CHAPTER 2-
REVIEW OF LITERATURE
Literature review

Ectoparasites of livestock cause great economic loss being pests as well as vectors of various diseases. Till recently, several chemicals including hydrocarbons and organophosphates were commonly used. Many of these compounds are not only toxic to animals but also cause environmental pollution and pose the problem of arthropod resistance. The widespread development of tick and fly resistance and high cost of the conventional ectoparasitic drugs have limited the control of veterinary parasites and hence led to evaluation of medicinal plants as an alternative source to control parasites. Tick production losses largely result from meat quantity loss caused by tick worry, and the death of cattle from tick fever and the reduction in meat quantity associated with tick infestation was estimated (Sing et al., 1983).

Ectoparasites, particularly ticks and lice, are important parasites because of their voracious blood-feeding activity and as vectors for various agents of diseases in both man and livestock. Ticks and tick-borne diseases (TTBD) pose a major constraint for the development and improvement of the livestock industry. They cause economic losses by decreasing milk production, effecting weight loss, and increasing risk for bacterial, viral, and fungal infections. It has been reported that the global costs of TTBDs in cattle lies between US$ 13.9 and US$ 18.7 billion annually (De Castro, 1997). A potential loss due to TTBDs is over US$ 800 million per annum, while a recent estimate of US$ 498.7 million per annum has been calculated as the cost of TTBDs in cattle in India (Devendra 1995; Minjauw and McLeod 2003).

Incidence and prevalence of Ixodid ticks on cattles were reported in Karnataka (Hiregoudar et al., 1988), Mathura (Santosh Kumar Vermaet al., 2012), Gazipur (S.Affroseet al., 2010), Punjab (S.Ghosh et al., 2011), Assam (Lahkaret et al., 1994),
etc. Studies made by above mentioned researchers disclose moderate tick burdens over cattles.

The frequent use of praziquantel, toltrazuril, and mebendazole (Schmahl and Mehlhorn 1985; Schmahl et al. 1988; Treves-Brown 1999) parasiticides has had limited efficacy in reducing monogenean infestations and is often accompanied by serious drawbacks, including the development of drug-resistant parasites, environmental contamination, and even toxicity to host (Goven et al. 1980; Marshall 1999). Various researches have been put efforts focused on developing alternative drug formulations including medicinal plants. A wide selection of plants has been found to contain phytochemicals that may be of use in the botanical control of parasites. Herbal extraction of silver nanoparticles is also been done in order to control ticks. The reason for this may simply be that relatively more known medicinal plants have been screened for insecticidal properties. The non-target organisms and human health concern problems have highlighted the need for the development of new strategies for parasites control. Extracts or essential oils from plants may be alternative sources of acaricidal, and insecticidal agents, since they constitute a rich source of bioactive compounds that are biodegradable into nontoxic products and potentially suitable for use in control of parasites. The Lamiaceae plant family extracts were investigated for their parasitic properties: the methanolic extract of Salvia staminea and Salvia caespitosa (Goze et al. 2009); the aqueous and hydro-alcoholic extract of Plectranthuspunctatus (Tadesse et al., 2009) and Plectranthusamboinicus (Periyanayagam et al., 2008); the essential oils of Ocimum suave and Ocimumkiligmandscharicum (Kweka et al., 2008a, b); the crude leaves carbon-tetrachloride, methanol, and petroleum ether extracts of Ajugaremota (Sharma et al., 2004). Green silver nanoparticles have been synthesized using various natural
products like *Syzygium cumini* leaf and seed extract (Kumar et al., 2010) *Nelumbo nucifera* (Santhoshkumaret al., 2011) and *Pongamia pinnata* (Rajesh et al., 2010). Efficacy of AgNPs extracted from *Musa paradisiaca* has been studied by Rahumanet al., (2011) against hematophagous parasites. Extraction of AgNPs have been done using *A. mexicana* leaves (Khandelwalet al., 2010), *Ocimum canum* against *Hyalomma anatolicum anatolicum* (Jayaseelanet al., 2012), *Euphorbia prostrata* against *H. bispinosa* and *H. maculata* (Zahiret al., 2012), *Manilkara zapota* against *Boophilus microplus* (Rajakumaret al., 2012).

It is evident from the literature survey that work have been done using medicinal plants against ectoparasites however, epidemiological surveillance of ticks in Agra region has not been performed yet nor the formation of AgNPs using *Carissa carandas* therefore, the present study is done with the objective to investigate acaricidal potential of plant mediated AgNPs against cattle ticks.