

## Medicinal Properties of Herbal Spices

Spice	Medicinal properties
Allspice	Stimulant, digestive and carminative
Basil, sweet	Stomachic, anthelmintic, diaphoretic, expectorant, antipyretic carminative, stimulant, diuretic, demulcent
Bay leaves (laurel)	Stimulant, narcotic
Caraway	Stomachic, carminative, anthelmintic, lactagogue
Celery	Stimulant, tonic, diuretic, carminative, emmenagogue, anti-inflammatory
Chive	Stimulant, diuretic, expectorant, aphrodisiac, emmenagogue, anti-inflammatory
Coriander	Carminative, diuretic, tonic, stimulant, stomachic, refrigerent, aphrodisiac, analgesic, anti-inflammatory
Dill	Carminative, stomachic, antipyretic
Fennel	Stimulant, carminative, stomachic, emmenagogue
Fenugreek	Carminative, tonic, aphrodisiac
Leek	Stimulant, expectorant
Marjoram	Carminative, expectorant, tonic, astringent
Mint (peppermint)	Stimulant, stomachic, carminative, antiseptic
Mint (spearmint)	Stimulant, carminative and antispasmodic
Oregano	Stimulant, carminative, stomachic, diuretic, diaphoretic and emmenagogue
Parsley	Stimulant, diuretic, carminative, emmenagogue, antipyretic, anti-inflammatory
Rosemary	Mild irritant, carminative, stimulant, diaphoretic
Sage	Mild tonic, astringent, carminative
Tarragon	Aperient, stomachic, stimulant, febrifuge
Thyme	Antispasmodic, carminative, emmenagogue, anthelmintic, spasmodic, laxative, stomachic, tonic, vermifuge

## Insect repellent properties of herbal spices

Spice	Mode of application	Insects
Fenugreek	Seed extract	<i>Tribolium castaneum</i> , <i>Acanthoscelides obtectus</i>
Fennel	Direct contact and fumigation	<i>Callosobruchus chinensis</i> , <i>Lasioderma serricorne</i>
Indian dill	Essential oil	<i>Callosobruchus maculatus</i>
Dill	Essential oil	<i>Lucilia sericata</i>
Peppermint and basil	Powdered aerial parts	<i>Callosobruchus maculatus</i>
Basil	Fumigation of essential oil	<i>Drosophila melanogaster</i>
Mint	Essential oil	<i>Callosobruchus analis</i>
Peppermint	Leaf powder	<i>Tetranychus cinnabarinus</i> , <i>Aphis gossypii</i> , <i>Tribolium confusum</i>
Cumin and anise	Vapour of essential oil	<i>Ephestia kuehniella</i> , <i>Acanthoscelides obtectus</i>
Oregano	Essential oil	<i>Tetranychus cinnabarinus</i> , <i>Aphis gossypii</i>

## Antimicrobial activity of herbal spices

Spice	Mode of application	Activity against bacteria	Activity against fungus
Basil	Essential oil		<i>Ascophaera apis</i>
Basil	Methyl chavicol	<i>Aeromonas hydrophilla, Pseudomonas fluorescens</i>	
Coriander	Essential oil		<i>Ascophaera apis</i>
Fenugreek	Seed saponins		<i>Fusarium oxysporum</i> f. sp. <i>Lycopersici</i>
Fenugreek	Essential oil	<i>Bordetella bronchiseptica, Bacillus cereus, Bacillus pumilus, Bacillus subtilis, Micrococcus flavus, Staphylococcus aureus, Sarcina lutea, Escherichia coli, Proteus vulgaris</i>	
Cumin	Essential oil		<i>Penicillium notatum, Aspergillus niger, Aspergillus fumigatus, Microsporium canis</i>
Fennel	Essential oil	<i>Staphylococcus aureus, Bacillus subtilis</i>	
Ajowan	Seed extracts		<i>Pythium aphanidematum, Macrophomina phaseolina, Rhizactonia solani</i>
Allspice	Plant extract:		<i>Fusarium</i> spp., <i>Alternaria</i> spp. and <i>Cladosporium</i> spp,
Oregano, coriander and basil	Essential oil	<i>Listeria monocytogenes, Staphylococcus aureus,</i>	<i>Aspergillus niger</i>
<i>Escherichia coli, Yersinia enterocolitica,</i>		<i>Pseudomonas aeruginosa, Lactobacillus plantarum</i>	
<i>Anethum graveolens, coriander</i>	Seed diffusates		<i>Alternaria alternata, Fusarium solani, Macrophomina phaseolina</i>
Pepper mint, thyme, caraway	Essential	<i>Agrobacterium tumefaciens, Ralstonia solanacearum, Erwinia carotovora</i>	
Spearmint, basil, parsley	Essential oil	<i>Staphylococcus aureus, Escherichia coli</i>	<i>Candida albicans, Aspergillus niger</i>
Oregano and mint	Essential oil		<i>Aspergillus ochraceus</i>
Oregano	Essential oil or carvacrol		<i>Candida albicans</i>
Oregano, thyme	Essential oil or carvacrol	<i>Streptococcus pneumoniae</i> R36 A. <i>Bacillus cereus</i>	

## Relative antioxidative effectiveness (RAE) of herbal spice extracts

Substrate, conditions	RAE
Lecithin emulsion, daylight, room temperature, 26 days	Rosemary>sage
Lard, 50°C	Rosemary>sage>marjoram
Chicken fat. 90°C	Sage>rosemary
Methylinoleate, 100°C	Sage>deodorized rosemary>untreated rosemary
Lard, 75°C	Oregano>thyme>marjoram>spearmint>lavender>basil
TGSO. 100°C	Summer savory>peppermint>common balm>spearmint>oregano>common basil
Low-erucic rapeseed oil, 60°C, 23 days	Sage>thyme>oregano
Methanol	Oregano>cinnamon=marjoram>caraway
Minced chicken meat, 4°C and -18°C	Caraway>wild marjoram
Raw pork meats. pretreated with NaCl, 4°C and -18°C	Sage>basil>thyme
Microwave cooked pork patties treated with NaCl. -18°C	Basil=thyme

## Antioxidants isolated from herbal spices

Spice	Antioxidants
Rosemary	Carnosic acid, carnosol, rosmarinic acid, rosmanol
Sage	Carnosol, carnosic acid, rosmanol, rosmarinic acid
Oregano	Derivatives of phenolic acid, flavonoids, tocopherols
Thyme	Carvacrol thymol, <i>p-cymene</i> , caryophyllene, carvone, borneol
Summer savory	Rosmarinic acid, carnosol, carvacrol, thymol
Marjoram	Flavonoids
All spice	Pimentol

**NUTRITIVE VALUE OF HERBAL SPICES  
(APPROXIMATE COMPOSITION/100g OF EDIBLE PORTION)**

Spice	Energy (k cal.)	Protein (g)	Fat (g)	Total CHO (g)	Fibre (g)	Ash (g)	Calcium (mg)	Fe (mg)	Mg (mg)	P (mg)	K (mg)	Na (mg)	Zn (mg)	Ascorbic acid (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin A (IU)
Sweet basil	251	14.4	4.0	61.0	17.8	14.3	2113	42	422	490	3433	34	6	61.2	0.1	0.3	6.9	9375
Bay	313	7.6	8.4	75.0	26.3	3.6	834	43	120	113	529	23	4	-	-	-	2	6185
Chervil	237	23.2	3.9	49.1	11.3	16.6	1346	32	130	450	4740	83	9	NA	NA	NA	NA	NA
Marjoram	271	12.7	7.0	60.6	18.1	12.1	1990	83	346	306	1522	77	4	51	-	-	4	8068
Oregano	306	11.0	10.3	64.4	15.0	7.2	1576	44	270	200	1669	15	4	-	-	-	6	6903
Parsley	276	22.4	4.4	51.7	10.3	12.5	1468	98	249	351	3805	452	5	122	-	I	8	23 340
Rosemary	331	4.9	15.2	64.1	17.7	6.5	1280	29	220	70	955	50	3	61	-	-	1	3128
Sage	315	10.6	12.7	60.7	18.1	8.0	1652	28	428	91	1070	11	5	32	-	-	6	5900
Tarragon	295	22.8	7.2	50.2	7.4	12.0	1139	32	347	313	3020	62	4	-	-	I	9	4200
Thyme	276	9.1	7.4	63.9	18.6	11.7	1890	124	220	201	814	55	6	-	-	-	5	3800

*Source:* Farrel ( 1990).

## Ayurvedic modes of administration

Modality	Mode/Vehicle	Effects	Potential
Cinnamon oil	Volatiles	Antimicrobial	Infections
Curcuma longa	'Band-aid'	Wound healing	Global scope
Asafoetida	Umbilicus	Antiflatulent	Post-Operative
Asparagus racemosus	with milk /boiled	Phagocytosis	Rasayana
Centella asiatica	Brahmighrita	Nootropic	Alzheimer's disease

Source : Vaidya (2002)

## Molecular Phytopharmacology of a few herbs and spices

Plant	Avtive Principle	Molecular actions	Uses
Piper longum	Piperine	RNA synthesis	Antiviral
Curcuma longa	Curcumin	ProtienSynthesis	Global scope
Mangifera indica	Mangiferin	Macrophage activation	Immunostimulant
Coleus forskohili	Forshlin	cAMP increase	Against glaucoma

## Use of major medicinal spices in *Ayurveda*

Standard medicine	Turmeric	Ginger	Pepper	Cardamom	Cinnamon/cassia Tej Poltra (Cinna-tamla)	Nutmeg	Others
1. Murchchha-paka or ghee, sesame, mustard, castor oil	3	-	-	-	-	-	Coriander
2. Gandha-paka	-	-	-	3	3	3	Clove, saffron
3. Anupan	3	3	3	-	-	-	Ocimum sanctum
4. Chaturbhadra	-	3	-	-	-	-	-
5. Panchkala	-	3	-	-	-	-	-
6. Valli Panchanula	-	-	-	-	-	-	-
7. Trikatu	-	3	3	-	-	-	Long Pepper
8. Lekniya Varga	3	-	-	-	-	-	-
9. Dipaniya Varga	-	3	3	-	-	-	-
10. Triptaighna Varga	-	3	-	-	-	-	-
11. Kushthaghma Varga	3	-	-	-	-	-	-
12. Vishagham Varga	3	-	-	-	-	-	-
13. Stunyasodhanna Varga	-	3	-	-	-	-	-
14. Sirouirechanopaga Varga	-	-	3	-	-	-	-
15. Trishna nigrsha Varga	-	3	-	-	-	-	-
16. Sitaprasemana Varga	-	3	-	-	-	-	-
17. Sulaprasemana Varga	3	3	3	-	-	-	-
18. Haridradiguna	3	-	-	-	-	-	-
19. Mustadigana	3	-	-	3	-	-	-
20. Lakshadigana	3	-	-	-	-	-	-
21. Rasnadi group	-	3	-	-	-	-	-
22. Pippalyadi group	-	3	3	-	-	-	-
23. Guruchaydi group	-	3	-	-	-	-	Coriander
24. Sunthayadi group	-	3	-	-	-	-	-
25. Duralabhadi group	-	3	-	-	-	-	-
26. Vishwadi group	-	3	-	-	-	-	-
27. Kanadi group	-	3	-	-	-	-	-
28. Granthyadi group	-	3	-	-	-	-	-
29. Kakolyadi group	-	3	-	-	-	-	-
30. Sripthaladi group	-	3	-	-	-	-	-
31. Bhunimvadi group	-	3	-	-	-	-	-
32. Maricahadi group	-	3	3	-	-	-	-
33. Katurikadya group	3	-	-	-	-	-	-
34. Nimbadi group	-	3	-	-	-	-	-
35. Katurikadya group	3	3	-	-	-	-	-
36. Trikodi group	-	3	3	-	-	-	-
37. Nidigdhikadi group	-	3	-	-	-	-	-
38. Katphaladi group	-	3	3	-	-	-	-
39. Navanga group	-	3	-	-	-	-	-

40.	Pancha bhadra group	-	3	-	-	-	-	-
41.	Kiratiktadi group	3	-	-	-	-	-	-
42.	Kiratadi group	-	3	-	-	-	-	-
43.	Araghadhadi group	3	-	-	-	-	-	-
44.	Mustadi group	-	3	-	-	-	-	-
45.	Pathasaptaka group	-	-	-	-	-	-	-
46.	Amritashtaka group	-	3	-	-	-	-	-
47.	Kantakaryadi group	-	3	-	-	-	-	-
48.	Swachchland Bhairirava	-	3	-	-	-	-	-
49.	Agnikumara Rasa	-	3	-	-	-	-	-
50.	Sarvajwarankusa Vatika	-	3	3	-	-	-	-
51.	Sarvajwarankusa Vatika	-	3	-	-	-	-	-
52.	Chanderswara	-	3	-	-	-	-	-
53.	Chadrasekhara Rasa	-	3	3	-	-	-	-
54.	Nanajwarchha-Sinha	-	3	3	-	-	-	-
55.	Mritunjaya Rasa	-	3	-	-	-	-	-
56.	Prachamdeswara Rasa	-	3	-	-	-	-	-
57.	Tripurabhahairava Rasa	-	3	3	-	-	-	-
58.	Kanphaketu	-	3	3	-	-	-	-
59.	Jwara kesari	-	3	3	-	-	-	-
60.	Jwara murari	-	3	3	-	-	-	-
61.	Situ bhanjdrosa	-	3	-	-	-	-	-
62.	Nawa-Jwarari Rasa	-	3	-	-	-	-	-
63.	Sarwanga Sundara	-	3	3	-	-	-	-
64.	Jayabati	3	3	3	-	-	-	-
65.	Srirama rasa	-	-	3	-	-	-	-
66.	Udakamanjiri	-	-	3	-	-	-	-
67.	Kshudradi	-	3	3	-	-	-	-
68.	Nagaradi group	-	3	-	-	-	-	Coriander
69.	Chaturdasanga	-	3	-	-	-	-	-
70.	Ashtadasanga	-	3	-	-	-	-	-
71.	Bhargydi group	-	3	-	-	-	-	-
72.	Sathyadi group	-	3	-	-	-	-	-
73.	Mustadya group	-	3	-	-	-	-	-
74.	Vyashadi group	-	3	3	-	-	-	-
75.	Watinga group	3	3	3	-	-	-	-
76.	Kankakaryadi group	3	3	-	-	-	-	Coriander
77.	Vrihatkatphatedi group	-	3	-	-	-	-	-
78.	Unmatha Rasa	-	3	3	-	-	-	-
79.	Vnihar Kasturi Bhairava	3	-	-	-	-	-	-
80.	Sleshma-kalanala	-	4	4	-	-	-	-

## Cultivating requirements and uses

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Plant	Propagation	Common uses
Anise	Annual. Seeds are sown in a dry, light soil in early summer. Seedlings should be thinned to inches apart. Anise needs 120 frost-free days to produce fully ripened seed heads.	The aromatic seeds are used in cooking, in pot-pourris and in some simple home remedies.
Basil	Perennial. Grows easily from seed. It is frost sensitive. Basil needs medium-rich, well-drained soil and full sun. Pinch off tips and flower buds to promote bushiness.	The leaves are a classic complement to tomatoes; they are also used to flavour salads, sauces and vegetables
Chervil ( <i>Anthriscus cerefolium</i> )	Annual and resembles parsley. Seeds are sown in spring. Thin to 15 cm (6 inches) apart. Likes moist, well-drained soil and partial shade. Will self-sow.	The leaves, with their delicate anise like flavour, are often used in soups and salads.
Lavender	Perennial, with many varieties. English lavender is the hardiest. Mulch it over the winter. Propagation is easiest by root division. Likes full sun and alkaline, gravelly soil.	Grown for its fragrance in the garden and to be used in pot-pourris and sachets.
Oregano	Perennial. Prefers well-drained, slightly alkaline soil and full sun. Propagate by seed, root division or cuttings.	The leaves are a favorite seasoning for pizza and other Italian dishes.
Parsley ( <i>Petroselinum crispum</i> )	Biennial. usually grown as an annual. Both types like a rich, well-drained soil and full sun or partial shade. Parsley seeds germinate slowly. Be patient; keep the soil moist. Thin to (20 cm) 8 inches apart.	Curly leaved parsley is popular as garnish. but flat leaved (Italian) parsley is more flavourful and is used as addition to salads and sauces. Parsley tea makes a healthful tonic
Rosemary	Perennial, grown indoors in cold climates. Rosemary needs full sun, and a sandy well-limed soil. Cut it back after flowering to prevent it from becoming leggy.	Propagate by layering or cuttings. This is an aromatic flavouring for meat and poultry dishes. Also used for making wreaths.
Savory	Winter savory, a perennial, has a peppery, pungent flavour. Summer savory, an annual, is similar but more delicate. Plant seeds of summer savory in a rich, light, moist soil; thin to 20 cm (8 inches) apart. Winter savory thrives in poorer soil and with less water. It can be propagated by seed, division or cuttings.	Savory is used to flavour sausages and other meats and is sometimes included in a bouquet garni.
Thyme	Perennial. There are many species and varieties including lemon, English, golden and garden. The garden variety is the most popular for cooking. Thyme grows well in dry sloping sides, pruning after flowering will keep it from getting woody. Propagated by cuttings.	The leaves add pungent taste to meats and vegetables; thyme sprigs are a main ingredient in bouquet garnishing for soups and stews.

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## Spices and herbs used in alcoholic beverages

Alcoholic beverages	Spices and herbs used
Vermouth	Marjoram, sage, coriander, ginger, cardamom, clove, mace, peppermint, thyme, anise, juniper berry
Gin	Coriander, juniper berry
Aquavit	Anise, fennel, dill, caraway
Curacao	Cinnamon, clove, nutmeg, coriander
Kummel	Caraway, fennel, coriander
Anisette	Anise, fennel, nutmeg
Ganica	Cinnamon, cardamom, coriander, mint, fennel, clove, pepper
Geme de cumin	Cumin
Geme de cacao	Clove, mace, vanilla
Geme de menthe	Peppermint
Peppermint schnapps	Peppermint

## Basic uses of herbs and spices

Basic function	Major function	Subfunction
Flavouring	Parsley, cinnamon, allspice, dill, mint, tarragon, cumin, marjoram, star anise, basil, anise, mace, nutmeg, fennel, sesame, vanilla, fenugreek, cardamom, celery	Garlic, onion, bay leaves, clove, thyme, rosemary, caraway, sage, savory, coriander, pepper, oregano, horseradish, Japanese pepper, saffron, ginger, leek, mustard
Deodorizing/masking	Garlic, savory, bay leaves, clove, leek, thyme, rosemary, caraway, sage, oregano, onion, coriander	
Pungency	Garlic, savory, bay leaves, clove, leek, thyme, rosemary, caraway, sage, oregano, onion, coriander, Japanese pepper, mustard, ginger, horseradish, red pepper, pepper	Parsley, pepper, allspice, mint, tarragon, cumin, star anise, mace, fennel, sesame, cardamom, mustard, cinnamon, vanilla, horseradish, japanese pepper, nutmeg, ginger
Colouring	Paprika, turmeric, saffron	

Source: Ravindran *et al.* (2002).

## Colour components in spices

Colour component	Tint	Spice
Carotenoid		
B-carotene	Reddish orange	Red pepper, mustard, paprika, saffron
Cryptoxanthin	Red	Paprika, red pepper
Lutin	Dark red	Paprika, parsley
Zeaxanthin	Yellow	Paprika
Capsanthin	Dark Red	Paprika, red pepper
Capsorbin	Purple red	Paprika, red pepper
Crocetin	Dark red	Saffron
Neoxanthin	Orange yellow	Parsley
Violaxanthin	Orange	Parsley, sweet pepper
Crocin	Yellowish orange	Saffron
Flavonoids	Yellow	Ginger
Curcumin	Orange yellow	Turmeric
Chlorophylls	Green	Herbs