General Introduction and Review of Literature
General Introduction

“Let food be thy medicine and medicine be thy food” espoused by the Hippocrates nearly 2500 years ago, has renewed interest. Recently many scientific studies supported the above fact. Indian literature abounds with references to various foods for treatment of specific disorders / diseases. The concept that food combines medicinal properties along with nutritional value is in our traditional knowledge known to us since time immemorial. Foods have now been accepted to be capable of playing not only a health promoting but also a disease preventing role, over and above its routine function of supporting growth and maintenance.

Fruits and vegetables are important class of foods rich in phytochemicals that have potential health benefits. Major classes of phytochemicals encompass carotenoids, polyphenols, flavonoids, isothiocyanates, sulphides & phytosterols. These natural compounds are reported to have multiple biological functions like antioxidant, antimicrobial, antiplatelet aggregation, anti inflammatory, immunomodulatory activities etc and help in the alleviation of many degenerative diseases like diabetes, atherosclerosis and cancer (Wildman, 2001). Further these bioactive components are reported to have their teleological functions in the source system. The most convincing evidence for protective benefits is attributed to their antioxidant property or multiple activities against free radicals.

There are increasing evidences to suggest that the free radicals induce oxidative damage to lipids, proteins and nucleic acids, which eventually causes atherosclerosis, ageing, cancer, diabetes, inflammation, AIDS and several degenerative diseases in humans (Halliwell, 1994; Maxwell, 1997). Antioxidant phytochemicals that are rich in fruits, vegetable and other plant extracts serve as
sources of nutraceuticals that alleviate the oxidative stress and therefore prevent or reduce the risk of degenerative diseases (Kitts et al., 2000 and Fu and Ji, 2003). Antioxidants from natural sources are preferred to use in food or medicine to replace synthetic ones, which are being restricted due to their carcinogenicity (Velioglu, et al., 1998).

Fruits and vegetables are fast emerged as “Healthy foods of the millennium”. They were also described as “Nutraceutical foods of the century,” owing to their health benefits. Nutraceutical properties of fruits and vegetables are attributed to the presence of phenolics, flavonoids and pigments.

India is the second largest producer of wide variety of fresh fruits and vegetables in the world. Owing to the botanically diverse families found in dietary fruits and vegetables, over 10,000 bioactive phytochemicals have been identified and are integral part of the human diet (Wise, 2001). There is an increasing interest in the use of plant derived bioactive molecules for therapeutic purpose. Advancement in technology to assist the process of isolation, identification and screening of bioactive molecules towards various functional properties has also triggered the research in the field of phytochemicals.

In this connection, selected fruits and vegetables were screened for their potential antioxidant activity. Elephant-foot yam was found to be promising. Hence, it was selected for further investigation.
Review of literature

Elephant foot yam (*Amorphophallus paeoniifolius* (Dennst.) Nicolson syn. *Amorphophallus paeoniifolius*), is an edible tuber crop grown in tropical and subtropical regions, particularly in South-east Asia. It is commercially cultivated in India, Sri Lanka, China, Malaysia, Thailand, Indonesia and the Philippines and in tropical regions of Africa. The corm of elephant foot yam is mainly used as a vegetable in the preparation of various delicious cuisines and is a major ingredient in indigenous Ayurvedic prescriptions (Misra *et al.* 2002; Srinivas and Ramanathan 2005; Angayarkanni *et al.* 2007). It is restorative, carminative, stomachic and tonic. Fresh yam acts as an acrid stimulant and expectorant (Chopra *et al.* 1958; Ghani 1998). The tuber is useful in the treatment of piles, acute rheumatism (Chopra *et al.* 1958; Yusuf *et al.* 1994), enlarged spleen, abdominal tumors, boils, asthma (Yusuf *et al.* 1994), abdominal pain, dyspepsia and elephantiasis (Kirtikar and Basu 1994; Kailash *et al.* 2007). The fermented juice of petioles is used to treat diarrhea whereas seeds are used to treat rheumatic swelling (Chatterjee and Pakrashi 2001).

The major sugars identified from tuber are glucose, galactose and rhamnose while flavonoids, phenols, coumarins, terpenoids, sterols, tannins, steroids and alkaloids have also been reported (Harborne 1984; Shilpi *et al.* 2005; Nataraj *et al.* 2009; Yadu and Ajoy 2010). Amblyone (a triterpenoid) and 3, 5-diacetylambulin (a flavonoid) have been isolated from tubers (Khan *et al.* 2008a, 2008b). The tuber is reported to have antiprotease (Prathibha *et al.* 1995), analgesic (Shilpi *et al.* 2005), antibacterial, antifungal, cytotoxic (Angayarkanni *et al.* 2007; Khan *et al.* 2007, 2008b), central nervous system depressant (Dey *et al.* 2009), anti-inflammatory (Dey *et al.* 2010), anthelmintic (Ramalingam *et al.* 2010), immunomodulatory (Tripathi *et al.* 2010), and other medicinal properties.
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al. 2010), antioxidant (Angayarkanni et al. 2010) and hepatoprotective activity (Shastry et al. 2010; Surendhra et al. 2011).

CURRENT STATUS:

Amorphophallus paeoniifolius (Dennst.) Nicolson is a tropical tuber crop belonging to the family Araceae. In India, it is commonly known as Elephant Foot yam, ‘Suran’ or ‘Jimikand’. It is used as a vegetable and traditionally cultivated on commercial scale in Kerala, Andhra Pradesh, Maharashtra and Gujarat. It is commonly used as a vegetable and for making pickles. The corm of elephant-foot yam contains moisture(78.9g), protein(1.2g), fat (0.1g), carbohydrates(18.4g), minerals(0.8g), calcium(50mg), phosphorus (34mg), iron(0.6mg), vitamin-A (434 I.U) and Riboflavin (0.07mg) per 100g of edible portion.

Ayurvedic medicinal importance of elephant-foot yam:

Ayurvedic preparations of Amorphophallus paeoniifolius are commonly used to cure various ailments. The corm is restorative, carminative, stomachic and tonic. The fresh yam acts as an acrid stimulant & expectorant and much used in the treatment of acute rheumatism. The tuber is useful in piles, enlargement of the spleen, abdominal tumors, asthma, abdominal pain, boils and much used in acute rheumatism. Herb is used in earache, intercostal neuralgia; perpueral fever and swelling of throat. Tuber is reported to have antiprotease activity. The methanol extract of Amorphophallus paeoniifolius tuber, given orally at the doses of 250 and 500 mg/Kg, showed significant analgesic activity in mice.

Review of literature available from various sources indicated that there are no scientific reports on the antidiabetic, antiplatelet aggregation activity and biochemical changes during the development of corm of elephant-foot yam.