Herbal plants are an important part of our natural wealth. They are being used from very ancient times till the present day. The remarkable therapeutic diversity of herbal plants is one of the main reasons of their distinct position. *Calotropis gigantea* is also a plant of herbal importance. This plant belongs to Apocynaceae family which includes latex bearing plants. The plant *Calotropis gigantea* (Botanical name) is known by different names in English Crown flower, giant Indian milkweed, in Hindi Aak, Arka, Madar, in Sanskrit Ganarupa, Mandara, Vasuka, Svetapushp etc. In India it has other names Ekka (Kannada), Erukku (Tamil and Malayalam) and Jilledi Puvvu (Telugu). It is also known by different vernacular names like, French cotton, Alarka, Rooster tree, Widuri in different parts of world. The genus *calotropis* R.Br. (Asclepiadaceous) is distributed in tropical and subtropical regions of Asia and Africa (The Wealth of India, 1959).

*Calotropis gigantea* is known for its utilization in traditional medicinal system for various properties to cure a variety of diseases. Herbal medicines have less side effects and man can get the herbs easily from nature. India being a tropical country is blessed with vast natural resources and ancient knowledge for its judicious utilization (Vaidya, 1998). In India two species viz. *C. procera* and *C. gigantea* are available. These two species show similar botanical aspects and pharmacological effects. In Ayurvedic medicine the plant *C. gigantea* is known as “Sweta Arka” and *C. procera* as “Raktha Arka.” The only difference between these is in the colour of the flowers; however, they are white in *C. procera* and pinkish white in *C. gigantea*. The plant is an erect, tall, large, much branched perennial shrub or small tree. It generally grows to a height of 4 meters.

The molecular agents that prevent the oxidation of other molecules either by stopping the transfer of electrons or hydrogen are known as the antioxidants. Antioxidants can protect the human body from free radicals and Reactive Oxygen Species (ROS) effects. Oxidative damages caused by free radicals to living cells mediate the pathogenesis of many chronic diseases such as Parkinson’s, Alzheimer’s, cancers, aging, cardiovascular, atherosclerosis, cataract, inflammatory, and other degenerative ailments (Chaudiere and Ferrari-Iliou, 1999). Medicinal plants contain many antioxidants such as vitamins, carotenoids, flavonoids, polyphenols, saponins, enzymes and minerals.
Natural antioxidants tend to be safer and also possess anti-viral, anti-inflammatory, anti-cancer, antimutagenic, anti-tumour, and hepatoprotective properties.

Phenols, flavonoids and tannins are the most commonly found polyphenolic compounds in plant extracts, the antioxidant activities of which play an important role in the absorption or neutralization of free radicals (Prabha and Vasantha, 2011). The presence of many phytochemicals such as Usharin, gigantin, calcium oxalate, α and β-calotropeol, beta-amyrin, fatty acids (both saturated and unsaturated), hydrocarbons, acetates and the benzoates, a mixture of tetracyclic triterpene compounds and giganteol whereas flavonoids, triterpenoids, alkaloids, steroids, saponins, terpenes, esters of calotropeols, volatile long chain fatty acids, glycosides and proteases have been isolated in different parts of C. gigantea especially in the leaves (Kumar et al. 2013).

In India calotropis occupies special importance because of its large industrial uses and economic values. It has various medicinal properties. Different parts of the plant have immense potential to cure various diseases and disorders like asthma, cold, epilepsy, fever, indigestion, leprosy, piles, skin diseases etc., and exhibiting activities that are anti-inflammatory, anthelmintic, anticancer and antitumor; as observed in various polyherbal preparations (Tenpe et al. 2007). It is a highly potential plant resource and different parts of this plant are used for multi purposes. The various uses of this plant are biogas production, substitute for petroleum products, cleansing of water, energy plantation, fibers, fodder, latex or rubber, substitute for paper etc. So, in order to understand their pharmacological action, there is a need to scientifically evaluate them at molecular and biochemical level.

In nature plants are often exposed to different types of environmental stresses. Crops can be affected by these stresses resulting in the reduction in the yields. Virus infections can drastically reduce crop yield (Picó et al, 1996), resulting in economic losses. Abiotic stresses include the various environmental conditions like temperature, heat and chemical stresses. Biotic stresses include infection by pathogens (including bacteria, fungi, viruses and nematodes) and attack by herbivore pests (Atkinson and Urwin 2012). Wild plants are almost colonized by a number of microbes, including fungi, bacteria and viruses and which may cause any of these interactions (Malmstrom, 2011). Viral diseases in perennial crop plants are more dangerous than in annual crops (Agrios, 1997). Pathogens affect host populations by reducing viability, fecundity and competitive ability, as well as affecting community interactions (Seabloom et al, 2009). In crops,
virus infection can reduce plant growth by depressing photosynthesis and changing metabolism (Técsi et al, 1996). In case of *calotropis*, infection has been reported due to bacterial, fungal and viral pathogens. Infected plants show systemic brilliant chlorotic to yellow spots on the leaves suspected to be due to virus infection based on the nature of symptoms.

This plant is seen susceptible to infection by several viruses viz. *Groundnut bud necrosis virus* (GBNV) (Reddy et al, 2011) and a *Begomovirus* (Prajapat et al, 2012). Plants in the field were observed to exhibit systemic yellow spots symptoms. In infected plants the flowers setting and size was reduced and fruits became discolored, shriveled and sterile which died prematurely whereas the seed was four times smaller that fails to germinate. The overall plant height and vigour were markedly reduced. Undulated margins and spots that coalesce into yellow blotches along the veins in infected leaves have been observed. Furthermore leaves become thin and puckered giving the plant a distorted appearance. Keeping in view the medicinal importance of *Arka*, there is a need to work out the causal agent of this disease at the molecular level, establish its experimental herbaceous host range, understand its morphological characteristics and work towards understanding epidemiology of the disease as well as effects on phytochemical constituents. Phytochemical constituents are important to understand their roles in the plants and to devise strategies for rapid diagnosis and control. Further, the effect of virus infection on active phytochemical constituent concentration is important to understand the importance of this disease. Therefore in order to understand the role of viruses in *Arka*, the present investigation has been carried out to study the viral pathogens with following objectives:

1. **To determine antioxidant properties as well as phytochemical constituents and its dynamics during chlorotic leaf spot disease in *C. gigantea*, and**

2. **Molecular characterization of the causal agent**