

Australia/New Zealand Weed Risk Assessment adapted for Florida

Data used for analysis published in: Gordon, D.R., K.J. Tancig, D.A. Onderdonk and C.A. Gantz. In press. Assessing the invasive potential of biofuel species proposed for Florida and the U S. using the Australian weed risk assessment. Biomass and Bioenergy. doi:10.1016/j.biombioe.2010.08.029.

<i>Saccharum officinarum</i> -- Florida test			
	Question	Answer	Score
1.01	Is the species highly domesticated?	y	-3
1.02	Has the species become naturalised where grown?	?	
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	1	
2.03	Broad climate suitability (environmental versatility)	?	
2.04	Native or naturalized in habitats with mean annual precipitation 40-70 inches.	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	?	
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	?	
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	y	1
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems		
4.09	Is a shade tolerant plant at some stage of its life cycle	y	1
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils).	y	1
4.11	Climbing or smothering growth habit	n	0

4.12	Forms dense thickets		
5.01	Aquatic	n	0
5.02	Grass	y	1
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	y	1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	1	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	?	
7.05	Propagules water dispersed		
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production	n	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			5

Outcome	Accept*
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*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. *Conserv. Biol.* 18: 360-368.

section	# questions answered	satisfy minimum?
A	9	Yes
B	9	Yes
C	18	Yes
total	36	Yes

Data collected 2008

Question number	Reference	Source data
1.01	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"The origins of <i>S. officinarum</i> are intimately associated with the activities of humans as <i>S. officinarum</i> is a purely cultivated or garden species with no members found in the wild (Sreenivasan et al. 1987)...It is believed to have become established as a domestic garden crop possibly as early as 2500 BC (Daniels and Roach 1987)."
1.02	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Hnatiuk (1990) reported that <i>S. officinarum</i> is naturalised in Queensland and New South Wales." BUT "In sugarcane districts, transient sugarcane plants may occur along roadsides or railways where it can establish after displacement during transport, but there is no indication that these form self-perpetuating populations."
1.03		
2.01	1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgn.d.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network- (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?32617 Accessed June 2, 2008. 3. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from	1. Global plant hardiness zones in cultivated range 9-13. 2. "Distributional range: only cultivated, naturalized in s.e. United States". 3. Minimum temperature: 17°F. 4. "growth in general is very slow below 15°C (59°F), and activity begins at 21°C (69.8°F)"; "The countries of Latin America produce about one-half of the world's sugarcane. India produces about 20 percent of the world's total and is the major producer. Brazil is the next leading producer with about 15 percent of the world's total. cuba,

	<p>various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 4. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i>. The University Press of Hawaii, Honolulu. 5. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) <i>The biology and ecology of sugarcane (Saccharum spp. hybrids) in Australia</i> (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 6. Howard, R. (1979) <i>Flora of the lesser Antilles. Leeward and Windward Islands Jamaica Plain, Volume 3. Monocotyledoneae</i>. Mass. Arnold Arboretum, Harvard University. 7. El Bassam, N. (1998) <i>Energy plant species: their use and impact on environment and development</i>. James & James.</p>	<p>Mexico, Pakistan, and the United States are the next largest producers." 5. "The centre of origin of <i>S. officinarum</i> is thought to be in Polynesia. The species was probably transported throughout south east Asia by humans, leading to a modern centre of diversity in Papua New Guinea and Irian Jaya (Indonesia) where the majority of specimens were collected in the late 1800s."; "Hnatiuk (1990) reported that <i>S. officinarum</i> is naturalised in Queensland and New South Wales." 6. "General Distribution: Cultivated in the tropics and subtropics of the world. Distribution in Lesser Antilles: Introduced as a cultivated crop on several of the islands; collection records from Antigua, Guadeloupe, Martinique, and Barbados." 7. "<i>S. officinarum</i> originated in the South Pacific islands and New Guinea."; "Subtropical and tropical areas have proven to be the most appropriate for growing sugarcane."; "<i>S. officinarum</i> originated in the South Pacific islands and New Guinea. "The most favourable temperature for subtropical and tropical sugarcane cultivation is 25-26°C."; "<i>S. officinarum</i> is reported to tolerate...an annual temperature of 16.0-29.9°C".</p>
2.02		
2.03	<p>1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network- (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?32617 Accessed June 2, 2008. 3. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) <i>The biology and ecology of sugarcane (Saccharum spp. hybrids) in Australia</i> (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 4. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution</i></p>	<p>1. Possibly three climatic groups, but cultivated distribution range is not specific enough to determine. 2. "Distributional range: only cultivated, naturalized in s.e. United States". 3. "The centre of origin of <i>S. officinarum</i> is thought to be in Polynesia. The species was probably transported throughout south east Asia by humans, leading to a modern centre of diversity in Papua New Guinea and Irian Jaya (Indonesia) where the majority of specimens were collected in the late 1800s."; "Hnatiuk (1990) reported that <i>S. officinarum</i> is naturalised in Queensland and New South Wales." 4. "The countries of Latin America produce about one-half of the world's</p>

	and Biology. The University Press of Hawaii, Honolulu. 5. El Bassam, N (1998) Energy plant species: their use and impact on environment and development. James & James.	sugarcane. India produces about 20 percent of the world's total and is the major producer. Brazil is the next leading producer with about 15 percent of the world's total. Cuba, Mexico, Pakistan, and the United States are the next largest producers." 5. "S. officinarum originated in the South Pacific islands and New Guinea."
2.04	1. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 2. El Bassam, N (1998) Energy Plant Species: Their Use and Impact on Environment and Development. James & James.	1. "For economic sugar production an annual rainfall of 1500 mm [59.06 inches] is regarded as the minimum; "Sugar cane will tolerate short floods, but, if approaching maturity, it will become lodged and the sugar content will decline." 2. "S. officinarum is reported to tolerate an annual precipitation of 470-4290mm [18.05-168.89 inches]"; "Sugarcane needs a large quantity of rainfall- an average of around 1500-1800mm [59.05-70.86 inches] of rain under most conditions."
2.05	1. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu. 3. Flach, M and F Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.	1. "First domesticated in India or Southeast Asia, now cultivated extensively in tropics and subtropics throughout the world." 2. "Sugarcane is considered to be native to southeast Asia, but it was grown widely throughout the tropics before recorded history." 3. "Sugar cane originated in New Guinea...Currently, cane is being produced in almost 70 countries".
3.01	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Hnatiuk (1990) reported that <i>S. officinarum</i> is naturalised in Queensland and New South Wales." BUT "In sugarcane districts, transient sugarcane plants may occur along roadsides or railways where it can establish after displacement during transport, but there is no indication that these form self-perpetuating populations."
3.02		no evidence
3.03		no evidence

3.04	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"As a result of many years of cultivation, <i>S. officinarum</i> has essentially lost the capacity to invade in uncultivated habitats."
3.05	Holm, L, et al. (1979) A Geographical Atlas of World Weeds. John Wiley and Sons, New York.	<i>S. spontaneum</i> is a Serious weed in Indonesia, India, and Thailand, and a Principal weed in the Philippines and Puerto Rico. <i>S. benghalense</i> is a Principal weed in Bangladesh.
4.01	FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm).	no description of these traits
4.02	1. Singh, Suman, and Shrivastava (2003) Isolation and identification of allelochemicals from sugarcane leaves. <i>Allelopathy Journal</i> 12: 71-79. 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	1. Two compounds found in sugarcane leaves significantly reduced root growth of lentil seedlings; one showed effects on wheat; neither affected seed germination. BUT 2. not allelopathic
4.03	FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm).	no description of parasitism
4.04	FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm).	"Sugar-cane stalks are quite palatable because of the sugar content"
4.05	1. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	1. "A mixture of bagasse and molasses is used as cattle feed. When fed in large quantities and incorrectly, molasses may be toxic." [but not the natural state of the plant] 2. no toxicity
4.06	1. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of	1. "The major pests and diseases that cause losses in sugarcane production include canegrubs, feral pigs, ratoon

	<p>sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 2. Flach, M and F Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.</p>	<p>stunting disease (RSD), sugarcane rusts, chlorotic streak and soil-borne diseases (McLeod et al. 1999)." 2. "Four major sugar cane diseases are encountered in the South-East Asian region: mosaic virus disease, ratoon stunting disease (caused by the bacterium <i>Clavibacter xyli</i> var. <i>xyli</i>), yellow spot (<i>Cercospora koepkei</i>) and rust (<i>Puccinia melanocephala</i>)...Major pests attacking sugar cane are the stem borer <i>Chilo sacchariphagus</i>, the top borer <i>Scirpophaga nivella</i> var. <i>intacta</i>, the woolly aphid <i>Ceratovacuna lanigera</i>, and the rat <i>Ratus ratus argentiventer</i>."</p>
4.07	<p>1. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.</p>	<p>1. "Sugarcane is a well-established agricultural crop with a long history of safe use." Sugarcane pollen showed some allergenicity in skin tests, but "there are no reports of any major allergic responses to the commercial hybrid cultivars of sugarcane in Australia". 2. no toxicity</p>
4.08		
4.09	<p>1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 3. Flach, M and F Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.</p>	<p>1. shade tolerance: intermediate 2. "Sugar cane will grow in shade" 3. "Sugar cane thrives under full sunlight"</p>
4.10	<p>1. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 2. Flach, M and F Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers,</p>	<p>1. "It has a wide range of soil tolerance, but drainage is essential." 2. "Sugar cane thrives on a wide variety of soil types, but deep, friable and well-drained soils with a pH of 5-8, ample nutrient and organic matter contents and a good water-holding capacity are most</p>

	Leiden.	suitable."
4.11	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	growth habit: graminoid
4.12		
5.01		terrestrial
5.02	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	Poaceae
5.03	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	does not fix nitrogen (and Poaceae)
5.04	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"the sugarcane root system is fibrous and shallow"
6.01		no evidence
6.02	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf). 3. Flach, M and F Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.	1. propagated by seed 2. "many commercial varieties of sugarcane can produce seed" 3. "True seed of sugar cane is only used for the purpose of breeding new cultivars."
6.03	Grass Manual on the Web, Utah State University	"Because of the potential economic damage of uncontrolled hybridization

	(http://herbarium.usu.edu/webmanual/default.htm).	between <i>S. spontaneum</i> and <i>S. officinarum</i> , the U.S. Department of Agriculture should be notified of plants found growing outside a controlled planting."
6.04	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Sugarcane is a cross-pollinating species although selfing occurs at low levels"
6.05	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Sugarcane pollen is transported by wind"
6.06	1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 3. Darke, R (1999) The Color Encyclopedia of Ornamental Grasses: Sedges, Rushes, Restios, Cat-tails, and Selected Bamboos. Timber Press, Portland, OR. 4. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 5. Grass Manual on the Web, Utah State University (http://herbarium.usu.edu/webmanual/default.htm).	1. rhizomatous [genus <i>Saccharum</i>] 2. vegetative spread rate: moderate 3. "Propagate by division or by rooting stem sections." 4. After burning, sugarcane "will sucker from nodes or regrow from the 'stool' afterwards". 5. "Plants with short rhizomes."
6.07	FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm).	"It matures in 12-14 months"
7.01		
7.02	1. FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm). 2. Howard, R. (1979) Flora of the lesser Antilles. Leeward and Windward	1. "Cultivated extensively in tropics and subtropics throughout the world...Sugar cane is one of the two main world sources of sugar for domestic and

	Islands Jamaica Plain, Volume 3. Monocotyledoneae. Mass. Arnold Arboretum, Harvard University.	industrial use." 2. "General Distribution: Cultivated in the tropics and subtropics of the world. Distribution in Lesser Antilles: Introduced as a cultivated crop on several of the islands; collection records from Antigua, Guadeloupe, Martinique, and Barbados."
7.03		no evidence
7.04	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Mature fuzz consists of the mature dry fruit (caryopsis), glumes, callus hairs, anthers and stigma."
7.05		
7.06		
7.07	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Mature fuzz consists of the mature dry fruit (caryopsis), glumes, callus hairs, anthers and stigma." [no evidence of adaptations to external dispersal].
7.08		
8.01	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	1. fruit/seed abundance: medium 2. "The ability of sugarcane to reproduce sexually was not recognised until 1888." [suggests it is not a prolific seed producer]
8.02	Australian Government, Dept. of Health and Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).	"Sugarcane fuzz [seed] is short lived, losing 90% of its viability in 80 days at 28°C if not desiccated (Rao 1980)."
8.03	Australian Government, Dept. of Health and	"The efficacy of glyphosate on killing

	<p>Ageing, Office of the Gene Technology Regulator (2004) The biology and ecology of sugarcane (<i>Saccharum</i> spp. hybrids) in Australia (http://www.ogtr.gov.au/rtf/ir/biologysugarcane.rtf).</p>	<p>sugarcane is affected by various factors such as cane varieties, soil type and stage of cane growth (Turner 1980)...Research showed that slashing of cane suppresses apical dominance and generally enhances chemical cane killing action on the regrowth (Leibrandt 1993). In addition, considerable improvement of eradication was also obtained when a mechanical under-cutter was used to shear the roots following herbicide application."</p>
8.04	<p>FAO, Grassland Index (http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/pf000310.htm).</p>	<p>After the whole stalk is harvested at maturity, "it will then grow again from the roots and produce a succession of ratoon crops...Sugar cane is often burnt to ease harvesting. It is not killed, and will sucker from nodes or regrow from the 'stool' afterwards."</p>
8.05		