

## Biological Activities for Extracts of Erva Tostão (*Boerhaavia diffusa*)

Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Entire plant India	Toxicity assessment (Quantitative)	ETOH - H2O (1:1) Ext	IP Mouse	1.0 gm/kg		Maximum tolerated dose	A03335
Entire plant India	Toxic effect (General)	ETOH - H2O (1:1) Ext	Intragastric Mouse	2000 mg/kg	Inactive		M26677
Root India	Toxicity Assessment (Quantitative)	ETOH - H2O (1:1) Ext	IP Mouse	1.0 gm/kg		Maximum tolerated dose.	A03335
Leaf Brazil	Toxicity (General)	Decoction	Oral Mice	5000 mg/kg	Inactive		AJ1003
Leaf Juice Brazil	Toxicity (General)	Juice Ext	Oral Mice	5000 mg/kg	Inactive		AJ1003
Root Nigeria	Toxicity Assessment (Quantitative)	H2O Ext	IP Mouse	LD50: 298.0 mg/kg			K11896
Root India	Uterine Stimulant Effect	ETOH - H2O (1:1) Ext	Rat Female	Not stated	Inactive	Uterus (estrogenic)	A03335
Entire plant India	Uterine Stimulant Effect	ETOH-H2O (1:1) Ext	Rat Female	Not stated	Inactive	Uterus (estrog)	A03335
Root India	Embryotoxic Effect	ETOH (70%) Ext	Intragastric Rat (pregnant)	250.0 mg/kg	Inactive		M31122
Root India	Teratogenic Activity	ETOH (70%) Ext	Intragastric Rat (pregnant)	250.0 mg/kg	Inactive		M31122
Entire plant India	Barbiturate Inhibition	ETOH - H2O (1:1) Ext	Intragastric Mouse	500.0 mg/kg	Active	Barbiturate sleeping time decreased.	M26677
Leaf Brazil	Barbiturate Potentiation	Decoction	IP Mice	1000 mg/kg	Inactive	Did not alter sleeping time.	AJ1003
Leaf Juice Brazil	Barbiturate Potentiation	Juice Ext	IP Mice	1000 mg/kg	Inactive	Did not alter sleeping time.	AJ1003
Root India	Hypotensive Activity	H2O Ext	IV Dog	0.02 ml/kg	Active		T15202

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Root India	Hypotensive Activity	MEOH Ext	IV Dog	0.02 ml/kg	Active	Effect blocked by atropine, but not by propranolol or mepyramine. Reported biological activity is highly dose-dependent.	T12052
Root India	Myocardial Depressant Activity	MEOH Ext	Frog Heart	0.1 ml	Active	Effect blocked by atropine. Reported biological activity is highly dose-dependent.	T12052
Root India	Cardiotonic Activity	ETOH-H2O (1:1) Ext	Perfusion Guinea Pig	Not stated	Active	Heart	A03335
Entire plant India	Anticoagulant activity	ETOH-H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	Prothrombin time decreased. Dose was given daily for 5 days. Vs.ccl4-induced hepatotoxicity.	M26677
Not stated India	Hemostatic Activity	Not stated	Vaginal Monkey	Not stated	Active	Aids in Arresting IUCD-induced Bleeding	T01268
Root India	Antihemorrhagic Activity	Not stated	Monkey	Not stated	Active	Reduced duration of menstrual flow (124%), menstrual iron loss (120.8%) and uterine tissue plasminogen activator (272%) in IUD-fitted monkeys	AJ1006
Root India	Antihemorrhagic Activity	Not stated	Monkey	Not stated	Active	Reduced stromal edema, inflammation, tortuosity of glands and increased deposition of fibrin and platelets in the vessel lumen of the endometrium of monkeys fitted with IUD's.	AJ1007
Root India	Angiotensin-Converting Enzyme Inhibition	Acetone Ext	Not stated	25.0 mcl	Weak Activity	3.0% Inhibition	K26414
Root India	Angiotensin-Converting Enzyme Inhibition	ETOH (95%) Ext	Not stated	25.0 mcl	Weak Activity	5.0% Inhibition	K26414

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Root India	Angiotensin-Converting Enzyme Inhibition	H2O Ext	Not stated	25.0 mcl	Active	40% Inhibition	K26414
Root Nepal	Adrenergic Receptor Blocker (alpha-2)	MEOH Ext	Not stated	Not stated	Active		H05892
Root India	Antiproliferative Activity	ETOH Ext	Not stated	Not stated	Active		AJ1001
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Inactive	Bacteriophage M-12 vs. plaque formation	M16847
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Inactive	Bacteriophage PP-7 vs. plaque formation	M16847
Root India	Antiphage Activity	H2O Ext	Intraportal	Not stated	Weak Activity	Bacteriophage Q-beta vs. plaque formation	M16847
Root India	Cholinesterase Inhibition	H2O Ext	Not stated	Not stated	Active		T15202
Not stated India	Diuretic Activity	Powder * Oral	Human Adult	1.5 gm/lb	Inactive	Forty patients with nephrotic syndrome were treated with fresh powdered drug for one month. The extract increased serum protein levels, reduced urinary protein excretion and increased the level of immunoglobulins and lowered immunecomplex.	K29697
Entire plant India	Diuretic activity	Not stated	Toad ( <i>Thermobia domes</i> )	Variable	Active	Depressed tubular excretion of phenol. Inhibited succinic dehydrogenase in kidney, but had a stimulatory effect with lower doses. It depressed kidney tissue slice respiration, but had no effect on kidney phosphatase. It stimulated the activity of kidney D-amino oxidase.	A11491

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Aerial parts India	Diuretic activity	ETOH	Oral Rat	0.4 ml/kg	Weak activity	Activity was increased when the dosage was halved and combined with <i>Phyllanthus niruri</i> extract	J12663
Not stated India	Diuretic Activity	Powder	Intragastric Rat (Male)	1.0 ml	Active	Kidney	K29697
Root India	Diuretic Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	Increased 24 Hr Urine output 100%	J08439
Stem India	Diuretic Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Inactive	Increased 24 Hr Urine out Put ca 15%	J08439
Entire plant India	Antidiuretic activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	Decreased 24 hr urine output by 30%	J08439
Flower + leaf India	Antidiuretic activity	ETOH (95%) Ext	IP Rat	300 mg/kg	Active	Decreased 24 hr urine output by 50%	J08439
Entire plant India	Diuretic activity	Pet ether Ext	Oral Rat	ED50 = 250 mg/kg	Active		J05221
Root India	Hepatoprotective Activity	H2O Ext	Rat	2 ml/kg	Active	In thioacetamide intoxicated rats the extract protected serum parameters GOT, GPT, ACP and ALP.	AJ1010
Entire plant India	Antihepatotoxic activity	ETOH - H2O (1:1) ext	Intragastric Mouse	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity. Reversed increases in glutamate pyruvate transaminase, glutamate oxylate transaminase and bilirubin.	M26677
Entire plant India	Glutamate-oxalo-acetate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677
Entire plant India	Glutamate-pyruvate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Mouse	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677
Entire plant India	Glutamate-pyruvate-transaminase inhibition	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity.	M26677

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Entire plant India	Hepatotonic Activity	ETOH - H2O (1:1) Ext	Intragastric Rat	500.0 mg/kg	Active	vs. CCL4-induced hepatotoxicity. Plasma bilirubin decreased.	M26677
Not stated India	Antihepatotoxic Activity	Not stated	IP Rat	Not stated	Active	vs. mercuric chloride induced hepatotoxicity. Liver showed an increased mitotic index and acceleration of tubular repair.	K07546
Leaf Nigeria	Anticonvulsant Activity	ETOH (70% )Ext	IP Mouse	2.0 gm/kg	Active	vs. metrazole-induced convulsions.	T06510
Leaf Nigeria	Anticonvulsant Activity	ETOH (70%) Ext	IP Mouse	Variable	Inactive	vs. strychnine-induced convulsions	T06510
Root Nigeria	Anticonvulsant Activity	MEOH Ext	IP Mouse	1.5 gm/kg	Active	vs metrazol-induced convulsions	N02475
Root Nigeria	Anticonvulsant Activity	H2O Ext	IP Mouse	ED50: 126 mg/kg	Active	vs. electroshock-induced convulsions	K11896
Root Nigeria	Anticonvulsant Activity	H2O Ext	IP Mouse	ED50: 251 mg/kg	Weak Activity	vs. pentylenetetrazole-induced convulsions	K11896
Root India	Skeletal Muscle Stimulant Activity	MEOH Ext	Frog	0.25 ml	Active	Muscle ( <i>Rectus abdominus</i> )	T12052
Root India	Smooth Muscle Stimulant Activity	MEOH Ext	Guinea Pig ileum	0.05 ml	Active	Effect blocked by atropine.	T12052
Root India	Antispasmodic Activity	ETOH - H2O (1:1) Ext	Guinea Pig ileum	Not stated	Active	vs. ACH- and histamine-induced spasms.	A03335
Entire plant India	Antispasmodic Activity	ETOH - H2O (1:1) Ext	Guinea Pig ileum	Not stated	Active	vs. ACH- and histamine-induced spasms.	A03335
Root India	Spasmogenic Activity	H2O Ext	Frog	Not stated	Active	Muscle ( <i>Rectus abdominus</i> )	T15202
Root India	Spasmogenic Activity	H2O Ext	Guinea Pig	Not stated	Active	Ileum	T15202
Leaf + root + seed India	Anti-inflammatory Activity	Not stated	Oral Human Adult	Variable	Active		T06320

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Entire plant India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	vs carrageenin-induced pedal edema. Paw volume decreased 44%	J08439
Flower + leaf India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300 mg/kg	Active	vs carrageenin-induced pedal edema. Paw volume decreased 52%	J08439
Root India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Active	vs. carrageenin-induced pedal edema decreased paw volume 52%	J08439
Stem India	Anti-inflammatory Activity	ETOH (95%) Ext	IP Rat	300.0 mg/kg	Weak Activity	vs. carrageenin-induced pedal edema paw volume decreased 16%	J08439
Leaf Brazil	Anti-inflammatory Effect	Decoction Leaf Juice	Oral Mouse	Not stated	Inactive	No effect on carrageenan-induced paw edema. P > 0.05	AJ1003
Leaf Brazil	Analgesic Effect	Decoction	Oral Mouse	1000 mg/kg	Active  Weak Activity	vs. acetic acid-induced writhing. demonstrated 47% inhibition. Thermal hot-plate writhing test.	AJ1003
Leaf Juice Brazil	Analgesic Effect	Juice Ext	Oral Mouse	1000 mg/kg	Active  Strong Activity	vs. acetic acid-induced writhing demonstrated 50% inhibition. Thermal hot-plate writhing test.	AJ1003
Twig India	Antipyretic Activity	Not stated	Intragastric Rat	Not stated	Weak Activity	Vs.pyrexia Induced by Subcutaneous Injection of Yeast	A14888
Not stated India	Immunostimulatory Effect	Alkaloid Fraction	Mice	25-100 mg/kg	Active	Inhibited SRBC-induced delayed hypersensitivity reactions during post-immunization drug treatment. An increase in antibody titre was observed during pre- and post-immunization treatment.	AJ1004

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Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root India	Immunosuppressive Activity	ETOH Ext	In vitro	Not stated	Active	Inhibited human NK cell cytotoxicity, production of NO in mouse macrophage cells, IL-2 and TNF-alpha in human PBMCs. No effect on IFN-gamma, cell surface markers CD16, CD25 and HLA-DR.	AJ1001
Not stated India	Blastogenic Activity	Alkaloid Fraction	Mice	25-100 mg/kg	Inactive	No blastogenic response of murine splenocytes to Concanvalin A and lipopolysaccharide.	AJ1004
Not stated India	Mitogenic Activity	Alkaloid Fraction	Mice	25-100 mg/kg	Inactive		AJ1004
Entire plant India	Cytotoxic activity	ETOH - H2O (1:1) Ext	Cell culture	ED50: > 20.0 mcg/ml	Inactive	Ca-9kb	A03335
Root India	Cytotoxic Activity	ETOH - H2O (1:1) Ext	Cell Culture	ED50: > 20.0 mcg/ml	Inactive	Ca-9kb	A03335
Root Nepal	Cytotoxic Activity	Ether Ext	Cell Culture	Not stated	Active	HeLa-S3 Cells	H05892
Root India	Antiproliferative Activity	ETOH Ext	Cell culture	Not stated	Active	Inhibited mitogenic T-cell proliferation of human peripheral blood mononuclear cells (PBMC). Inhibited antigen-stimulated PBMC proliferation. Inhibited the growth of mouse and human macrophage cells, mouse fibroblast cells, human embryonic kidney cells, mouse liver cells, monkey kidney cells, mouse lymphoma cells, human erythroleukemic cells and human T cells.	AJ1002

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Plant part - origin	Activity tested for	Type extract	Test model	Dosage	Result	Notes / organism tested	Ref #
Root India	Antiviral Activity	H2O Ext	Not stated	Undiluted	Active	<i>Gomphrena mosaic virus</i> <i>Sunnhemp rosette virus</i> <i>Tobacco mosaic virus</i> <i>Tobacco ring spot virus</i>	N02873
Aerial parts Iran	Antibacterial Activity	ETOH (80%) Ext	Agar plate	100.0 mcg/ml	Active Active Active	<i>Pseudomonas aeruginosa</i> <i>Salmonella paratyphi A</i> <i>Staphylococcus aureus</i>	T09667
Entire plant India	Antibacterial Activity	H2) Ext	Agar Plate	30-40 mg/ml	Active	<i>Aeromonas hydrophilla</i> <i>Bacillus cerues.</i>	AJ1012
Aerial parts Iran	Antibacterial Activity	ETOH (80%) Ext	Agar plate	100.0 mcg/ml	Inactive	<i>Bacillus anthracis</i> <i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Proteus vulgaris</i> <i>Shigella sonnei</i> <i>Vibrio cholera</i>	T09667
Petiole Nigeria	Antibacterial Activity	H2O Ext	Agar Plate	Not stated	Active	<i>Clostridium botulinum</i> <i>Corynebacterium diphtheriae</i> <i>Salmonella typhimurium</i>	K16264
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext	Agar Plate	Not stated	Active Weak Activity	<i>Clostridium botulinum</i> <i>Clostridium tetani</i>	K16264
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext H2O Ext	Agar Plate	Not stated	Equivocal	<i>Neisseria gonorrhoea</i>	K16264
Entire plant Nigeria	Antibacterial activity	MEOH Ext	Agar plate	2.0 mg/ml	Inactive	<i>Corynebacterium diphtheriae</i> <i>Neisseria species</i> <i>Pseudomonas aeruginosa</i> <i>Salmonella species</i> <i>Staphylococcus aureus</i> <i>Streptobacillus species</i> <i>Streptococcus species</i>	M27767
Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext H2O Ext		Not stated	Inactive	<i>Staphylococcus aureus</i>	K16264

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Petiole Nigeria	Antibacterial Activity	ETOH (40%) Ext	Agar Plate	Not stated	Inactive	<i>Salmonella typhimurium</i> <i>Bacillus subtilis</i> <i>Bacteroides fragilis</i> <i>Bacteroides melaninogenicus</i> <i>Corynebacterium diphtheriae</i> <i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Proteus vulgaris</i> <i>Pseudomonas pyocyanae</i> <i>Yersinia pseudotuberculosis</i>	K16264
Petiole Nigeria	Antibacterial Activity	H2O Ext	Not stated	Not stated	Inactive	<i>Staphylococcus aureus</i>	K16264
Petiole Nigeria	Antibacterial Activity	H2O Ext	Agar Plate	Not stated	Inactive	<i>Bacillus subtilis</i> <i>Bacteroides fragilis</i> <i>Bacteroides melaninogenicus</i> <i>Clostridium tetani</i> <i>Proteus vulgaris</i> <i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Pseudomonas pyocyanae</i> <i>Yersinia pseudotuberculosis</i>	K16264
Not stated Nigeria	Antifungal Activity	Not stated	Agar Plate	Not stated	Inactive		AJ1008
Not stated India	Antifungal Activity	Not stated	Agar Plate	Not stated	Weak Activity	<i>Microsporium gypseum</i> <i>Chrysosporium tropicum</i> <i>Trichophyton terrestre</i>	AJ1005
Root Sri Lanka	Nematocidal Activity	Decoction	Not stated	10.0 mg/ml	Inactive	<i>Toxocara canis</i>	M26175
Leaf India	Antinematodal activity	H2O Ext	Not stated	Variable	Active	<i>Meloidogyne incognita</i>	T07251
Leaf India	Antiamebic Activity	ETOH (80%) Ext	Not stated	MIC >1000 mcg/ml	Inactive	<i>Entamoeba histolytica</i>	K19310
Not stated India	Antiamebic Activity	ETOH (80%) Ext	Intragastric Rat	250.0 mg/kg	Weak Activity	<i>Entamoeba histolytica</i>	K19310
Root India	Antiamebic Activity	ETOH (80%) Ext	Intragastric Rat	500.0 mg/kg	Active	<i>Entamoeba histolytica</i>	K19310
Root India	Insecticide Activity	Butanol Ext	Not stated	Not stated	Active	<i>Musca domestica</i>	N15507

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Root Nigeria	Molluscicidal Activity	MEOH Ext	Not stated	100.0 ppm	Inactive	<i>Bulinus globosus</i>	T04176
Not stated India	Alpha-Amylase Inhibitory Activity	ETOH Ext	In vitro	Not stated	Inactive		AJ1011

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