Preface - An introduction to integrated approach

"Sericulture" is a labour intensive, agro-based industry suitable for developing countries where unemployment and underemployment continue to be a serious problem. It fits well in socio-economic structure for up-liftment of rural populations transferring wealth from rich class to the poor sections of the society. Because, silk products are mostly consumed by the affluent class and the value is distributed among the farmers, reelers, twisters, weavers and traders.

The agro-based industry, sericulture, involves four distinct phases of activities mulberry cultivation, silkworm rearing, silk reeling and weaving. The success of sericulture depends on the quality of mulberry leaves fed to silkworms. The leaf quality is influenced by various factors viz., physico-chemical properties of the soil, available nutrients, mulberry variety, age of leaf, pruning, fertilizers, irrigation, environmental factors, cultivation practices, incidence of pests and diseases, method of leaf harvesting and preservation.

'Soil' is a loose superficial layer of the earth's crust. It forms a thin layer on the land surface and ranges from a few inches to a few feet in thickness. It is formed with five essential components, i.e. mineral matter, soil water, soil organic matter, soil organisms and soil air. Normally, a unit volume of soil constitutes 50% of organic and inorganic components, 25% liquid and 25% micro-organisms plus air. Based on the relative amount of different soil particles, soil is classified as loam, sandy and clayey soil. Most soils contain 1 to 6%
organic matter that is mainly derived from dead remaining of plants and animals which are acted upon by the soil micro-organisms. A fresh organic matter like fallen leaves, twigs, animal excreta etc., undergoes decomposition and gets converted into humus. Humus formed from plant debris and the process of humus formation is known as humification. Humus being amorphous and porous substance chiefly contains peptides and their degradation products. It not only gives dark color to the soil also useful in improving soil porosity, water holding capacity and fertility of soil. Humus is finally converted into inorganic substance by a process known as mineralization which, also brought about by soil microbes. Thus, humus is also a rich source of microbes to plants. The percent of humus is always high in loamy soil and poor in dry and sandy soils. Mineralization helps in recycling of minerals such as potassium, calcium, sulphur, phosphorus etc. The important mineral substance of the soil are Calcite (CaCO₃), Quartz or Silica (SiO₂), Clay, Mica and Feldspar. In addition, sixteen elements are recognized essential for normal growth and development of plants, which supplied by soil in varied quantities. Nitrogen (N), Phosphorous (P), Potassium (K) are used in large quantities by plants and are known as ‘major elements’; Ca, Mg, S are required in relatively smaller but, in appreciable quantity and are called as ‘secondary elements’. Fe, Zn, Mn, Cu, Bo, Mb, Cl are required in smaller quantities and hence, referred as ‘trace elements’ or ‘micro-nutrients’ (Sinha et al., 1992).

Soil is a reservoir of different nutrients required for plant growth and productivity. Thus, increase in biomass of mulberry per unit area of land, the native soil fertility alone cannot be relied upon
and recourse of soil has to be made through the application of fertilizers and manures. Healthy growth of mulberry requires a number of nutrients and some of them are very much essential (Chowdary et al., 2003). The chemical inputs and farm yard manure in crop production are becoming increasingly in short supply and costly leading to their less application thereby affecting the soil health and leaf quality adversely (Bhogesha et al., 1997). Thus, an integrated nutrient management has utmost importance in mulberry crop production. Integrated nutrient management is broadly encompassing the nutrient cycle among soil, plant and silkworm, balancing the use of organic manures and chemical fertilizers that facilitate biological nitrogen fixing potential and taking holistic view of crop management system. A package, integrating the use of manures and bio-fertilizers helps in stabilized sericulture in globalization of the trade (Shankar Rao et al., 2001).

In recent years, sericulture industry in India is passing through a critical stage and almost demoralized the cocoon and silk producers due to steep fall in cocoon and silk prices. The silk which aptly called “Queen of Textile Fibers” reigns supreme in the textile industry. Being, one of the major silk producing and consuming countries in the world, India need to protect its interest from external competition by restructuring the sericulture industry.

Towards this, over the last few years, a large number of new technologies have been developed by various research institutes and universities with a sole objective of resolving the problems related to the sericulture activities. However, most of the technologies developed so far could not reach down to the lower strata. This
means that the transfer of technology is an essential follow-up for scientific innovations towards deriving optimum benefits. Adoption of new technologies, ideas and practices among the rural communities is rather slow and irregular process and some time unreachable. Thus, farmers need to be highly informative and knowledgeable with regard to sericulture practices and technologies.

Interestingly, in recent days, 'Information Technology (IT)' revolution has resulted in information explosion through World Wide Web (WWW) connected internet. The internet and web have been using as platform to address all kinds of problems and to communicate the possible solution on mouse-click based approach. With the onset of internet related information sources, access to internet through personal computers and mobiles has revolutionized the search of required information, which is found to be very handy for everyone. Internet and web have been growing by leaps and bounds in recent years accelerating the information explosion, a well-known phenomenon known to all of us. Extensive application of IT for the development of silk industry right from farming to product production for export and making it more dynamic and viable in the upcoming free trade regime is need to be addressed. Hence, some efforts have been made in the areas like e-chaupals for sericulturists, on-line trading, futures trading, dissemination of information on latest cocoon and silk prices at the doorsteps of sericulturists, quick spread of new technologies etc. (Magadum et al., 2005; Kololgi and Ramesha, 2005).

In the light of recent advances in development of new technologies in sericulture and information technology we have
planned to integrate these two technologies for the first time to decipher information to the sericulture practicing farmers through IT by developing suitable strategies. The resultant data is presented in two parts in the thesis,

**Part A.** Analysis of fertility status of mulberry garden soil

**Part B.** Construction of soil database for mulberry garden soil