Propagules dispersed by other animals (externally)? No] "Differences also occur in the frequency of pods. Single flowering heads of <i>L. leucocephala</i> will bear from 5 to 20 pods, while multiple pods are very rare in heads of both KX2-Hawaii and its <i>L. pallida</i> parent. Populations of the hybrid are variable in many traits since the trees derive from outcrossed seed among self-sterile plants. About 20% of the seeds of KX2-Hawaii abort, but plump viable seeds are comparable in weight to the K8 parent." [Unlikely. Seeds rarely produces and lack a means of external attachment]
708	1993. Gardener, C.J./Mclvor, J.G./Jansen, A.. Passage of Legume and Grass Seeds Through the Digestive Tract of Cattle and Their Survival in Faeces. Journal of Applied Ecology. 30(1): 63-74.	[Propagules survive passage through the gut? Yes] "There were large significant differences between species when the number of seeds recovered intact in the faeces was expressed as a fraction of the number of seeds fed (Table 5). The highest value was 80% for <i>Leucaena leucocephala</i> and the lowest was 6% for <i>Trifolium repens</i> ." [Seeds of KX2 would presumably share traits of one of its parental species, <i>L. leucocephala</i>]
708	1993. Gardener, C.J./Mclvor, J.G./Jansen, A.. Survival of Seeds of Tropical Grassland Species Subjected to Bovine Digestion. Journal of Applied Ecology. 30(1): 75-85.	[Propagules survive passage through the gut? Yes] "The survival of seeds in nylon bags placed first in the rumen and then immersed in acid pepsin has proved a good indicator of the actual survival of seeds through the digestive tract of cattle. Gardener, Mclvor & Jansen (1993) studied the survival of seeds of seven grasses and 10 legumes placed in the rumens of steers and found close agreement with the nylon bag results (Fig. 6). Many seeds of <i>Pennisetum clandestinum</i> , <i>Leucaena leucocephala</i> , <i>Stylosanthes hamata</i> , <i>Stylosanthes scabra</i> , <i>Lotononis bainesii</i> and <i>Neonotonia wightii</i> survived..." [Seeds of KX2 would presumably share traits of one of its parental species, <i>L. leucocephala</i>]
801	2000. Gardiner, C./Jones, R.. <i>Leucaena</i> KX2: propagation aspects. Proc. of the Sixth Australian Tropical Pastures Conference In: Sixth Australian Tropical Pastures Conference, 26-28 April 2000, Emerald, QLD, Australia.	[Prolific seed production (>1000/m ²)? No] "Many livestock producers in parts of tropical Queensland and in developing countries regard <i>leucaena</i> (<i>Leucaena leucocephala</i>) as the premium forage shrub. It possesses many of the attributes sought in a shrub forage plant; however, to other members of the community, some of these attributes, particularly its high seed production and capacity to spread into non-target areas, make it an environmental weed. The hybrid <i>leucaena</i> , known as KX2 (<i>Leucaena leucocephala</i> x <i>L. pallida</i>) is psyllid resistant and more productive in terms of total biomass than <i>L. leucocephala</i> but does not produce abundant seed. Although it is most unlikely to present a weed risk, it is difficult to establish for livestock production or as a multipurpose shrub legume. Simple vegetative propagation methods need to be developed."
801	2002. Mullen, B.F./Gutteridge, R.C.. Wood and biomass production of <i>Leucaena</i> in subtropical Australia. Agroforestry Systems. 55: 195-205.	[Prolific seed production (>1000/m ²)? No] "The KX2 and KX3 hybrids were the outstanding accessions in the collection giving the highest yields after a two-year rotation period. However, their evaluation in large plots and subsequent use for large-scale biomass plantations is currently limited by a lack of seed."
801	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Prolific seed production (>1000/m ²)? No] "KX2 F1 hybrids are self-incompatible, but segregate strongly in subsequent generations with many individuals becoming self-fertile. They generally flower into shortening days and produce only light seed crops."
801	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . Journal of Plant Registrations. 2(3): 190-193.	[Prolific seed production (>1000/m ²)? No] "About 20% of the seeds of KX2-Hawaii abort, but plump viable seeds are comparable in weight to the K8 parent. Since individual plants of KX2-Hawaii are usually self-sterile, it has been of interest to refine methods of cloning outstanding individual plants as high-value forage or timber (Shi and Brewbaker, 2006)."
802	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Evidence that a persistent propagule bank is formed (>1 yr)? Presumably Yes] "Seed must be scarified to break the impermeable testa. Previously, hot water treatment was recommended but resulted in highly variable results including reduced viability. Mechanical scarification, using coarse sandpaper (for small seed lots) or abrasive-lined rotating drum scarifiers, is now preferred." [Although seed production is low, any seeds produced would likely persist in the soil]
803	2005. Cook, B.G./Pengelly, B.C./Brown, S.D. et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Well controlled by herbicides? Yes] "Herbicides such as bentazone (post emergence) and imazethapyr (post-plant) can be used to control weeds in establishing <i>leucaena</i> hybrids. Can be controlled by basal bark application of herbicides containing 120 g/L picloram and 240 g/L triclopyr mixed with diesel. Glyphosate will kill slashed regrowth although repeat applications may be necessary."

804	2005. Cook, B.G./Pengelly, B.C./Brown, S.D.et al.. Tropical Forages: an interactive selection tool., [CD-ROM],. SIRO, DPI&F(Qld), CIAT and ILRI, http://www.tropicalforages.info/index.htm	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Extremely tolerant of regular defoliation by cutting, but marginally less persistent than <i>L. leucocephala</i> under grazing. <i>L. leucocephala</i> growing on a poorly drained podsolic in southeast Queensland, Australia had a half life of 23 years under regular grazing, but much longer life span can be expected under favourable conditions." ... "Mature plants are tolerant of moderate intensity fires, regrowing readily from burnt stumps."
804	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . <i>Journal of Plant Registrations</i> . 2(3): 190-193.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "It is harvestable as high-value hardwood (specific gravity 0.6) at 25 cm diameter (breast height) on a 10- to 12-yr cycle. It is known to survive continuous coppicing for many years and appears to be highly drought tolerant."
805	2008. Brewbaker, J.L.. Registration of KX2-Hawaii, Interspecific c-Hybrid <i>Leucaena</i> . <i>Journal of Plant Registrations</i> . 2(3): 190-193.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? No] "The cultivar was released following six cycles of recurrent mass selection for self sterility, high forage yield and resistance to the psyllid insect (<i>Heteropsylla cubana</i> Crawford)." [Bred specifically for psyllid resistance, the main pest of <i>Leucaena</i> in Hawaii and elsewhere]