Mosquitoes (Diptera: Culicidae) have imposed one of the severe hazardous impact on human populations. They pose the major public health menace because of their ability to transmit various pathogens causing dreadful diseases such as malaria, filariasis, dengue, chikungunya and Japanese encephalitis which afflict millions of people worldwide. In addition, “mosquito-bites can cause severe skin irritation through an allergic reaction to the mosquito's saliva causing the eruptions and itching” (Abdullahi et al., 2003). These mosquito-borne diseases were firstly described in 1877 when transmission of lymphatic filariasis from human to human was noted (Gubler, 1998). Thus, mosquitoes are the most nuisence and irritating dipeteran, transmitting number of diseases and WHO, therefore, designated them as enemy number one to mankind (WHO, 1996).

Malaria remains to be the main world’s injurious diseases transmitted by mosquitoes and is the ninth largest cause of death and disability (Malaria, 2012). The mosquito, *Anopheles* is a transmitting agent for malaria causing pathogen, *Plasmodium* “*P. vivax, P. falciparum, P. malariae, P. ovale* and *P. Knowlesi*” globally. *P. falciparum*, most deadly one which predominates in Africa; *P. vivax*, less dangerous and more widespread, and the other three species are found less frequently. Transmission of the parasites is generally via the female Anopheline mosquitoes, was noted by Ronald Ross's in 1897. Approximately, 400 species of anopheline mosquitoes are found throughout the world but females of nearly 70 species are incriminated as malaria vectors (Gravitz, 2012). In India, among 58 *Anopheles* species six are implicated to be of primary importance, namely *An. culicifacies, An. stephensi, An. fluatilis, An. minimus, An. gyrus and An. sundicus* (Raghavendra and Subbarao, 2002 and Dash et al., 2007). “Globally, an estimated 3.3 billion people were at risk of malaria in 2011, with populations living in Sub-Saharan Africa having the highest risk of acquiring malaria: approximately 80% of cases and 90% of deaths are estimated in African Region” (WHO, 2012). “Next to African Region (81%), South-East Asian region bears the second largest burden of malaria (13%). Among South-East Asian region, India shares two-third burden (66%) followed by Myanmar (18%) and Indonesia (10%)“ (WHO, 2011).
“In 2012, there are 99 countries and territories with ongoing malaria transmission and 5 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endemic” (WHO, 2012).

Lymphatic filariasis (LF) is the most important Culex borne disease which presents the second largest public health burden of any disease worldwide (WHO, 2004). Patrick Manson had “first implicated mosquitoes in the transmission of filarial nematodes in the nineteenth century” (D’ Antonio and Spielman, 2002). It is caused by the nematodes, Wuchereria bancrofti and Brugia malayi which are transmitted by the ubiquitous vector, Culex quinquefasciatus. “W. bancrofti accounts for about 90% of the disease burden while B. malayi contributes the remaining 10%” (Anitha and Sheno, 2001). “An estimated 120 million people in 73 countries are currently infected, and about 1.393 billion live in areas where filariasis is endemic and mass drug administration (MDA) is required” (WHO 2012). Approximately, “1.2 billion (20% of the world’s population) are at risk of acquiring infection, one third of them live in India, one third in Africa and most of the remainder in Asia, the Pacific and Americas” (Kuppusamy and Murugan, 2008).

The next most important culicine mosquito borne disease in terms of public health impact is Japanese encephalitis (JE) and their incidences are rapidly increasing. Its transmission takes place by Cx. tritaeniorhynchus and it is the most common cause of childhood viral encephalitis in the world. “It causes an estimated 50,000 cases and 10,000 deaths annually” (Solomon, 2006). This disease is “endemic to Southeast and Northeast Asia, the Pacific Islands, and northern Australia” (Hills et al., 2011). “In about five months, 5,737 cases and 1,344 deaths were reported from seven districts of Uttar Pradesh, India, when an epidemic occurred in 2005” (Parida, 2006). JE causes “45,000 cases of clinical disease each year, mostly among children under 15 years of age, resulting in about 10,000 deaths and 15,000 cases” according to WHO (WHO, 2012).

Like dengue epidemic, chikungunya is an acute febrile illness caused by an arthropod-borne alphavirus, Chikungunya virus (CHIKV). The chikungunya term used for both the virus and the disease come from the Makode Plateau language in Tanzania, where virus was first identified in 1953 (Lumdsen, 1955 and Robinson, 1955).

In the Makonde language of East Africa, the word chikungunya means “that which bends up” in reference to symptoms observed on affected people (Rajapakse et al., 2010).
CHIKV was first found in Asia, isolated in Bangkok, Thailand in 1958. The virus is transmitted by culicine mosquitoes, *Ae. aegypti*, *Ae. albopictus* and *Ae. polynesiensis* rarely by *Cx. sps.* and *An. stephensi* also (Brooks et al., 2004). The dominant carrier of CHIKV in India is *Ae. aegypti*, which breeds mainly in stored fresh water in urban and semi-urban environments (Yergolkar, 2006). About “18 countries throughout Asia, Europe and North America documented imported cases of chikungunya fever” (Powers, 2007). “More than 1.3 million people were estimated to be affected CHIKV prevail across 150 districts of 8 states in India” (Lahariya, 2006).

Far from being controlled, in many regions of the world mosquito-borne diseases are flourishing, responsible for significant global morbidity and mortality, and disproportionately affecting children and adolescents. In addition, these diseases are responsible for the economic loss and social disruption (Becker et al., 2003). Previously various strategies like synthetic, phyto and microbial pesticides have been developed to reduce the prevalence of these vectors. Indiscriminate application of them exhibits certain obstacles. As synthetic pesticides develops resistance in target organisms which “results in rebounding vectorial capacity” (Liu et al., 2006 and Bansal et al., 2011), causes “toxicity to non-target organisms and foster environmental and human health concerns” (Gold et al., 2001; Anjali et al., 2010 and Bansal et al., 2012). However, the phyto and microbial pesticides have low environmental impacts but they have certain disadvantages. As they are time consuming, requires in large amount, high cost and limited shelf-life (Sharma et al., 1995; Mohan et al., 2007 and Srivastava et al., 2011). These threats prompted researchers to look for other alternative strategy, synergism which is the joint action of insecticides where one insecticide with low toxicity resulting in an unexpectedly high mortality (Srivastava et al., 2011). The synergistic technique has high biocontrol potentiality to combat vectors with least or no harmful effects on environment and human health. This technique is further strengthened by the involvement of nanotechnology.

In recent decade, Nanotechnology becomes a promising field of research which opens up a wide array of opportunities. Nanotechnology is the production, manipulation and the use of materials ranging in size from less than a micron to that of individual atoms. Nanoparticles are considered as the building blocks of nanotechnology.
The synthesis of nanoparticles especially metallic (silver, gold, zinc, alumina, titanium, platinum and silica/silicon) and polymeric nanoparticles has accrued utmost interest over the past decade owing to their unique properties that make them applicable in different fields of science and technology.

The applications of metallic nanoparticles pose potential risks, silver nanoparticles (AgNps) contributes higher toxic effects than that of silver nitrate (Griffitt et al., 2009) and are capable of penetrating biological barriers such as cell membranes (Verma et al., 2008); enter into the cells (Hussain et al., 2005; Kim et al., 2008) and causes the toxicity (Sondi and Salopek-Sondi, 2004; Morones et al., 2005; Lok et al., 1997; Nel et al., 2006). Inhalation and oral ingestion of nanosilver causes liver toxicity (bile duct hyperplasia) (Sung et al., 2008; Kim et al., 2009). Alumina nanoparticles (aluminum oxide) slowed the growth of roots in five species of plants (corn, cucumber, cabbage, carrot and soybean) (Yang et al., 2005). Titania nanoparticles cause the impairment of alveolar macrophage phagocytosis (Renwick et al., 2001) and the endocytosis by human airway cells (Stearns et al., 2001). Carbon Nanotubes (CNTs) have been reported to be harmful to living organisms (Hoet et al., 2004; Warheit et al., 2004; Lam et al., 2004).

In recent years, encapsulation formulations have been revolutionized the application of pesticides due to the development of nanotechnology in insect pest management. The first report on a controlled release system of an insecticide through the polymeric encapsulation was observed by Allan et al. (1971). Nanoencapsulation is a process through which a chemical such as insecticide is slowly and efficiently released for insect pest control. It has been observed that encapsulated nanoparticles in form of pesticides allows for proper absorption of the chemical into the plants unlike the larger particles (Scrinis and Lyons, 2007). The release mechanisms of nanoencapsulated pesticides “include diffusion, dissolution, biodegradation and osmotic pressure with specific pH” (Vidhyalakshmi et al., 2009; Ding and Shah, 2009). Pesticide in the form of nanoparticles are reported as eco-friendly pesticides (Bhattacharyya, 2009; Sukal et al., 2009; Barik et al., 2008; Gha-young et al., 2008) and they can “help to produce new pesticides, insecticides and insect repellants” by Owolade et al., 2008.
The nanoencapsulated pesticides show meritorious properties in the field of insect pest management. They require lesser pesticide quantity which reduces the application dosages resulting in reduced input costs and environmental pollution. They have less impact on non-targeted organisms, safer storage due to reduced flammability, released in a controlled and targeted fashion. In addition to these they help in occlusion of pesticide odor, render liquids into powders, prevent clumping and improve mixing (Soraf et al., 2007) and more reactive due to their increased surface area (Park et al., 2009). They protect active ingredient from degradation by direct exposure to severe environments such as light, temperature etc., thereby by increasing its shelf life (Shahidi, 1993).

The photo and thermal sensitization phenomenon on the toxicity of encapsulated nanopesticide in different light and temperature conditions was studied to determine the ideal favorable conditions for effective application against the mosquito larvae. Further, its effect on aquatic non-targets was observed to examine the ecofriendly nature of the most potent encapsulated nanopesticide studied and further to enhance the importance of present investigation in mosquito management.

The attention of the pesticidal industries is therefore, needed towards nano scale pesticides for delivery of the active ingredient to the target host efficiently through encapsulation. These nanopesticides being effectively water soluble as compared to existing conventional pesticides because of their large surface area. The nanopesticide application have therefore, lead to the reduction of costs and doses to much extent. They are released in a controlled manner having less impact on non-target organisms. Various approaches have been reported on development of nanopesticides formulations during the last decade (Kuzma et al., 2008; Bhattacharyya et al., 2010), but the research on nanopesticide formation and their applications is still at a nascent stage. The present work is therefore, a forward step towards the development of an ecofriendly, biodegradable, cost-effective, target specific encapsulated nanopesticide of synthetic, plant and fungal origin against Anopheles stephensi and Culex quinquefasciatus to control these mosquito borne diseases.