

RELATIVE SUSCEPTIBILITIES OF BRAZILIAN VEGETATION TO AIRBORNE FLUORIDE¹

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ABSTRACT - Airborne fluorides are the most toxic of the common air pollutants to plants. Compounds such as hydrogen fluoride, silicon tetrafluoride, and fluosilicic acid are byproducts of the manufacture of aluminum, phosphate fertilizer, steel, glass, fluoroplastics, and of coal combustion, but there are also many other lesser sources. Fluoride is not only highly toxic but it also accumulates in the plant, especially in the foliage. Ingestion by herbivores can induce a dental and skeletal disease called "fluorosis" in many species. The fluoride accumulated in plants poses little danger to man because the amount of fluoride that might be ingested in the average diet would be relatively low compared with herbivores. Because most of the fluoride in plants accumulates in foliage, ingestion of stems, seeds and fruits, and roots should not increase fluoride significantly. During the course of inspecting vegetation at four aluminum smelters in Brazil in 1982, 1983 and 1986, more than 230 species of plants from tropical, semi-tropical, and temperate areas were ranked according to their relative susceptibility to fluoride, based upon the degree of foliar injury produced. This may not be a measure of yield response, however. Species are classified according to standard botanical nomenclature, along with the vernacular names used in Brazil and the U.S.

Index terms: pollutants, hydrogen fluoride, silicon tetrafluoride, fluosilicic acid, "fluorosis".

SUSCEPTIBILIDADE DA VEGETAÇÃO BRASILEIRA AO FLUORETO DA ATMOSFERA

RESUMO - De todos os poluentes contidos na atmosfera, os fluoretos são os mais tóxicos para as plantas. Compostos tais como fluoreto de hidrogênio, tetrafluoreto de silício e ácido fluossilícico são subprodutos usados na fabricação de alumínio, de fertilizantes fosfáticos, de aço, de vidro e de fluoroplásticos, e na combustão de carvão. Há muitas outras fontes de fluoreto, porém menos importantes. Além de ser altamente tóxico, o fluoreto se acumula nas folhas. Sua ingestão pelos animais herbívoros pode acarretar, em muitas espécies, a doença dos dentes e do esqueleto chamada "fluorose". Para o homem, a quantidade de fluoreto acumulado nas plantas apresenta menos perigo do que para os animais. A maior parte dele se encontra acumulado nas folhas; portanto, o consumo do caule, das sementes, dos frutos e das raízes não aumenta muito o fluoreto no organismo. No decurso de uma pesquisa de vegetação com vistas a quatro fundições de alumínio, no Brasil, em 1982, 83 e 86, mais de 230 espécies de plantas originárias de áreas tropicais, semitropicais e temperadas foram classificadas de acordo com sua relativa susceptibilidade ao fluoreto, com base no grau de danos causados nas folhas. Tal fato, contudo, não pode ser considerado como medida de desempenho de produção. As espécies são classificadas de acordo com a nomenclatura botânica padrão, juntamente com os nomes vernáculos usados no Brasil e nos Estados Unidos.

Termos para indexação: poluentes, tóxicos, fertilizantes fosfáticos, folhas, "fluorose".

INTRODUCTION

Airborne fluorides (F) in the form of hydrogen fluoride, silicon tetrafluoride, and fluosilicic acid, are the most phytotoxic of the common air pollutants (Weinstein 1977, 1983). The major global sources include volcanoes and fumaroles, but the sources of greatest concern to agriculture and forestry are anthropogenic. Among these, the production of aluminum, phosphate fertilizer, steel, glass, fluoroplastics, and coal combustion are ma-

ior sources, but there are many others. Not only are many F-containing compounds phytotoxic, but they also accumulate in plant foliage, thereby providing a source of F to herbivorous animals. Ingestion of F compounds above threshold levels (depending upon species and age of the animal) can induce a dental and skeletal disease called "fluorosis". It is therefore common practice for F-emitting industries and environmental control agencies to institute surveillance programs to measure the amount of F in the atmosphere, water, and soil; to determine the accumulation of F in foliage of plants of economic or ecologic concern; and to inspect the condition of vegetation surrounding industrial sources. Analyses of bones

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of indigenous animals and of livestock are often part of a surveillance program. Sources of fluoride for man are somewhat different than for other animals. There is insufficient F in the average diet to provide an amount of F believed to be necessary to prevent or reduce dental caries, and communities often supplement the water supply to give a daily total intake of ca. 1.3 to 1.6 mg per adult per day (Singer & Ophaug 1983). The amount of F in vegetation near F-emitting sources would supplement the daily requirement, but the amount of vegetation ingested would have to be great in order to exceed the recommended daily intake. Fluoride accumulates in leaf tissues, with the greatest amount accumulated generally found in leaves that have been exposed the longest. Stems, seeds and fruits, and roots contain much lower levels of F, but stems accumulate the greatest amount among these organs (Weinstein 1977, Davison 1983).

In 1982, 1983 and 1986, inspections were made near four primary aluminum smelters in Brazil, separated by more than 2000 km. Inspection of many species of indigenous and cultivated plant species under field conditions, to assign them to categories of relative susceptibility to airborne F. More than 230 species found in tropical, semi-tropical, and temperate areas of Brazil are given in Table 1. Some of these species are grown through-

out the world and are also found in other lists prepared for North America, Europe, and Asia (Daines et al. 1952, Zimmerman & Hitchcock 1956, Thomas & Alther 1966, Guderian et al. 1969, Treshow & Pack 1970, Fluorides 1971, Weinstein 1977, Doley 1986), but most of the species in the list have not been classified previously. Although the relative susceptibilities of the same species may appear in the same classes in different lists, climatic, edaphic, and topographic conditions in various geographic areas of the world, as well as differences in sensitivity of cultivars, may result in some variations in their susceptibility.

Species nomenclature is consistent with Bailey (1976). The sequence of gymnosperm families follows Lawrence (1951); the angiosperm families follow Cronquist (1981). Brazilian colloquial names are as found in Pio Correa (1909). Each species has been ranked as susceptible (S), moderately tolerant (intermediate, I), or tolerant (T) to F. Because the rankings are based only on the extent or degree of foliar injury, effects on plant growth and yield of crops or trees based only on foliar effects should be extrapolated with caution. In some species, it is possible to have severe foliar injury without effects on yield or quality (depending on when in the growth cycle injury occurs); in others, foliage may appear normal but yield and quality may be reduced.

TABLE 1. Relative susceptibilities of Brazilian plants to airborne F.

Gymnosperms		
Araucariaceae		
<i>Araucaria angustifolia</i> (Bertol.) O. Kuntze	Pinheiro-do-paraná, pinheiro-brasileiro e Paraná pine	I
<i>Araucaria heterophylla</i> (Salisb.) Franco.	Norfolk Island Pine	T
Pinaceae		
<i>Cedrus atlantica</i> Manetti.	cedro Atlas cedar	I
<i>Pinus caribaea</i> Morelet.	pinho Caribbean pine	I
<i>Pinus elliottii</i> Engelm.	pinho Slash pine	S/I
<i>Pinus taeda</i> L.	pinho Loblolly Pine	S

TABLE 1. Continuation.

Gymnosperms		
Taxodiaceae		
<i>Taxodium distichum</i> (L.) L. Rich	pinheiro-do-brejo Bald cypress	T
Cupressaceae		
<i>Cupressus sempervirens</i> L.	cipreste Cypress	T
<i>Thuja occidentalis</i> L.	túia Arborvitae	T
Angiosperms		
Dicotyledons		
Magnoliaceae		
<i>Magnolia grandiflora</i> L.	magnólia-branca Bull bay	I
<i>Magnolia soulangeana</i> Soul.	magnólia Saucer magnolia	I
Lauraceae		
<i>Nectandra</i> spp.	canella	T
<i>Persea americana</i> Mill.	abacateiro Avocado	S
Ranunculaceae		
<i>Clematis</i> spp	cipó-cruz Clematis	I
Plantanaceae		
<i>Platanus occidentalis</i> L.	plátano-canadense Sycamore, Planetree	I/T
Moraceae		
<i>Artocarpus heterophyllus</i> Lam.	jaca Jackfruit	I/T
<i>Ficus benjamina</i> L.	ficus-benjamim Weeping fig	T
<i>Ficus doliaria</i> Mart.	gamelleira	T
<i>Ficus elastica</i> Roxb.	ficus-japonês Rubber plant	T
<i>Morus alba</i> L.	amoeira-branca White mulberry	I/T
<i>Morus nigra</i> L.	amoeira-negra Black mulberry	T
Cecropiaceae		
<i>Cecropia</i> spp.	umbaúba, embaúba, imbaúba	S
Myricaceae		
<i>Myrica gale</i> L.	Cecropia alecrim-do-norte Sweet gale	T
Casuarinaceae		
<i>Casuarina equisetifolia</i> L.	casuarina She oak	T
Nyctaginaceae		
<i>Bougainvillea spectabilis</i> Willd.	três-marias, buganvílea Bougainvillea	I
Cactaceae		

TABLE 1. Continuation.

Gymnosperms		
<i>Cactus</i> spp.	cacto	T
	Cactus	
<i>Opuntia</i> spp.	palmatória	T
	Prickly pear	
Chenopodiaceae		
<i>Beta vulgaris</i> L.	beterraba	T
	Beet	
<i>Chenopodium ambrosioides</i>	mastruço	
	American wormseed	
<i>Spinacia oleracea</i> L.	espinafre	
	Spinach	
Amaranthaceae		
<i>Amaranthus</i> spp.	brede	
	Amaranth	
<i>Celosia argentea</i> var. <i>cristata</i> Kuntze	crista-de-gallo	
	Cockscomb	
Portulacaceae		
<i>Portulaca grandiflora</i> Hook.	onze-horas	
	Moss rose	
Caryophyllaceae		
<i>Dianthus caryophyllus</i> L.	cravo	
	Carnation, Pinks	
Polygonaceae		
<i>Rumex acetosa</i> L.	azedá-miúda	
	Garden sorrel	
Theaceae		
<i>Camellia japonica</i> L.	camélia	
	Camellia	
<i>Thea sinensis</i> L.	chá	
	Tea	
Clusiaceae		
<i>Hypericum teretiusculum</i> A.	arruda-do-campo	
	St. John's-wort	
Sterculiaceae		
<i>Theobroma cacao</i> L.	cacau	
	Cocoa	
Bombacaceae		
<i>Bombax sienopetalum</i> Schur	paineira	
Malvaceae		
<i>Gossypium hirsutum</i> L.	algodão	
	Cotton	
<i>Hibiscus rosa-sinensis</i> L.	graxa	
	Rose of China	
<i>Hibiscus syriacus</i> L.	malva-rosa	
	Rose of Sharon	
<i>Malva sylvestris</i> L.	malva	
	Mallow	
Violaceae		
<i>Viola</i> spp.	violeta	
	Violet	

TABLE 1. Continuation.

Gymnosperms		
Passifloraceae		
<i>Passiflora alata</i> Dry.	maracujá Passion flower	I
Cucurbitaceae		
<i>Cucurbita</i> spp.	capim-dandá Squash	T
Begoniaceae		
<i>Begonia</i> spp.	begônia Begonia	I/T
Salicaceae		
<i>Populus</i> spp.	choupo Poplar	T
<i>Salix babylonica</i> L.	salgueiro, chorão Weeping willow	S/I/T
Capparidaceae		
<i>Cleome spinosa</i> L.	catinga-de-negro Cleome	T
Brassicaceae		
<i>Brassica oleracea</i> L.	couve Cole, Wild cabbage	T
<i>Brassica oleracea</i> var. <i>botrytis</i> L.	couve-flor Cauliflower	T
<i>Brassica oleracea</i> var. <i>capitata</i> L.	epolho Cabbage	T
<i>Brassica</i> spp.	mostarda Wild mustard	T
<i>Capsella bursa-pastoris</i> (L.) Medic.	bolsa-de-pastor Shepherd's purse	T
<i>Lobularia maritima</i> (L.) Desv.	alface Sweet alyssum	T
<i>Nasturtium officinale</i> R. Br.	agrião Water cress	T
<i>Raphanus sativus</i> L.	rábano Radish	T
Ericaceae		
<i>Rhododendron indicum</i> Sweet	azaléa Azalea	S/I
Hydrangeaceae		
<i>Hydrangea macrophylla</i> Ser.	hortênciã Hydrangea	T
Crassulaceae		
<i>Kalanchoe pinnata</i> Pers.	folha-da-costa Air plant	T
Rosaceae		
<i>Cydonia oblonga</i> Mill.	marmelo Quince	I/T
<i>Eriobotrya japonica</i> Lindl.	ameixeira Loquat	S
<i>Fragaria chiloensis</i> Duchesne	morango Strawberry	T
<i>Fragaria vesca</i> L.	morango Strawberry	T

TABLE 1. Continuation.

Gymnosperms		
<i>Moquilea tomentosa</i> Benth.	oiti	S
<i>Prunus persica</i> Sieb. & Zucc.	pêssego Peach	S
<i>Pyracantha coccinea</i> Roem.	Firethorn	T
<i>Rosa</i> spp.	rosa Rose	I
<i>Spiraea vanhouttei</i> Zabel	buquê-de-noiva Vanhoutte spirea	I
Mimosaceae		
<i>Albizzia moluccana</i> Miq.	albisia Albizzia, Mimosa	I
<i>Anadenanthera colubrina</i> (Vell.) Brenan	angico	I
<i>Calliandra</i> spp.	jurema Powderpuff	I
<i>Mimosa pudica</i> L.	sensitiva Sensitive mimosa	T
<i>Prosopis</i> spp.	algarobo Mesquite	T
Caesalpiniaceae		
<i>Caesalpinia echinata</i> Lam.	pau-brasil Brazilwood	I/T
<i>Delonix regia</i> Raf.	flamboia Royal poinciana	I/T
Fabaceae		
<i>Arachis hypogaea</i> L.	amendoim Peanut	T
<i>Cajanus cajan</i> Millsp.	andú, endu, guandu Pigeon pea	T
<i>Glycine max</i> Merr.	soja Soybean	I
<i>Lathyrus</i> spp.	comanda Perennial sweet pea	I
<i>Medicago sativa</i> L.	alfafa, luzerna Alfalfa, Lucerne	I/T
<i>Phaseolus limensis</i> Macf.	feijão-de-lima Lima bean	T
<i>Phaseolus</i> spp.	feijão Bean	T
<i>Pisum sativum</i> L.	ervilha Pea	I/T
<i>Spartium junceum</i> Lam.	giesta, gestia Broom	I/T
<i>Tipuana tipu</i> (Benth.) O. Kuntze.	tipuana Rosewood	T
<i>Trifolium</i> spp.	trevo Clover	I
<i>Vicia faba</i> L.	fava Fava, Broad bean	I/T
Proteaceae		
<i>Grevillea robusta</i> A. Cunn.	grevilha Silk oak	T

TABLE 1. Continuation.

Gymnosperms		
Lythraceae		
<i>Lagerstroemia indica</i> L.	reseda	T
	Crepe myrtle	
Myrtaceae		
<i>Callistemon</i> spp.		T
	Bottle brush	
<i>Eucalyptus citriodora</i> Hook.	Eucalipto-laranja	S
	Lemon-scented gum	
<i>Eucalyptus globulus</i> Labill.	eucalipto	I
	Blue gum	
<i>Eucalyptus grandis</i> W. Hill ex Maiden	eucalipto	S/T
	Rose gum	
<i>Eucalyptus saligna</i> Sm.	eucalipto	I/T
	Sydney blue gum	
<i>Eugenia uniflora</i> L.	pitanga	T
	Surinam cherry	
<i>Melaleuca leucadendron</i> (L.) L.	óleo-de-cajuput	T
	River tea tree	
<i>Psidium guajava</i> L.	goiaba	S
	Guava	
<i>Syzygium jambos</i> (L.) Alston	jamelão	I
	Rose apple	
Onagraceae		
<i>Fuchsia triphylla</i> L.	brinco-de-princesa	T
	Fuchsia	
Combretaceae		
<i>Terminalia catappa</i> L.	amendoeira, castanheda	T
	Indian almond	
Euphorbiaceae		
<i>Codiaeum variegatum</i> var. <i>pictum</i> Muell. Arg.	cróton	I/T
	Croton	
<i>Euphorbia pulcherrima</i> Willd.	papagaio	I/T
	Poinsettia	
<i>Jatropha curcas</i> L.	pinhão-branco	T
	Barbados nut	
<i>Manihot utilissima</i> Pohl.	mandioca, aipim, macaxeira	S
	Monioc, Tapioca	
<i>Phyllanthus acidus</i> Skeels.	groselha	I
	Otaheite gooseberry	
<i>Ricinus communis</i> L.	mamona	T
	Castor bean	
Vitaceae		
<i>Vitis vinifera</i> L.	videira, parreira	S
	Grapevine, vine	
Sapindaceae		
<i>Koelreuteria paniculata</i> Laxm.	colreutéria	S/I
	Varnish tree	
Aceraceae		
<i>Acer palmatum</i> Thunb.	momiji	I
	Japanese maple	

TABLE 1. Continuation.

Gymnosperms		
Anacardiaceae		
<i>Anacardium occidentale</i> L.	cajueiro	I
	Cashew	
<i>Mangifera indica</i> L.	manga	I
	Mango	
<i>Schinus terebinthifolius</i> Raddi.	aroeira, pimenteira	I/T
	Christmas berry tree	
Meliaceae		
<i>Melia azedarach</i> L.	cinamoma	I
	Chinaberry tree	
Rutaceae		
<i>Citrus aurantifolia</i> Swingle	lima	I
	Lime	
<i>Citrus aurantium</i> L.	laranja	I
	Sour or Seville orange	
<i>Citrus limonia</i> Osbeck	limão	I
	Lemon	
<i>Citrus medica</i> L.	limão	I
	Citron	
<i>Citrus sinensis</i> Osbeck	laranja	I
	Orange	
<i>Ruta graveolens</i> L.	arruda	S
	Rue	
Oxalidaceae		
<i>Oxalis</i> spp.	azedinha	I
	Wood sorrel	
Geraniaceae		
<i>Pelargonium x hortorum</i> Bailey	gerânio	I/T
	Geranium	
Tropaeolaceae		
<i>Tropaeolum majus</i> L.	chagas	I/T
	Nasturtium	
Balsaminaceae		
<i>Impatiens balsamina</i> L.	beijo-de-frade	T
	Impatiens, Garden balsam	
<i>Impatiens sultanii</i> Hook.	maria-regateira	T
	Impatiens	
Araliaceae		
<i>Brassaia actinophylla</i> Endl.	cheflera	I
	Schefflera	
<i>Hedera helix</i> L.	hera	T
Apiaceae		
<i>Pimpinella anisum</i> L.	English ivy	I
	anis	
	Anise	
Apocynaceae		
<i>Nerium oleander</i> L.	esplrradeira	T
	Oleander	
<i>Plumeria drastica</i> Mart.	janaúba	I
	Frangipani	
<i>Vinca major</i> L.	vinca	I
	Vinca	
Solanaceae		
<i>Capsicum annuum</i> L.	pimentão	I

TABLE 1. Continuation.

Gymnosperms		
<i>Datura stramonium</i> L.	Pepper estramônio	T
<i>Lycopersicon esculentum</i> Mill.	Jimson weed tomate	I
<i>Nicotiana sanderae</i> Sander	Tomato	T
<i>Nicotiana tabacum</i> L.	Wild-tobacco fumo, tabaco	T
<i>Petunia hybrida</i> Vilm.	Tobacco petúnia	T
<i>Solanum paniculatum</i> L.	Petunia Jurubeba	T
<i>Solanum tuberosum</i> L.	Nightshade batata-americana Potato	T
Convolvulaceae		
<i>Ipomoea batatas</i> Lam.	batata-doce Sweet potato	I
Polemoniaceae		
<i>Phlox</i> spp.	flox Phlox	T
Verbenaceae		
<i>Lantana camara</i> L.	cambará, camerá Lantana	T
<i>Petrea subserrata</i> Barçena	são-miguel Purple wreath	S/I
<i>Verbena chamaedryfolia</i> Juss.	camaradinha Verbena	T
Lamiaceae		
<i>Coleus blumei</i> Benth.	coléos Coleus	I
<i>Majorana hortensis</i> Moench	mangerona Sweet majoram	I
<i>Mentha</i> spp.	hortelã Mint	T
<i>Rosmarinus officinalis</i> L.	alecrim Rosemary	I
<i>Salvia splendens</i> Kerr.	pingo-de-lacre, cordeial-do-brasil Scarlet sage	T
Buddlejaceae		
<i>Buddleja brasiliensis</i> Jacquin	verbasco-do-brasil Butterfly bush	T
Oleaceae		
<i>Forsythia intermedia</i> Zabel	Forsythia White ash	T
<i>Fraxinus americana</i> L.	cerca-viva, alfaneiro	S/I
<i>Ligustrum lucidum</i> Ait.	Privet oliveira, oliva	T
<i>Olea europaea</i> L.	Olive	T
<i>Syringa vulgaris</i> L.	lilá Lilac	I
Scrophulariaceae		
<i>Antirrhinum majus</i> L.	boca-de-leão Snapdragon	T
Bignoniaceae		
<i>Crescentia cujete</i> L.	coité, cuité Calabash tree	T

TABLE 1. Continuation.

Gymnosperms		
<i>Jacaranda ovalifolia</i> R. Br.	caroba-guaca, Jacarandá	T
<i>Pandorea</i> spp.	pandórea, sete-léguas Australian bower vine	I
<i>Spathodea campanulata</i> Beauv.	espatodéia South African tulip tree	I
<i>Tabebuia avellandae</i> Lorentz ex Griseb.	ipé-amarelo Trumpet tree	I
Rubiaceae		
<i>Coffea arabica</i> L.	café Coffee	T
<i>Gardenia jasminoides</i> Ellis.	Jasmin-do-cabo, dama-da-noite, gardênia Gardenia	I/T
<i>Genipa americana</i> L.	genipapo Genipap	T
<i>Posoqueria latifolia</i> (Rudge) Roem. & Schult.	papterra Needle flowered tree	I
Caprifoliaceae		
<i>Lonicera caprifolium</i> L.	madressilva Honeysuckle	I/T
Asteraceae		
<i>Ageratum conyzoides</i> L.	mentastro, agerato Ageratum	T
<i>Callistephus chinensis</i> Nees.	rainha-margarida China aster	I/T
<i>Chrysanthemum frutescens</i> L.	margarida Chrysanthemum	I
<i>Chrysanthemum</i> spp.	mal-me-quer, crisântemo Chrysanthemum	I/T
<i>Coreopsis lanceolata</i> L.	coreópsis Coreopsis	I/T
<i>Cosmos</i> spp.	cósmea Cosmos	T
<i>Dahlia</i> cvs.	dália Dahlia	T
<i>Helianthus annuus</i> L.	girassol Sunflower	T
<i>Helianthus tuberosus</i> L.	topinambo Jerusalem artichoke	T
<i>Lactuca sativa</i> L.	alface Lettuce	T
<i>Solidago</i> spp.	cordão-de-ouro Goldenrod	T
<i>Tagetes</i> spp.	cravo-de-defunto Marigold	T
<i>Vanillosmopsis erythropappa</i> Sch. Bit.	candeia	I
<i>Xanthium</i> spp.	carrapicho Cocklebur	T

Monocotyledons

TABLE 1. Continuation.

Gymnosperms		
Arecaceae		
<i>Astrocaryum tucuma</i> Mart.	tucum Tucuma	S/I
<i>Caryota urens</i> L.	banda-de-sargento Sago palm	I/T
<i>Chamaerops humilis</i> L.	palma-de-leque Fan palm	T
<i>Chrysalidocarpus lutescens</i> H. Wendl.	areca Yellow palm	S
<i>Cocos nucifera</i> L.	coco Coconut	S
<i>Elaeis guineensis</i> Jacq.	dendê-do-pará, caiaué Dende palm	S
<i>Euterpe oleracea</i> Mart.	açai Assai palm	I
<i>Mauritia flexuosa</i> L.f.	buriti Ita palm	I
<i>Maximiliana maripa</i> (Corréa) Drude	inajá Cucurite palm	I
<i>Orbignya barbosiana</i> Burret	babaçu Babassu	S/I
<i>Phoenix dactylifera</i> L.	tamareira, palmeira-de-igreja Date palm	S/I
<i>Roystonea regia</i> (HBK) O.F. Cook	palmeira-imperial Royal palm	S
<i>Sabal mexicana</i> Mart.	palmeira-mexicana Palmetto	T
<i>Syagrus campestris</i> (Mart.) H. Wendl.	ariri	S
Pandanaceae		
<i>Pandanus utilis</i> Bory.	pandano Screw Pine	S
Araceae		
<i>Caladium bicolor</i> Vent.	caládio Caladium	I/T
<i>Monstera deliciosa</i> Liebm.	sete-chagas Cut leaf philodendron	I
<i>Philodendron imbe</i> Schott.	cipó-imbé Philodendron	I
Cyperaceae		
<i>Cyperus papyrus</i> L.	papiro Papyrus	S/I
Poaceae		
<i>Anatherium bicorné</i> Beauv.	sapé	I
<i>Aristida pallens</i> Cav.	barba-de-bode Goat's beard	S/I
<i>Bambusa vulgaris</i> Schrad.	bambu Feathery Bamboo	I
<i>Cynodon dactylon</i> Pers.	capim-de-burro Bermuda grass	T
<i>Melinis minutiflora</i> Beauv.	capim-gordura	T

TABLE 1. Continuation.

Gymnosperms		
<i>Paspalum notatum</i> Fluegge	Molasses grass grama-batais	T
<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	Bahia grass capim-cucuíu	T
<i>Poa</i> spp.	Kikuyu grass capim-sempre-verde	I
<i>Saccharum officinarum</i> L.	Meadow grass, Spear grass cana-de-açúcar	S/I
<i>Triticum aestivum</i> L.	Sugar cane trigo	I
<i>Zea mays</i> L.	Wheat milho	S
	Corn, Maize	
Typhaceae		
<i>Typha</i> spp.	tabua Cattail	S/I
Bromeliaceae		
<i>Ananas comosus</i> Mett.	abacaxi Pineapple	T
Heliconiaceae	banana-do-mato	I
<i>Heliconia bihai</i> L.		
Musaceae	Wild plantain	
<i>Musa paradisiaca</i> var. <i>sapientum</i> Kuntze	banana Banana	I
Cannaceae		
<i>Canna generalis</i> Bailey.	albará Canna lily	S/I
<i>Canna indica</i> L.	cana-da-india Indian-shot	S/I
Liliaceae		
<i>Allium cepa</i> L.	cebola Onion	I
<i>Hemerocallis</i> Hybrids	lirio-amarelo Daylily	S
<i>Hyacinthus orientalis</i> L.	Jacinto Hyacinth	S
<i>Lilium candidum</i> L.	lirio-dos-poetas Madonna lily	S/I
Iridaceae		
<i>Gladiolus communis</i> L.	lagrima-de-sta.-rita Tears of Saint Rita	S
<i>Gladiolus</i> hybrids	palma-de-sta.-rita Gladiolus	S
<i>Iris</i> spp.	lirio Iris	S
Aloeceae		
<i>Aloe vera</i> L.	barbosa Aloe	T
Agavaceae		
<i>Agave sisalana</i> Perrine	sisal Sisal	S/I
<i>Agave</i> spp.	agave	S/I

TABLE 1. Continuation.

Gymnosperms		
<i>Dracaena marginata</i> Lam.	Agave dracena	S/I
<i>Sansevieria zeylanica</i> Willd.	Dracena espada-de-ogum Snake plant	T
<i>Yucca filamentosa</i> L.	árvore-da-pureza Adam's needle yucca	I
Smilacaceae		
<i>Smilax</i> spp.	Japecanga Greenbriar, Catbriar	S

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