CHAPTER – II

ETHNOBOTANICAL INFORMATION OF Pimenta dioica

*Pimenta dioica* is native to the West Indies, Southern Mexico and Central America. It was "discovered" in Mexico during 16th century by Spanish explorers who called it "pimienta", confusing it with black pepper. The spice or condiment, allspice, is made from the dried, unripe fruit of the allspice or pimento tree. This is a small tree that grows to 40 ft (12.2 m) tall, with 4-8 inch long leaves. The leaves are leathery, evergreen, opposite, oblong, aromatic and quite attractive. The whitish gray bark peels in thin sheets. The white flowers are about 0.25 inch across and borne in many flowered pyramidal cymes originating from the leaf axils. The fruit is a brown berrylke drupe, about 0.25 inch long. The leaves and fruits smell like a combination of cloves, black pepper, nutmeg, and cinnamon, hence the common name. Certain active principles in allspice have been found to have anti-inflammatory, rubefacient (warming and soothing), carminative, antidiabetic and anti-flatulent properties.

Allspice corns contain health benefiting essential oils like eugenol, a phenyl propanoid class of chemical compound, which gives a pleasant, sweet aromatic characteristic to this spice. It also contains caryophyllene, methyleugenol, glycosides, tannins, quercetin,
resin and sesquiterpenes. The volatile essential oils are acquired through a distillation process utilizing this spice corn. The outer coat peels of the allspice-berrys is thought to have the highest of a number of compounds of high medicinal values. This spice also contain a considerable amount of vitamin A, vitamin B-6 (pyridoxine), riboflavin, niacin and vitamin-C. Vitamin C is a powerful natural occurring antioxidant whereby the regular consumption of foods rich in vitamin C helps the body to develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radical species.

Different plant parts have been used to relieve dental and muscle aches, as well as against rheumatic pains, colds, menstrual cramps, indigestion, flatulence, diabetes, viral infections, sinusitis, bronchitis, depression, nervous exhaustion, hysterical paroxysms, arthritis and fatigue (Nakatani, 1994; Christman, 2004). The therapeutic properties of the essential allspice oils are anesthetic, analgesic, antimicrobial, antioxidant, antiseptic, acaricidal, carminative, muscle relaxant, rubefacient, stimulant and tonic. Pimento oil can be helpful for the digestive system, for cramp, flatulence, indigestion and nausea. Further, the essential oils can help in cases of depression, nervous exhaustion, tension, neuralgia and stress and is used as a natural repellent. The essential P. dioica leaf and fruit oil is also used in
perfumes, aftershaves and commercial food flavoring (Sharma, 2003; Seidemann, 2005).

2.1 BOTANICAL POSITION OF *Pimenta dioica*

Botanical name of allspice is *Pimenta dioica* (L.) Merr. and it belongs to Myrtaceae family. It possesses an aromatic taste and flavor resembling a mixture of cinnamon, cloves and nutmeg, hence the name allspice (Neal, 1965; Weiss, 2002). Allspice is a small evergreen tree up to 15 meter tall with a pale brown bark. The leaves are simple and elliptical, 6-20 cm long, with pellucid glands which give off the odour of all-spice when crushed. The flowers are small and whitish with a peculiar aroma.
Fig. 2. *Pimenta dioica* tree

Fig. 3. Collection of *Pimenta dioica* leaves
2.2 TAXONOMIC POSITION

Kingdom : Plantae
Subkingdom : Tracheobionta
Superdivision : Spermatophyta
Division : Magnoliophyta
Class : Magnoliopsida
Subclass : Rosidae
Order : Myrtales
Family : Myrtaceae
Genus : Pimenta Lindl.
Species : \textit{Pimenta dioica}

2.3 DISTRIBUTION

\textit{Pimenta dioica} is native to the Caribbean region, especially Jamaica and Cuba. The trees grow naturally at a mean average temperature of 18°C - 24°C. Pimenta is a forest tree and its seedlings benefit from shading until established. Like clove, Pimenta may require quite specific environmental conditions to flourish. \textit{Pimenta dioica} is widely planted in warm regions of the world as an ornamental plant valued for its fragrance and attractive habit (Weiss, 2002).
2.4 MAJOR USES OF PLANT PARTS

The dried, green-mature fruit is the commercial flavourant and curing agent. Ground fruits are preferred in desserts, relishes, sausages and preservatives. Traditionally, extract of the berries is used to treat flatulence and diarrhea while the powdered fruit is used for corns, neuralgia and rheumatism. In India, it is used as an aromatic stimulant in digestive troubles, as an adjuvant to tonics and purgatives, as an anodyne against rheumatism and neuralgia (Anonymous, 1969). The essential oils of *P. dioica* leaves and fruits are utilized in food industry mainly meat and tanning industries as well as in perfumery compositions and cosmetic products. The therapeutic properties of the essential allspice oils are anesthetic, analgesic, antimicrobial, antioxidant, antiseptic, acaricidal, carminative, muscle relaxant, rubefacient, stimulant and tonic. Pimenta oil can be helpful for the digestive system, for cramp, latulence, indigestion and nausea. Further, the essential oils can help in cases of depression, nervous exhaustion, tension, neuralgia and stress and is used as natural repellent. The essential *P. dioica* leaf and fruit oil is also used in perfumes, aftershaves and commercial food flavoring (Sharma, 2003; Seidemann, 2005). Pimenta seed is reported to be used by Haitian immigrants and their descendants in the province of Camaguey, Cuba to treat
abdominal pain when taken triturated and ingested with rum and sugar (Volpato et al., 2009).

**Anticancer activity**

A glucoside, extracted from Allspice has been used as an active ingredient of carcinogen-promoter inhibitors. The glucoside is reported to inhibit Epstein-Barr virus by early antigen formation.

**Antifungal activity**

*Pimenta dioica* berry oil was found to completely inhibit *Fusarium oxysporum, F. verticilloides, Penicillium brevcompactum, P. expansum, Aspergillus flavus* and *A. fumigatus* at 1 μl/ml concentration. Antifungal activity was also shown by the essential oil of allspice berries (Oussalah et al., 2007; Kamble et al., 2008).

**Antimicrobial activity**

*Pimenta dioica* extract was found to inhibit *S. aureus* and *P. aeruginosa* (Marzouk et al., 2007). The essential oil of *Pimenta dioica* leaves showed a strong antibacterial activity against coagulase negative *Staphylococci* and *Pseudomonas* species and a strong antifungal activity against *Aspergillus niger* (Rao et al., 2001).

**Nematicidal activity**

Allspice berry oil showed good nematicidal activity at 2mg/ml against the pinewood nematode, *Burasaphelenchus xylophilus* (Park et al., 2007).
Antioxidant activity

Allspice berries show effective antioxidant activity. It also showed good free radical scavenging activity by the DPPH method (Kikiuzaki et al., 2000). Pimenta leaf oil from Jamaica showed potential free radical scavenging activity.

Antidiabetic effect

Ground Jamaican Pimenta berries have been reported to inhibit protein glycation indicating its potential to be used as an effective antidiabetic agent (Dearlove et al., 2002). The spice is enriched with good amount of minerals like potassium (1044 mg and 22%), calcium (661 mg and 61%), copper (0.553mg and 61%), iron (7.06 mg and 88%), magnesium (135 mg and 16%), manganese (2.943 mg and 128%), phosphrous (113 mg and 16%) and zinc (1.01 mg and 9%), nutrients like carbohydrates (72.12 g and 55%), protein (6.09 g and 11%), total fat (8.69 g and 29%), cholesterol (0 mg and 54%), dietary fibre (21.6 g and 54%), vitamins such as folates (36μg and 9%), nilacin (2.860 mg and 18%), pantothenic acid (0.210 mg and 16%), pyridoxine (0.201 mg and 16%), riboflaxin (0.063 mg and 8.5%), thiamin (0.101 mg and 2.5%), vitamin A (540 IU and 18%) and vitamin C (39.2 mg and 65%) and electrolytes (77mg and 5%).