

## Spices- An Option for Medicine, Health and Wealth

K. Nirmal Babu<sup>1</sup> and K.V. Peter<sup>2</sup>

<sup>1</sup>All India Coordinated Research Project on Spice,  
Indian Institute of Spices Research,  
Kozhikode 673 012, Kerala, India.  
Email : nirmalbabu30@hotmail.com

<sup>2</sup> Director,  
World Noni Research Foundations,  
Perungudi, Chennai 600096 Tamil Nadu, India.  
Email : kvptr@yahoo.com

### Introduction

The word food is derived from the word *feed* the prime source that keeps all the living things to continue their healthy living. Since time immemorial, spices and herbs have been used by many cultures around the world not only for food but to treat illness.

### Spices and Herbs as Food and Ethnic Medicines

Indians are the pioneers in the knowledge of spices and have been supplying these food processing agents for over 3500 years. Herbs and spices have tremendous importance in the way we live, as ingredients in food, alcoholic beverages, medicine, perfumery, cosmetics and colouring. They prevent food spoilage due to the action of microorganisms, help quick digestion of the food, create a cooling sensation in the body due to their diaphoretic action, excite sex centres and keep urine sterile when they are used moderately. Excessive use of spices cause irritability in gastro-intestinal and urinary tract, therefore, they are contra-indicated in their respective diseases. They are not recommended in gall bladder diseases and gout. They also have antioxidant, antimicrobial pharmaceutical and nutritional properties. In addition to the known direct effects, the use of these plants can also lead to complex secondary effects such as salt and sugar reduction, improvement of texture and prevention of food spoilage.

The basic effects of spices when used in cooking and confectionery can be for favouring, deodorizing/masking, pungency and colouring. They are also used to make food and confectionery more appetizing and palatable. Some spices like turmeric and paprika are used for imparting an attractive colour. Because of their antioxidant and antimicrobial properties, spices have dual function – in addition to imparting flavour and taste, they play a major role in food preservation by delaying the spoilage of food.

Many herbs and spices have been used in cosmetics, perfumery and beauty and body care since ancient times. The toiletries and allied industries use spices and herbs and their fragrant oils for the manufacture of soaps, toothpastes, face packs, lotions, freshness sachets, toilet waters and hair oils. They are essential ingredients in beauty care as cleansing agents, infusions, skin toners, moisturizers, eye lotions, bathing oils, shampoos, hair conditioners, cosmetic creams, lotions and creams for improvement of complexion and purifying blood. Spices form an important component in quite a few alcoholic beverages and beers.

Herbs and spices have been an essential factor in health care through ages in all cultures. They are prepared in number of ways to extract their active ingredients for internal and external use. Extracts from herbs and spices are used as infusions, decoctions, macerations, tinctures, fluid extracts, teas, juices, syrups, poultices, compresses, oils, ointments and powders. Many medicinal herbs used in Ayurveda have multiple bioactive principles. The most commonly used spices, herbs and their major medicinal properties and uses are given in Table 1.

Table 1: Important spices and their medicinal properties

| Sl. No. | Common name   | Botanical name                                  | Medicinal Uses   |
|---------|---------------|---|--|
| 1       | Ajowan        | <i>Trachyspermum ammi</i> L. Sprague ex. Tussil | Antispasmodic, stimulant, tonic and carminative. Administered in flatulence, dyspepsia, diarrhea, cholera. Effective in relaxing sore throat and in bronchitis. External application of fruit paste recommended in asthma. Used in preparation of ointment for checking chronic discharge. It is diuretic and carminative. |
| 2       | Allspice      | <i>Pimenta dioica</i> (L.) Merr                 | Used to treat flatulence, dyspepsia and diarrhea, Rheumatism and arthritis. Remedy for depression, nervous exhaustion and stress. has antioxidant properties   |
| 3       | Angelica      | <i>Angelica archangelica</i> L.                 | Antispasmodic, aphrodisiac, anticoagulant, bactericidal, carminative, diuretic, expectorant, nervine, stimulant and tonic properties. Used in stomach complaints, vomiting, leucoderma, and reduces accumulation of toxins.  |
| 4       | Anise         | <i>Pimpinella anisum</i> L.                     | Carminative with good flavour and fragrance.   |
| Sl. No. | Common name   | Botanical name                                  | Medicinal Uses   |
| 5       | Asafoetida    | <i>Ferula asafoetida</i> L.                     | Stimulant to mucus membrane, carminative, antispasmodic, expectorant, laxative and digestive. Also used in asthma, bronchitis and whooping cough.  |
| 6       | Basil         | <i>Ocimum basilicum</i> L.                      | Carminative and anti microbial used against gas, nausea and dysentery.   |
| 7       | Black caraway | <i>Bunium persicum</i> (Bosis) B Fedtsh         | Stimulant and carminative. Used in treating diarrhea, dyspepsia, fever, flatulence, stomachic, hemorrhoids and hiccups.  |
| 8       | Black cumin   | <i>Nigella sativa</i> L.                        | Seeds are carminative, stimulant, diuretic, emenagogue, galactagogue, used in mild cases of puerperal fever, skin eruptions. Alcoholic extract shows antibacterial activity. Also used as preservative.  |
| 9       | Black         | <i>Brassica nigra</i>                           | Used against lung congestion, bronchial problems   |

|    |              |                                   |   |
|----|--------------|-----------------------------------|---|
|    | mustard      | (L)Koch                           | and inflammation.   |
| 10 | Black Pepper | <i>Piper nigrum</i> L.            | As aromatic stimulant in cholera, vertigo, coma, stomachic in dyspepsia and flatulence. Externally valued for its rebeفاعent properties. Used as protective in filaria.   |
| 11 | Capers       | <i>Capparis spinosa</i> L.        | Reduces flatulence and have anti- rheumatic and antioxidant properties, used as hepatic stimulants, diuretics, kidney disinfectants, vermifuges and tonics.   |
| 12 | Caraway      | <i>Carum carvi</i> L.             | Antispasmodic and used against gas pains.   |
| 13 | Cardamom     | <i>Elettaria cardamomum</i> Maton | As adjuvant to carminative drugs, as stomachic and in dyspepsia. Home remedy for indigestion, nausea, halitosis, bronchial infections, skin diseases, inflammations, itching and poisons.   |
| 14 | Capsicum     | <i>Capsicum annum</i> L           | Source of capsasin, capsorubin vitamin C,A and E it has health enhancing effects in clearing lungs, increase flow of digestive juices, triggering brain to release endorphins (pain killers) and anti oxidant and as a muscle relaxant. Used in flavoring, and colouring food products. |
| 15 | Celery       | <i>Apium graveolens</i> L         | Carminative and sedative used against gas pains and as a tonic.   |

| Sl. No. | Common name | Botanical name                          | Medicinal Uses  |
|---------|-------------|---|---|
| 16      | Cinnamon    | <i>Cinnamomum verum</i>                 | Carminative, antispasmodic, aromatic stimulant, diuretic, haemostatic, astringent, stomachic and germicide. Used in pain balms, cold, cough, gastric troubles. It also has anti microbial and anti oxidant properties.  |
| 17      | Clove       | <i>Syzygium aromaticum</i> Merr & Perry | Aromatic, stimulant and carminative, used in gastric irritation and dyspepsia. Administered in powdered form to relieve nausea and vomiting, to correct flatulence. Oil used as local analgesic for hypersensitive dentine and carious cavities. Has antiseptic and pain relieving qualities. |
| 18      | Coriander   | <i>Coriandrum sativum</i> L.            | Fruits carminative, diuretic, tonic, stomachic, antibilious, laxative, refrigerant, aphrodisiac. Fruits and leaves used against colic, dizziness, kidney stones, indigestion, sore throat.  |
| 19      | Cumin       | <i>Cuminum cyminum</i> L.               | Seeds are stimulant, carminative, are stomachic,  |

|    |           |                                     |   |
|----|-----------|-------------------------------------|---|
|    |           |                                     | astrigent and useful in diarrhea and dyspepsia and veterinary medicine. Is an appetite stimulant and good digestive. Used for common gastro intestinal upsets.  |
| 20 | Dill      | <i>Anehtum graveolens</i> L         | Folk remedy for infant cholic and digestive disorders.  |
| 21 | Fennel    | <i>Foeniculam vulgare</i> Mill      | Anti spasmodic and used in indigestion and stomach cramps.  |
| 22 | Fenugreek | <i>Trigonella foenum-graceum</i> L. | Seeds are carminative, tonic, antiarthritic and galactogogue. Used externally in poultices as emollient for intestinal inflammations. Aqueous extract shows antibiotic activity. Used in treatment of chronic bronchitis, disbetis, hepato and splenomegaly.  |
| 23 | Galangal  | <i>Kaempferia galanga</i>           | Stimulatory, expectorant, carminative and diuretic. Also used for dyspepsia, headache and malaria.  |
| 24 | Garlic    | <i>Allium sativum</i> L.            | Has a significant carminative effect with a release or nausea. It brings about a decrease in triglycerides and cholesterol. Oil drops used in earache. Preparations given in pulmonary phthisis, bronchiectasis, gangrene of the lung and whooping cough. Used in laryngeal tuberculosis, lupus and duodenal ulcers, pulmonary tuberculosis. Used in dyspepsia, flatulence and colic. Antiseptic, nntispasmodic and used in lowering cholesterol, reducing hyper tension. |

| Sl. No. | Common name      | Botanical name                   | Medicinal Uses  |
|---------|------------------|----------------------------------|---|
| 25      | Ginger           | <i>Zingiber officinale</i> Rosc  | Carminative, stimulant, remedy for flatulence and colic, adjunct to stimulant remedies. Contains antihistaminic factor, remedy for diarrhea and constipation, anorexia and indigestion. Ginger tea is used for colds, coughs, flu and hangovers. Ginger compresses are used to relieve sinus congestion, kidney problems, menstrual cramps, and various aches and pains. Its is also rubefacient. |
| 26      | Greater galangal | <i>Alpinia galangal</i> L.Willd. | Rhizomes are bitter, acrid, thermogenic, nervine tonic, stimulant, carminative, stomachic, disinfectant, aphrodisiac, bronchodilator and tonic properties. Also known for antimicrobial, antifungal, antiprotozoal and expectorant activities. Used in skin diseases, indigestion, colic, dysentery, enlarged spleen, respiratory diseases, cholera, mouth and stomach cancer.                    |

|    |                     |   |   |
|----|---------------------|---|---|
| 27 | Horse radish        | <i>Armoracia rusticana</i> Gart.                                | Antimicrobial, diuretic, stimulant, diaphoretic. Used in treatment of arthritis, respiratory and urinary infections and fevers.   |
| 28 | Juniper             | <i>Juniperous communis</i> L                                    | Diuritic and carminative.   |
| 29 | Kokkam and cambodje | <i>Garcinia indica</i> Chiocy<br><i>Garcinia cambogia</i> Desr. | Source of natural red pigment and hydroxycitric acid which reduces cholesterol and used as anti obesity agent. It is used against bilious infections, dysentery, mucous diarrhoea, etc.   |
| 30 | Lavender            | <i>Lavendula officinalis</i> Chaix                              | Carminative, spasmolytic, tonic and antidepressant. Used in headache, neuralgia, rheumatism, depression etc.  |
| 31 | Longpepper          | <i>Piper longum</i> L.  | As an stimulant, anticolic, anti-tussive and inducing resistance to infections. Fruits and roots used in respiratory tract diseases, as counter-irritant and analgesic; as a snuff in coma and drowsiness, sedative in insomnia and epilepsy, as a cholagogue, emmenagogue and abortifacient, as ingredient in rejuvenating medicine. |
| 32 | Lovage              | <i>Levisticum officinale</i> W.D.J.Koch                         | Used against gas pains and breath deodorizer.   |
| 33 | Marjoram            | <i>Marjorana hortensis</i> M                                    | Source of sweet marjoram oil .antioxidant antispasmodic, anti microbial , carminative, stimulent and nerve tonic. Used in asthma, coughs. Indigestion, rheumatism, tooth ache and heart conditions.   |

| Sl. No. | Common name | Botanical name  | Medicinal Uses  |
|---------|-------------|---|---|
| 34      | Mints       | <i>Mntha piperita</i> L (pepper mint), <i>M. spicata</i> (spear mint) | Pepper mints menthol is added in many medicines for its therapeutic effects. They have carminative and emmenagogue effects. They make refreshing herbal teas.   |
| 35      | Nutmeg      | <i>Myristica fragrans</i> Houtt.                                      | As stimulant, carminative, astringent, aphrodisiac, tonic, electuaries and forms constituent of preparations prescribed for dysentery, stomach ache, flatulence, nausea, vomiting, malaria, rheumatism, sciatica, early stages of leprosy. Mace has been recommended for treatment of inflammations of bladder and urinary tract. Butter is a mild external stimulant in ointments, hair lotions. Used in helminthiasis, cough, asthma, amenorrhoea, dysmenorrhoea etc. |
| 36      | Onion       | <i>Allium cepa</i> L  | External anticeptic has many medicinal properties. Also used in reducing intestinal   |

|    |             |                                   |  |
|----|-------------|-----------------------------------|--|
| 37 | Oregano     | <i>Origanum vulgare</i>           | Rich in Vitamin E, B6, riboflavin, niacin, pantothenate and biotin. Is an antioxidant, carminative, stomachic, diaphoretic and expectorant. Used in colic, coughs, headaches and irregular menstrual cycles. |
| 38 | Parsley     | <i>Petroselinum crispum</i> Mill  | Used as liver tonic, laxative, carminative and against kidney stones. Relieves flatulence and colic. Rich in minerals and vitamins A, C.   |
| 39 | Pomegranate | <i>Prunica granata</i> L.         | Astringent, anthelmintic and used against tapeworm, cooling and refrigerant and used against dysentery and diarrhoea.  |
| 40 | Rosemary    | <i>Rosemarinum officinalis</i> L. | Carminative, antidepressant, anticarcinogenic, antispasmodic, rubefacient, antimicrobial, anti-inflammatory. Used in pulmonary diseases, antidiarrhoeic, antidiabetic, antispasmodic and antidepressant.     |
| 41 | Sage        | <i>Salvia officinalis</i> L       | Used for excessive sweating, fever and nervous disorders. Carminative and antiseptic.  |
| 42 | Saffron     | <i>Crocus sativus</i>             | Antimicrobial, carminative, diuretic and stomachic. Used in digestives disturbances, cough mixtures and colic pain.  |
| 43 | Star anise  | <i>Illicium verum</i> Hooker      |  |

| Sl. No. | Common name   | Botanical name                  | Medicinal Uses  |
|---------|---------------|---------------------------------|---|
| 44      | Summer savory | <i>Satureja hortensis</i> L.    | Aromatic, carminative and expectorant properties.   |
| 45      | Sweet flag    | <i>Acorus calamus</i> L.        | Constituents of tonics, also has antacid, purgative, antioxidant, antimicrobial and anti-insecticidal properties. Used in skin and hair care and also as stimulant.                           |
| 46      | Tarragon      | <i>Artemisia dracunculus</i> L. | Diuritic, stimulant and emmenagogue.  |
| 47      | Thyme         | <i>Thymus vulgaris</i> L.       | Used in bronchitis, whooping cough, has antimicrobial, antifungal, antioxidant, spasmolytic and anti-inflammatory activities.   |
| 48      | Turmeric      | <i>Curcuma longa</i> L.,        | As an ingredient of curry powders, improves flavor and functions as antiseptic, anti poison factor. Aromatic stimulant tonic, carminative and anthelmintic. Paste of turmeric and neem leaves |

is applied to facilitate the process of scabbing. Used in treating eosinophilia. Ingredient of recipes intended for promotion of health and intelligence of children. As stomachic, tonic, blood purifier, antiperiodic, alterative etc. Anti oxidant and has anti carcinogenic and anti AIDS properties.

Source : Ravindran *et al.*, (2004); Peter (2004), Reader's Digest (1986)

**Functional Properties**

In addition to their use as medicine, food additives for flavoring and preserving foods and beverages herbs and spices have nutritional, antioxidant, antimicrobial, insect repellent properties. They are rich source of proteins vitamins -A, C, B and E and minerals such as calcium, potassium, sodium and iron etc. the nutritive values of a few spices are given in Table 2.

Of late there is increased awareness of the impact of natural foods and plant based medicines on the well-being and health of a person and the role herbs and spices play within this food chain. The World Health Organization (WHO) estimates that 80% of the world's population uses some form of herbal medicine, revealing the importance of herbs as medicinal plants. The number of practitioners of holistic medicine in the developed countries is increasing rapidly. This will stimulate demand for products made in the developing countries. Retail outlets for herbal products are increasing rapidly. The usage of some herbs will grow as the popularity of the schools of medicine in which they are used becomes progressively popular. The opportunities, however, are considerable, fuelled by the strong interest in the developed countries in health and well being, and the strong growth in expenditure in this field.

In the pharmaceutical field many drugs owe their origin to natural herbal ingredients. The greatest markets for herbal medicines, both in terms of manufacturing and consumption, are in Europe followed by Asia and Japan. Asian sales represent approximately half of the sales levels achieved in Europe.

**Herbs in Flavors and Cosmetics**

An increasing demand exists for herbs and herb derived products for a variety of applications other than phytomedicinals. These include food flavourings, cosmetic and personal hygiene products including fragrances, creams, and lotions, industrial chemicals, and feeds. The majority of herb and spice products (80%) are found in the form of tablets, although other applications include teas, tablets, capsules, tinctures, creams, oils, syrups, inhalants and liquids. The more popular herbs are those that address the same symptoms as do the top-selling, over the counter drugs. Best-selling herbs are those that can be used for antacids, flu and cold relief, laxatives, diuretics, stress reducers, mental clarity, energy, menstrual cycle relief or support and sleep aids (<http://www.gov.mb.ca/>).

Table 2. Nutritional Profile of few important herbs and spices (Source : Compiled from information on <http://www.whfoods.com>)

| Spice & herbs Nutrient  | Cinnamon, Ground 2.00 tsp 11.84 calories    |   |   | Pepper, Black 2.00 tsp 10.88 calories         |            |        | Turmeric, Ground 2.00 tsp 16.04 calories |                                 |           |        |                  |                                 |
|-------------------------|---|---|---|---|------------|--------|--|---------------------------------|-----------|--------|------------------|---------------------------------|
|                         | Amount                                      | DV (%)  | Nutrient Density                              | World's Healthiest Foods Rating               | Amount     | DV (%) | Nutrient Density                         | World's Healthiest Foods Rating | Amount    | DV (%) | Nutrient Density | World's Healthiest Foods Rating |
| Iron                    | 1.28 mg                                     | 7.1   | 17.0  | very good                                     | 1.24 mg    | 6.9    | 11.4                                     | very good                       | 1.88 mg   | 10.4   | 11.7             | excellent                       |
| Calcium                 | 63.40 mg                                    | 6.3   | 15.2  | very good                                     | 55.68 mg   | 5.6    | 8.5                                      | very good                       | 0.96 g    | 3.8    | 4.3              | Good                            |
| Vitamin A               | 281.24 IU                                   | 5.6   | 13.5  | very good                                     | 2.48 g     | 9.9    | 15.1                                     | very good                       | 0.36 mg   | 18.0   | 20.2             | Excellent                       |
| dietary fiber           | 1.20 g                                      | 4.8   | 11.5  | good  | 0.76 mg    | 38.0   | 57.8                                     | excellent                       | 114.48 mg | 3.3    | 3.7              | Good                            |
| Manganese               | 0.08 mg                                     | 4.0   | 9.6   | good  |            |        |  |                                 | 0.08 mg   | 4.0    | 4.5              | Good                            |
| Magnesium               | 12.68 mg                                    | 3.2   | 7.6   | good  |            |        |  |                                 |           |        |                  |                                 |
| Vitamin C               | 1.84 mg                                     | 3.1   | 7.3   | good  |            |        |  |                                 |           |        |                  |                                 |
| Potassium               | 103.00 mg                                   | 2.9   | 7.0   | good  |            |        |  |                                 |           |        |                  |                                 |
| Vitamin B6              |   |   |   |   |            |        |  |                                 |           |        |                  |                                 |
| <b>Nutrient</b>         | <b>Thyme, Ground 2.00 tsp 7.92 calories</b> | <b>Peppermint Leaves, Fresh 1.00 oz-wt 19.85 calories</b> | <b>Oregano, Ground 2.00 tsp 9.16 calories</b> | <b>Rosemary, Dried 2.00 tsp 7.28 calories</b> |            |        |  |                                 |           |        |                  |                                 |
| Iron                    | 3.56 mg                                     | 19.8  | 44.9  | excellent                                     | 1.44 mg    | 8.0    | 7.3                                      | very good                       | 0.64 mg   | 3.6    | 8.8              | good                            |
| Calcium                 | 54.16 mg                                    | 5.4   | 12.3  | very good                                     | 68.89 mg   | 6.9    | 6.2                                      | very good                       | 28.16 mg  | 2.8    | 7.0              | good                            |
| Vitamin A               |   |   |   |   | 1204.31 IU | 24.1   | 21.8                                     | excellent                       | 207.08 IU | 4.1    | 8.1              | good                            |
| Dietary fiber           | 1.08 g                                      | 4.3   | 9.8   | good  | 2.27 g     | 9.1    | 8.2                                      | very good                       | 1.28 g    | 5.1    | 10.1             | very good                       |
| Manganese               | 0.24 mg                                     | 12.0  | 27.3  | excellent                                     | 0.33 mg    | 16.5   | 15.0                                     | excellent                       | 0.16 mg   | 8.0    | 15.7             | very good                       |
| Vitamin C               |   |   |   |   | 22.68 mg   | 5.7    | 5.1                                      | very good                       | 1.52 mg   | 2.5    | 5.0              | good                            |
| Potassium               |   |   |   |   | 9.02 mg    | 15.0   | 13.6                                     | excellent                       |           |        |                  |                                 |
| Vitamin B6              |   |   |   |   | 161.31 mg  | 4.6    | 4.2                                      | good                            |           |        |                  |                                 |
| TRYptophan              |   |   |   |   | 0.02 g     | 6.3    | 5.7                                      | very good                       |           |        |                  |                                 |
| Folate                  |   |   |   |   | 32.32 mg   | 8.1    | 7.3                                      | very good                       |           |        |                  |                                 |
| Omega 3 fatty acids     |   |   |   |   | 0.12 g     | 4.8    | 4.4                                      | good                            |           |        |                  |                                 |
| Vitamin B2 (riboflavin) |   |   |   |   | 0.08 mg    | 4.7    | 4.3                                      | good                            |           |        |                  |                                 |
| Copper                  |   |   |   |   | 0.09 mg    | 4.5    | 4.1                                      | good                            |           |        |                  |                                 |

Table 2. Nutritional Profile of few important herbs and spices (Source : Compiled from information on <http://www.whfoods.com>)

| Nutrient                | Thyme, Ground 2.00 tsp 7.92 calories |      | Peppermint Leaves, Fresh 1.00 oz-wt 19.85 calories |           | Oregano, Ground 2.00 tsp 9.16 calories |      | Rosemary, Dried 2.00 tsp 7.28 calories |           |           |     |      |           |          |     |     |      |
|-------------------------|--------------------------------------|------|--|-----------|--|------|--|-----------|-----------|-----|------|-----------|----------|-----|-----|------|
|                         | 3.56 mg                              | 19.8 | 44.9   | excellent | 1.44 mg                                | 8.0  | 7.3                                    | very good | 1.32 mg   | 7.3 | 14.4 | very good | 0.64 mg  | 3.6 | 8.8 | good |
| Calcium                 | 54.16 mg                             | 5.4  | 12.3   | very good | 68.89 mg                               | 6.9  | 6.2                                    | very good | 47.28 mg  | 4.7 | 9.3  | good      | 28.16 mg | 2.8 | 7.0 | good |
| Vitamin A               |                                      |      |  |           | 1204.31 IU                             | 24.1 | 21.8                                   | excellent | 207.08 IU | 4.1 | 8.1  | good      |          |     |     |      |
| Dietary fiber           | 1.08 g                               | 4.3  | 9.8  | good      | 2.27 g                                 | 9.1  | 8.2                                    | very good | 1.28 g    | 5.1 | 10.1 | very good |          |     |     |      |
| Manganese               | 0.24 mg                              | 12.0 | 27.3   | excellent | 0.33 mg                                | 16.5 | 15.0                                   | excellent | 0.16 mg   | 8.0 | 15.7 | very good |          |     |     |      |
| Magnesium               |                                      |      |  |           | 22.68 mg                               | 5.7  | 5.1                                    | very good |           |     |      |           |          |     |     |      |
| Vitamin C               |                                      |      |  |           | 9.02 mg                                | 15.0 | 13.6                                   | excellent |           |     |      |           |          |     |     |      |
| Potassium               |                                      |      |  |           | 161.31 mg                              | 4.6  | 4.2                                    | good      | 1.52 mg   | 2.5 | 5.0  | good      |          |     |     |      |
| Vitamin B6              |                                      |      |  |           | 0.02 g                                 | 6.3  | 5.7                                    | very good |           |     |      |           |          |     |     |      |
| TRYptophan              |                                      |      |  |           | 32.32 mg                               | 8.1  | 7.3                                    | very good |           |     |      |           |          |     |     |      |
| Folate                  |                                      |      |  |           |  |      |  |           |           |     |      |           |          |     |     |      |
| Omega 3 fatty acids     |                                      |      |  |           | 0.12 g                                 | 4.8  | 4.4                                    | good      |           |     |      |           |          |     |     |      |
| Vitamin B2 (riboflavin) |                                      |      |  |           | 0.08 mg                                | 4.7  | 4.3                                    | good      |           |     |      |           |          |     |     |      |
| Copper                  |                                      |      |  |           | 0.09 mg                                | 4.5  | 4.1                                    | good      |           |     |      |           |          |     |     |      |

Health foods, Nutraceuticals and Medicines

Awareness of the benefits of a healthy lifestyle and the knowledge of the role played through nutritious eating has contributed to the renewed interest in incorporating herbs and spices into the health and eating regimes of people in developed countries. Increased awareness of calcium in the prevention of osteoporosis, dietary fibre in the prevention of colon cancer, importance of antioxidants (eg. Vitamin E, Vitamin C, Beta Carotene) in the diet, and the role of essential fatty acids. It is important to increase the utilization of herbs and spices and use of natural flavourings. The role of curcumin as anti oxidant anti carcinogenic and anti HIV are fast changing our acceptance of herbal components in pharmaceuticals. The lower incidence of adverse reaction to Herbal medicines and decreased cost as compared to conventional pharmaceuticals are driving national health care institutions to consider plant medicine as an alternative to synthetic drugs. Pharmaceutical firms recognize the potential of natural products to provide novel drugs as well as templates for the development of improved versions of the existing treatments for human illnesses.

Bio prospecting of natural resources has impetus around the world, for search of new and novel molecules as therapeutic agents. Studies indicate that around 60% of the antitumour and anti-infective agents in later stages of clinical trials have plant origin.

Health foods, based on herbs and spices have been developed. A blend of herbs and spices was prepared as a chewing food that provides vitamins and fibres to the body, controls mouth odour and conditions intestinal functions. Nutmeg (Myristicin) has anti carcinogenic, Garcinia (HCN) has anti obesity, Cinnamim and Fenugreek as anti diabetic, Star anise has anti viral properties. The antidiabetic and hypocholesterolemic effect of fenugreek ensures its use in various antidiabetic preparations. A composition based on plant extracts and essential oils usable in therapy, cosmetics and dietics has been developed. Ginger is used as an antiemetic for cancer chemotherapy. The hypoglycemic and hypocholesterolemic properties of black caraway (*Carum carvi*) oil have been reported. Rosemary oil, improves chronic circulatory weakness on external application. Peppermint oil, spearmint oil and extracts so natural products have been reported to be effective as helicobacterial inhibitors. The antioxidant activity of spices and their extracts is due to the presence of phenolic compounds. Plant phenols may scavenge free radicals involved in lipid peroxidation as has been documented (Madsen et al., 1996).

World Market Trends

The major importing markets for medicinal plants are the EU and USA. In these countries, increased demand for medicinal plants is being fuelled primarily by consumer interest in natural products and remedies, as well as by increasing concerns about the possible side effects of allopathic medicines. Major developing countries such as China and India are exporting medicinal plants, herbal tonics, cosmetics, perfumes etc. However, markets in developed countries for herbal medicine – especially in Europe and the USA – are highly regulated and are very difficult to penetrate, particularly for developing countries and LDCs whose products have not undergone the stringent tests applied by developed country pharmaceutical manufacturers before mass production.

Total global herbal market is of size 62.0 billion dollars, in this India's contribution is only one billion dollars. European union is the biggest market with the share 45% of total herbal market. North America accounts for 11%, Japan 16%, ASEAN countries 19% and rest of European Union 4.1%. Countries like Japan and China have successfully marketed their traditional medicines abroad. When compared to the Chinese and the Japanese level of penetration in the global market India is not at all figuring anywhere. The forecast is that the

global market for herbal products is expected to be \$5 Trillion by 2050. Herbal remedies would become increasingly important especially in developing countries and India has a tremendous potential and advantage in this emerging area.

At global level, the production of spices is estimated at 23 million tonnes grown over an area of 7.8 million ha. Global spice industry is to the tune of 1,050,000 MT in volume accounting for US\$ 2.75 billion in value. India's share at global level is 47.7% in volume and 41.75% in value. During 2011-2012, India exported 5,75,270 Mt valued around US \$ 2037.76 million (Spices Board, 2012). Thus India still remains as a major hub of World Spice trade.

Recent research has helped propel the knowledge of other plants from around the world and this has helped accelerate the development of new supplements and medicines. The market share of herbal products made in developing countries remains comparatively low. The major successes have been achieved by Chinese products, mainly herbal supplements. The EU and the US regulations have special provision for herbal medicines that do not use mixtures of herbs. In this respect their regulations are, comparatively, relaxed. But if the exported products contain herbal mixtures and claim curative properties, the rules become much stricter. For medicines, product trials need to be carried out that cost several millions of dollars.

As markets grow, the search for a wider variety of ingredients is increasing. 'Phyto-medicines' have already started to link traditional medicines with modern (allopathic) medicine, with research and development primarily funded by large pharmaceutical manufacturers.

However, there is still a general lack of knowledge within the world market about the whole range of traditional remedies available, and demand will grow as knowledge increases. The issue of consumer safety is increasingly important with the USA recently prohibiting the sale of some Chinese products. The developing countries will need to pay increasing attention to this.

### Constraints

Medicinal herbs have received low priority in national investment, research and export development. Despite large import potential for spices as medicinal plants, market development is constrained by several factors like meager R&D facilities and investments, unlicensed unregulated markets, poor local technology as well as skill shortages and inadequate post harvest handling, storage, processing, and packaging resulting in poor quality and low unit values for exports, lack systems of measurement, standards, testing and quality (MSTQ) required by exporters to ensure their products meet international standards for hygiene, product specification and quality and lack of knowledge of supply and the lack institutional capability to advise on policy and regulatory mechanisms to provide consistently high-quality products. Know-how in processing technologies is also deficient, as is the availability of sustainable production processes. There is also limited knowledge of the medicinal properties of the herbs and spices beyond traditional knowledge and belief. This restricts the use and marketability. A systematic approach is required to identify, validate and market high value compounds from various spices to have a larger share in global spices and pharma and cosmetic market.

### Suggested Reading

- Madsen, H.L., Bertelsen, G. and Skibsted L.H. (1996). Antioxidative activity of spices and spice extracts. In: Sara J Risch and Chi-Tang Ho (eds.) Spices Flavour chemistry and Antioxidant Properties. ACS Symposium Series, New Orleans. pp176-187.
- Aman (1969) Medicinal secrets of your food, Indo American Hospital, Mysore.
- Chakrabarty C. (1929) An Interpretation of Ancient Hindu Medicine. Dembinska, Maria, rev. 1999. adapted by William Woys Weaver. Food and Drink in Medieval Poland: Rediscovering a Cuisine of the Past, University of Pennsylvania, Philadelphia.
- Farooqi, A.H.A, Fatima S, Sharma S and Sushil Kumar (2000). Recent trends in the development of herbal formulations from medicinal plants for common use. *J. Medicinal Aromatic Plant Sci.* 22-23: 597.
- Fetrow CW and Avila JR 1999. The complete guide to herbal medicines. Springhouse Corporation, Springhouse, PA
- Flandrin, Jean-Louis (1996). Seasoning, Cooking and Dietetics in the Late Middle Ages. In : Food: a culinary history from antiquity to the present. NY: Columbia University Press, p.313-327. Hildegard of Bingen. Hildegard von Bingen's Physica 1998. The complete English translation of her classic work on Health and Healing. Trans. from the Latin by Patricia Throop. Rochester, VT: Healing Arts.
- <http://www.allnaturalhealth.org>
- <http://www.healthlibrary.com/reading/ncure/preface.htm>
- Kanwar (1964) Medicine in Ancient India, J.I.P. : XVII (1) : 87-92.
- Leonard Fuchs, De Historia Stirpium Commentarii Insignes, (Notable Commentaries on the History of Plants), aka Botany or The Great Herbal 1542-1545, illustrations online at <http://www.med.yale.edu/library/historical/fuchs>
- Madsen, H.L, Bertelsen G and Skibsted L.H. (1996). Antioxidative activity of spices and spice extracts. In: Sara J Risch and Chi-Tang Ho (eds.) Spices Flavour chemistry and Antioxidant Properties. ACS Symposium Series, New Orleans. pp176-187.
- Peter K.V. (ed.) 2004. Handbook of Herbs and Spices. Vol.III. CRC Press, Woodhead Publishing Limited, Cambridge, pp.360.
- Ravindran PN, Johny AK and Nirmal Babu K 2002. Spices in our daily life, 56 All India Ayurvedic Congress, Satabdi Smaranika Vol 2, Kottakkal Arya Vaidya Sala, Kottakkal, Kerala, India. pp.227-242.
- Reader's Digest 1986. Magic and medicine of plants. Reader's Digest, Association
- Shylaja MR and Peter KV 2004. Functional role of herbal spices, pp. 11-22. In KV. Peter (ed.) *Handbook of Herbs and Spices*. Vol.III. CRC Press, Woodhead Publishing Limited, Cambridge.
- Singh J, Bagchi GD, Amrita S and Sushil Kumar 2000. Plant based drug development : A pharmaceutical industry perspective. *J. Medicinal Aromatic Plant Sci.* 22-23: 554.