Weed Risk Assessment for

Acacia nilotica (L.) Willd. ex Delile

prickly acacia

Addendum to a report, Analysis and Assessment of the Invasive risk of A*cacia nilotica*, submitted by Sarah Reichard and Lizbeth Seebacher, University of Washington, College of Forest Resources, Center for Urban Horticulture.

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Addendum to a report, Analysis and Assessment of the Invasive risk of *Acacia nilotica,* submitted by Sarah Reichard and Lizbeth Seebacher, University of Washington, College of Forest Resources, Center for Urban Horticulture, Seattle, WA.

This addendum provides a risk assessment that conforms to the USDA, Animal and Plant Health Inspection Service (APHIS) format for weed risk assessment. The information from the report was adapted to this format and risk ratings were assigned by Polly Lehtonen, USDA, APHIS, Plant Protection and Quarantine.

Stage 1: Initiating Weed Risk Assessment Process

Step 1. Document the Initiating Event(s) for the weed risk assessment

This assessment is part of Plant Protection and Quarantine's continuous effort to identify potential Federal noxious weeds. The attached report was the product of a USDA Invasive Species Coordination initiative, a contract with Dr. Sarah Reichard of the University of Washington. The WRA area is the United States.

Step 2. Identify and Cite Previous Weed Risk Assessments

This is the first USDA weed risk assessment for this species.

Step 3. Establish Identity of Weed

Scientific Name: Order, Family, Genus, and species:

Fabales, Fabaceae, *Acacia nilotica* (L.) Willd. ex Delile

Nine subspecies are recognized. (See Appendix 1)

Synonym(s):

Acacia adansonii Guill. & Perr.
Acacia adstringens (Schumach.) Berhaut
Acacia arabica (Lam.) Willd.
Acacia indica Benth.
Acacia scorpioides W. Wight
Mimosa arabica Lam.
Mimosa nilotica L.
Mimosa scorpioides L.
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Common names:

prickly acacia, black thorn, Egyptian thorn, Nile acacia, algaroba, babul, gum arabic tree, tiare (HEAR, 2001).
suntwood (Bailey and Bailey, 1976)
scented thorn (CPC, 2001)
babul acacia, Egyptian acacia (Rehm, 1994)
Indian gum-arabic-tree, thorny acacia (Townsend and Guest, 1966)
thorn-mimosa (Markle, et al, 1998)
acacia à gomme (Rehm, 1994) [French]
gommier rouge (Rehm, 1994) [French]
arabische Gummiakazie (Rehm, 1994) [German]
acacia gomifera (Rehm, 1994) [Spanish]
lekkerruikpeul (Parsons and Cuthbertson, 1992) [South Africa]
Acacia de Cayenne, black piquant, casha, cassie, goma ar bica (ILDIS, 2001)

Description, general morphology:

Acacia nilotica is a perennial non-climbing shrub or tree, usually 2.5-15 meters high, sometimes as low as 1.2 meters or up to 25 meters. The bark or trunk is whitish and pubescent when young, rough, fissured, black to gray or brown when mature, never powdery nor peeling. The crown varies with location; in Africa it is flattened or rounded and spreading, in India and Pakistan it is hemispherical or narrow and erect. Plants are spiny when young and at maturity bear a pair of stout stipular spines below each leaf on young stems. The spines are 5 to 50 mm long, and are straight, often deflexed. Damaged stems exude a clear gum (Bolton et al., 1985). Petioles have 1-2 glands and the leaflets are found mostly in 12-27 pairs per pinnae, rarely as few as 7 or as many as 36, glabrous to pubescent, 1.5-7 mm long in diameter, on axillary peduncles 1.2-4.5 cm long (Fagg et al., 1990).

The flowers, born as terminal balls in the leaf axils, are yellow, sweetly scented, and nectarless (Bolton et al., 1985). The flower heads are about 1.2 cm in diameter, usually in clusters of 2 to 6, on pubescent stalks, each stalk with a pair of bracts near the midpoint (Parsons and Cuthbertson, 1992). Most flowers are functionally male with a few hermaphrodites (Invasive Woody Plants in the Tropics website, 1997). The fruit is an indehiscent leathery pod (Kriticos et al., 1999). The pod is variable, dark brown to gray or gray-green, straight or curved, glabrous to velvety, compressed but rather thick, usually strongly constricted between seeds, 10-20 cm long, 1-2 cm wide and edible (Bolton et al., 1985; Parsons and Cuthbertson, 1992). There are 6- 16 seeds per pod (Fagg et al., 1990). Seeds are depressed and subglobular (Parsons and Cuthbertson, 1992).

Plants have a deep, woody taproot with branching surface lateral roots (Mackey, 1997).

Acacia nilotica is easy to recognize by its feathery leaves, bright yellow flowers in round heads; bracteate flower stalks, straight stipular spines which are often slightly deflexed, and dark
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indehiscent pods compressed over the seeds (Fagg, 1992; Isely, 1973).

Pertinent information regarding life history, including growth, development, means of reproduction and dispersal:

Seeds germinate after a period of warm moist weather in late spring after scarification by age-related processes, fire or passing through an animal's digestive tract. Seedling growth is rapid unless hampered by good grass cover. Trees in Australia usually flower and set seed 2 or 3 years after germination (Parsons and Cuthbertson, 1992). Growth rates are variable; this species may mature in eight months under ideal conditions, or not for up to 12 years under harsh conditions (Kriticos et al., 1999).

All of the flowers produce pollen but the tree produces relatively few fully hermaphroditic flowers, which are at the top of the inflorescence (Tybirk, 1989). Prickly acacias are pollinated by insects, primarily bees. Prickly acacia reproduces entirely from seed, which are first produced when the tree's basal diameter exceeds 30 mm. Many pods may be aborted under adverse conditions. Cattle are the primary seed dispersal vectors and dispersed seeds are highly clumped. Mortality rates for juvenile and adult plants are low compared to that of seedlings, which compete for resources and self-thin. Adult trees persist for 25-60 years (Kriticos et al., 1999).

Preferred habitat and climatic tolerance:

A. *nilotica* has been planted widely for generations in arid and semi-arid regions of India and Pakistan. It is characteristic of dry regions and does not grow in areas receiving rainfall in excess of about l250 mm, or in localities susceptible to frost and cold (Puri et al, 1994). This species is tolerant of salts, arid environments (Minhas et al, 1997), grazing, drought and fire (Invasive Woody Plants in the Tropics website, 1997). Acacias often form the main part of the woody vegetation in the semiarid areas on African savannas (Tybirk, 1989).

The African subspecies have distinct ecological preferences. Subspecies *subalata, leiocarpa* and *adstringens* occur in wooded grassland, dry scrub forests and savanna. Subspecies *nilotica* and *tomentosa* occur in riverine habitats and seasonally flooded areas. Subspecies *kraussiana* prefers dry grasslands and savannas, especially on compacted sandy loam, shallow granite or clay soils along drainages and rivers, but away from flooding. On the subcontinent, subspecies *indica* forms low altitude dry forests frequently on alluvium soils. Subspecies *hemispherica* is restricted to dry sandy streams beds near Karchi, subspecies *cupressiformis* has similar preferences to subsp. *indica* though is less resilient to weed competition (Fagg, 1992).

In Australia, *Acacia nilotica* occurs along streams and bore drains, in semi-arid grasslands (Parsons and Cuthbertson, 1992).

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Native distribution:

The native distribution of *Acacia nilotica* includes much of Africa and the Indian subcontinent Cox, 1997). From the GRIN database (USDA, ARS, National Genetic Resources Program. 2001), the native distribution includes:

Africa: Algeria, Angola, Botswana, Egypt, Ethiopia, Gambia, Ghana, Guinea-Bissau, Kenya, Libya, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Asia: Iran, Iraq, Israel, Oman, Saudi Arabia, Syria, Yemen, India, Nepal, Pakistan

Current world distribution beyond native distribution:

(From ILDIS, 2001; Fagg, 1992; HEAR, 2001; Isely, 1973; Parsons and Cuthbertson, 1992; USDA, USGS, 1999).

Asia: China, Viet Nam . Gavinlertvatana et al (1987) mention *Acacia nilotica* as being introduced into Indonesia, where it is aggressive and regarded as a pest.

Australia (Queensland and Northern Territory)

Caribbean: Antigua-Barbuda, Bahamas, Barbados, Cuba, Grenada, Guadeloupe, Martinique, Montserrat, St. Lucia, St. Martin – St. Barthelemy

SW Pacific: New Caledonia, Wallis and Futuna Islands,
Atlantic: Cape Verde Islands

Indian Ocean: Mauritius, Rodriguez Island.

South America: Galapagos Islands

Stage 2: Assessing pest risk

Step 4: Geographic and Regulatory Information

Federal noxious weeds are prohibited entry into the United States. According to the Plants Database (2002), *Acacia nilotica* occurs in Puerto Rico and the Virgin Islands, but not on the mainland or in Hawaii. Neal (1965), however, mentions *Acacia nilotica* as one of the introduced species in Hawaii. It is probably cultivated in at least several States, as it is offered for sale by at least three nurseries in the United States. Three of the subspecies, *nilotica*, *adansonii*, and *tomentosa* are listed in Hortus Third, a dictionary of plants cultivated in the United States and Canada.

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Step 5. Assess Economic and Environmental Importance: Consequences of Introduction

After each of the four risk elements (A-D) in step 5, we discuss the rationale for the rating and the level of certainty.

A. **Establishment potential or habitat suitability in the protected area.**

Estimate the potential range in the United States, considering suitable climate conditions. (See discussion and map in the attached report.)

Assign rating as follows:

Rating	Numerical Score	Explanation: A suitable climate and habitats would permit the weed to survive and establish:
High	3	In most or all of the United States (generally, in more than four plant hardiness zones).
Medium	2	In approximately one-third to two thirds of the United States (generally, in three or four plant hardiness zones).
Low T	1 T	In less than one third of the United States.
Negligible	0	No potential to survive and become established in the WRA area.

Rationale for the rating and the level of certainty:

Based on the CLIMEX climate prediction model using the known distribution of *Acacia nilotica* in Queenland, Northern Territories, Western Australia, and New South Wales where this species is well established, the climatic correlation is high throughout the states of Florida, Texas and California as well as the coastal southeast. A nursery website (Phoenix desert tropicals at http://www.desert-tropicals.com/) recommends the plant for USDA hardiness zones: 9b-11, describes the young trees as tender, and hardy in Phoenix to 26°F (-3°C). *Acacia nilotica* occurs from sea level to over 2000 m. It withstands extremes of temperature (-1 to 50° C), but is frost tender when young.

In Queensland, a series of wet years in the 1950s and 1970s combined with an increase in cattle stocking rates and grazing precipitated dispersal and large scale regeneration after a long "dormant" lag phase (Mackey, 1997). There are a few reports that frost susceptible areas in Queensland have *Acacia nilotica* populations which are slowly spreading and setting seeds (Carter et al, 1991).

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Level of certainty = Uncertain. The conservative prediction is based only on climate preference and documented distribution in other parts of the world. Although the potential range is three plant hardiness zones, the zones encompass an area smaller than one third of the United States.

B. Spread potential after establishment, Dispersal Potential

Check each of the following that apply:

- Consistent and prolific seed production 3
- Rapid growth to reproductive maturity 3
- High germination rate under a wide range of conditions
- Ability to suppress the growth of other plants by releasing a chemical inhibitor
- Ability to persist as dormant long-lived propagules or underground parts, such as rhizomes, tubers, turions or stolons
- Seed dormancy 3
- Stress tolerance, 3 including ability to resist herbicides
- Ability to colonize a wide variety of habitats
- Lack of natural control agents
- Well-developed storage tissue (for example, tap root) 3
- Dispersal by windT, waterT, machinery, animals T, and/or humans T.

Assign rating as follows:

Rating	Numerical score	Explanation
High T	3 T	Weed has potential for rapid natural spread throughout its potential range in the WRA area (*e.g.*, high reproductive potential ***AND*** highly mobile propagules).
Medium	2	Weed has potential for natural spread throughout a physiographic region of the WRA within a year (*e.g.*, it has either high reproductive potential ***OR*** highly mobile propagules).
Low	1	Weed has potential for natural spread locally in the WRA area within a year (some reproductive potential and/or some mobility of propagules).
Negligible	0	Weed has no potential for natural spread in the WRA area.

Rationale for the rating and the level of certainty:

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Carter (1994) lists these reasons for *Acacia nilotica*'s successful invasion in Queensland Australia: seedlings and young trees are protected from grazing by thorns; it has long distance dispersal mechanisms allowing uncontrollable spread; large seed production; long-lived seeds; young plants grow rapidly; it is tolerant of grazing, drought, fire and salinity; trees are long-lived (30-60 years); growth is possible over an extensive climate range; and the useful characteristics of the plant and slow initial spread led to complacency among government authorities.

Prickly acacia reproduces entirely from seed, first reproducing when the tree's basal diameter exceeds 30 mm. Growth rates are variable; this species may mature in eight months under ideal conditions, or not for up to 12 years under harsh conditions (Kriticos et al., 1999). Seed production is high (up to 175,000 seeds per tree) when water is plentiful. In drier locations such as Kenya, trees produced between 153 and 34,000 seeds. The half-life is 10-12 months for the seed bank (Carter, 1994). Seeds are long lived (more than five years) in the soil (Brown and Carter, 1998). Most seeds are "hard" due to impermeable seed coats, and can remain dormant in soil for long periods (Parsons and Cuthbertson, 1992). Stored seed may require scarification in order to germinate (Duke, 1983).

Dispersal is primarily through cattle consumption of the seedpods and deposition of the seed in the dung. Sheep also help spread but to a lesser extent. Livestock consume the pods rapidly after they fall from the tree. Dispersal over long distances occurs when animals that have ingested seeds are moved by road transport (Carter, 1994). Pods can float but free seeds do not. Some limited dispersal may occur along stream channels and areas that are periodically inundated (Kriticos et al., 1999). Wind may blow seed pods from tall trees for distances up to 25 m. Seed can be spread short distances in mud packs adhering to animal hooves (Carter, 1994).

The species tolerates stresses such as clay or heavy soil, drought, heat, high pH, salt and water-logging (Duke, 1983). Juvenile and adult plants can regenerate from the base when the top growth is removed (Brown and Carter, 1998).

Acacia nilotica has a deep woody taproot with several branching surface laterals (Parsons and Cuthbertson, 1992). *Acacia* seedlings rapidly extend the tap root following germination which ensures that competition with grasses is minimized as the seedlings can access soil moisture below the rooting zone of the grasses (Kriticos et al., 1999).

Level of certainty = very certain

C. Economic Impact

Discuss the potential economic importance of the species in the WRA area. Consider three primary types of damage:

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1. Reduced crop yield (*e.g.*, by parasitism, competition, or by harboring other pests). T
2. Lower commodity value (e.g., by increasing costs of production, lowering market price, or a combination); or if not an agricultural weed, by increasing costs of control.T
3. Loss of markets (foreign or domestic) due to presence of a new Federal noxious weed. T

Assign ratings as follows:

Rating	Numerical score	Explanation
High T	3 T	Weed causes all three of the above impacts, or causes any two impacts over a wide range (over 5 types) of economic plants, plant products, or animals.
Medium	2	Weed causes any two of the above impacts, or causes any one impact to a wide range (over 5 types) of economic plants, plant products, or animals.
Low	1	Weed causes any one of the above impacts.
Negligible	0	Weed causes none of the above impacts.

Rationale for the rating and the level of certainty:

1. Reducing crop yield: A study by Puri et al. (1994) found that crops, such as wheat, chickpea, cotton and berseem clover, in close proximity to plantings of *Acacia nilotica* decreased growth and productivity in above ground biomass only, for up to 13 meters. Crop maturation was also affected. These impacts were due to the moisture depletion from the trees as well as shading the crops on the north facing side of the trees. At low densities, prickly acacia can be beneficial by providing nutrition for stock, shade and shelter resulting in increased lamb survival (Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000; Cox, 1997). At high densities, with its long spines or prickles, *Acacia nilotica* forms dense thickets that are impenetrable to stock and can reduce carrying capacity (Parsons and Cuthbertson, 1992). The pods of one subspecies, *Acacia nilotica* subsp. *kraussiana*, have been reported as toxic to goats in South Africa (Parsons and Cuthbertson, 1992). A wide range of pests affect this species, including a stem borer, bruchid beetles, buprestid beetles, fungal rots, and powder post beetles (Fagg, 1992).

2. Costs of Control/Lowering commodity value: Costs of control in Australia range from $2 to $100 (about $4 - $194 US dollars) per hectare, with many years of follow-up required, which increases the cost several fold. The presence of spines on the ground restricts the use of horses, dogs and motorcycles for handling stock (Parsons and Cuthbertson, 1992).

3. Loss of markets: Acacia *nilotica* subsp. *kraussiana* is listed as a prohibited invasive plant by

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Namibia and South Africa. Seeds of all thorny acacias are prohibited by New Caledonia and Madagascar. *Acacia nilotica* is prohibited by Tahiti, Australia, New Zealand (Excerpt database, 2001; Australia (Agriculture & Resource Management Council of Australia; Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000). Commodities infested with *Acacia nilotica* seeds would be denied entry into these countries.

Level of certainty = reasonably certain.

D. Environmental Impact

Check each of the following that apply. Consider whether or not the weed, if introduced, could:

- Cause impacts on ecosystem processes (alteration of hydrology, sedimentation rates, a fire regime, nutrient regimes, changes in productivity, growth, yield, vigor, etc.). T
- Cause impacts on natural community composition (*e.g.*, reduce biodiversity, affect native populations, affect endangered or threatened species, impact keystone species, impact native fauna, pollinators, or microorganisms, etc.). T
- Cause impacts on community structure (*e.g.*, change density of a layer, cover the canopy, eliminate or create a layer, impact wildlife habitats, etc.). T
- Have impacts on human health such as allergies or changes in air or water quality.
- Have sociological impacts on recreation patterns and aesthetic or property values. T
- Stimulate control programs including toxic chemical pesticides or introduction of a nonindigenous biological control agent. T

Assign ratings as follows:

Rating	Numerical Score	Explanation
High T	3 T	Three or more of the above. (Potential to cause major damage to the environment with significant losses to plant ecosystems and subsequent physical environmental degradation.
Medium	2	Two of the above. (Potential to cause moderate impact on the environment with obvious change in the ecological balance, affecting several attributes of the ecosystem, as well as moderate recreation or aesthetic impacts.)
Low	1	One of the above, unless the factor is potential to reduce populations of endangered or threatened species, which rates High. (Limited potential impact on environment.)

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Rating	Numerical Score	Explanation
Negligible	0	None of the above. (No potential to degrade the environment or otherwise affect ecosystems.)

Rationale for the rating and the level of certainty:

Cattle introduce seed to watercourse areas, where thickets can then prevent access to water and transpire large quantities of water (Parsons and Cuthbertson, 1992). Prickly acacia has potential to replace a portion of Australia's native grassland ecosystems with thorny scrub land. It threatens rare species there, and exacerbates and accelerates soil erosion. While some people consider the trees aesthetically pleasing, some property values have been decreased by as much as 20% due to heavy infestations of prickly acacia (Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000).

Prickly acacia can be managed by a combination of chemical and mechanical control. Triclopyr in diesel oil may be used as a basal bark or cut stump treatment. Tebuthiuron granules may be applied from the air. For larger trees, picloram or liquid hexazinone may be injected into the main stem at 8 cm intervals when the tree is in full leaf (HEAR, 2001). Chemical programs require several years of follow up due to the persistent seed bank

Introduced biological control agents in Australia have not had a noticeable impact (Parsons and Cuthbertson, 1992; Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000). Adult prickly acacia have many traits that make their control difficult by insect herbivores. They have a long growing period, a tough woody stem that makes protein and carbohydrate reserves less accessible, high rates of re-growth following defoliation, low food quality due to high tannin content, and a large moderately persistent seed bank (Kriticos et al., 1999).

On the positive side, a report from the Sudan indicates that prickly acacia pods may contain an algacide. When added to an artificial lake, the pods suppressed a massive growth of algae without harming fish, amphibians or insects (Parsons and Cuthbertson, 1992).

Level of uncertainty: reasonably certain

ECONOMIC and ENVIRONMENTAL IMPORTANCE SUMMARY: Consequences of Introduction: Cumulative Risk Element Score

Add together the numerical estimates for the four risk elements to produce an overall estimate of the Consequences of Introduction Risk Rating for the weed. The overall risk rating is used to assign a Consequences of Introduction Risk Score as follows:

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Risk: Consequences of Introduction (Sum Risk Elements #1-4) (1+3+3+3= 10)		
Cumulative Risk Element Score	Risk Rating	Risk Score
0 – 2	Negligible	0
3 – 6	Low	1
7 - 10 T	Medium T	2
11 – 12	High	3

The Consequences of Introduction Risk Rating, an indicator of the potential of the weed to become established and spread, and its potential to cause economic and environmental impacts, is medium for *Acacia nilotica*.

Step 6. Assess Likelihood of Introduction

Discuss entry potential and establishment potential. What is the likelihood that the species will enter the United States, survive the shipment and find a suitable habitat for establishment?

Assign ratings as follows:

Rating	Numerical Score	Explanation: Introduction is
High T	3 T	Very likely or certain
Medium	2	Likely
Low	1	Low, but clearly possible
Negligible	0	Extremely unlikely

Rationale for rating and the level of certainty:

Intentional introduction by humans is the most likely pathway. *Acacia nilotica* seeds are available through the Internet (e.g., SeedsExpress.com). The plant is used as an ornamental shade tree, as a medicinal remedy and for fuel, timber, paper production, fodder and gum. In India and Pakistan, trees are planted along field borders as windbreaks and shelterbelts. It is also viewed as having the potential to increase crop productivity, reduce soil erosion, and improve soil fertility through nitrogen fixation.

In Africa and Asia, the gum, stem, bark, leaves and fruits of *A. nilotica* are used to treat colds, bronchitis, pneumonia, ophthalmia, hemorrhage and skin ailments. The fruit juice and stem bark are used as a tonic and astringent and are used internally to treat diarrhea, dysentery (El-Tahir et al., 1999) and for the treatment of sore throats and chest complaints (Mustafa, 1999). A decoction of the fruits is thought to reduce fever (El-Tahir et al., 1999). The water extract of the

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fruit is used externally to treat syphilitic lesions and other venereal diseases. The vapors of burnt fruit are inhaled to relieve chest congestion and to treat the common cold. The infusion of fruit in warm water is used as a gargle to relieve sore throats, mouth ulcers and gum infections. A ground fruit poultice is applied to the vagina as a prophylactic agent against postnatal infection (Mustafa, 1999).

Immigrants from countries of origin may intentionally introduce the species, if it is not regulated. This species is being promoted on the internet with no mention of invasiveness (www.agroforester.com/articles/nftguide.pdf page 8, accessed 7/6/02).

Likely pathways into the United States are ornamental seed shipments, transport or sale of seeds for medicinal purposes and intentional importation in passenger baggage. None of these pathways is subject to treatment prior to shipping, and the propagules would be likely to survive the shipment and be introduced intentionally and repeatedly into the environment. In the absence of regulation, and with the likelihood of cultivation, *Acacia nilotica* will almost certainly be introduced beyond its present limited range.

Level of certainty = reasonably certain

Step 7. Conclusion: Pest Risk Potential of Weed

Produce an estimate of the pest risk potential by considering the Consequences of Introduction and the Likelihood of Introduction using the following table as a guide. The pest risk potential will be obtained from the combination of the scores for likelihood of introduction and consequences of introduction, and will be assigned as follows:

Consequences of Introduction (Rating and Score)	Likelihood of Introduction (Rating and Score)	Overall Pest Risk Potential
Negligible (0)	Negligible (0)	Negligible
Negligible (0)	Low (1)	Negligible
Negligible (0)	Medium (2)	Negligible
Negligible (0)	High (3)	Negligible
Low (1)	Negligible (0)	Negligible
Low (1)	Low (1)	Low
Low (1)	Medium (2)	Low
Low (1)	High (3)	Low
Medium (2)	Negligible (0)	Negligible

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Consequences of Introduction (Rating and Score)	Likelihood of Introduction (Rating and Score)	Overall Pest Risk Potential
Medium (2)	Low (1)	Low
Medium (2)	Medium (2)	Medium
Medium (2) T	High (3) T	Medium- High T
High (3)	Negligible (0)	Negligible
High (3)	Low (1)	Low
High (3)	Medium (2)	Medium-High
High (3)	High (3)	High

Summary and Conclusion:

Acacia nilotica earns a medium-high pest risk potential rating. This is a borderline high, given the uncertainty around the habitat suitability rating and considering that the predicted range includes the tropical areas with the most serious invasive species problems (Florida and Hawaii).

Its uses in its native distribution are many, including ornamental, medicinal, tanning and dyeing, fiber and forage, and reforestation of inundated areas. Because of its resins, the wood resists insects and water, and is used for boat-making, posts, buildings, water-pipes, well-planking, plows, cabinet-work, wheels, mallets and other implements. It yields excellent firewood and charcoal (Duke, 1983). *Acacia nilotica* is a substitute for gum arabic, and is used for making candles, inks, matches, and paints (NAS, 1980). It is important to note that listing *A. nilotica* as a noxious weed would not prevent the importation of non-propagatable forms of the plant, so most of these uses would still be possible. Listing would have no effect on the availability of the product gum arabic or arabica, which is derived from *Acacia senegal*.

Acacia nilotica is a serious weed in South Africa and has become one of Australia's worst weeds. Aggressively replacing grasslands with thorny thickets, *Acacia nilotica* infests over 6 million hectares of arid and semi-arid land in Queensland. It costs primary production over $5 million (Australian dollars) per annum by decreasing pasture production and increasing management costs (Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000). Livestock production in Hawaii, Southern Texas and Florida could be similarly affected.

Using the Reichard and Hamilton (1997) indicators of invasiveness, *A. nilotica is* classified as invasive using a model based on discriminant analysis of characters and using the model based on classification and regression trees. Using the decision tree it is classified as "Reject," based on its previous known invasions outside its native range and being in a family and genus that is

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already known to be invasive in North America.

Easily dispersed by humans and stock, establishment of *Acacia nilotica* may lead to large infestations that could adversely affect biological diversity and agriculture. The potential negative impacts of this species outweigh potential benefits gained from cultivating this species for shade, ornament or forage.

If APHIS publishes a proposed rule to list this species, the notice should request information about the extent of its distribution within the United States.

Step 8. References

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Appendix 1 The Subspecies of *Acacia nilotica*

Subspecies	Distribution	Overall aspect	Habitat	Pod characteristics
adstringens	Senegal and Gambia to Somalia and south to Cameroon, India, Pakistan, cultivated in Libya, Algeria	shrubby tree with wide spreading crown	dry woodland and savannah	densely tomentose, 1.3-2.2 cm wide, with distinctly but often irregularly scalloped margins
cupressiformis	western Pakistan, India	crown narrow and erect, Cypress-like	similar preferences to subsp. indica but is less resilient to weed competition.	necklace-like, constricted between seeds, grey to white-tomentellous
hemispherica	Pakistan	hemisperical shrubby tree with wide spreading crown, without obvious main stem	dry sandy streambeds	glabrous or subglabrous even when young, narrow, 1-1.3 cm wide, margins straight or crenate, if narrowly constricted, then only irregularly so
indica	P.D.R. Yemen, the Yemen Arab Republic, Oman, Pakistan, India, Burma. Cultivated in Africa, Iran, Vietnam, Australia	tree to 20 m., crown not narrow and erect	riverine habitats, forms low altitude dry forests usually on alluvium and black soil, Grows on saline, alkaline soils	necklace-like, constricted between seeds, glabrous or almost glabrous

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kraussiana	south of Tanzania in Africa (Tanzania, Malawi, Zambia, Zimbabwe, Mozambique, Angola, Botswana, Namibia, South Africa, Swaziland). Probably Ethiopia, Yemen, Oman.	shrubby tree , 5-6 m. high, with wide spreading crown, rounded or flattened	dry grasslands, woodlands and savannahs, especially on compacted sandy loam, shallow granite or clay soils along drainages	pubescent, becoming glabrescent and later more or less shining on the raised part over the seeds, 1-1.9 cm wide, margins slightly scalloped
leiocarpa	Somalia, Ethiopia, and Kenya	shrubby tree with wide spreading crown, main stem usually distinct	savannah, wooded grasslands, and dry scrub forest	glabrous or subglabrous even when young, narrow, 1-1.3 cm wide, , margins straight or crenate, if narrowly constricted, then only irregularly so
nilotica	Egypt, Ethiopia, Sudan westwards through northern tropical Africa to Senegal	tree to 20 m.	savannah, river banks, seasonally flooded areas	necklace-like, constricted between seeds, glabrous or almost glabrous
subulata	Sudan, Ethiopia, Uganda, Tanzania, Pakistan, India, Sri Lanka	shrubby tree with wide spreading crown, which has distinctive twisted interlacing branches	savannah, wooded grassland and dry scrub forests away from riverine habitat	oblong, densely subtomentose, straight or slightly curved scalloped margins
tomentosa	Senegal, Mali, Ivory Coast, Ghana, Niger, Nigeria, Sudan, Ethiopia	tree to 20 m.	riverine, including seasonally flooded areas	necklace-like, constricted between seeds, grey to white-minutely tomentous

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