INTRODUCTION

Our country, India is based on agricultural products. These products are gained through intensive farming. Intensive farming needs sufficient energy, which are provided through fertilizers, growth regulators etc. The dyes, produced from the dye industries flown as wastes into the fields through irrigation channels, are also a form of energy but they have a negative impact on the cultivation. They show toxic effects on both flora & fauna and thereby reduce the productivity of the crops causing socio-economic problems.

Along with agriculture India has its place amongst 10 most industrially developed countries of the world. Rapid industrialization has dramatically affected the upper stratosphere and seasonal climate all over the world. Exploitation of water resources and their use have been of primary importance from the early dawn of human revolution. It has brought in global interest in improving technologies for planning and uses of water resources. Many parts of the world are experiencing acute water shortage and thus have brought and increased awareness about
the vital importance of water as a natural resource. Water has become a powerful instrument for socio-economic changes.

With the rapid growth of industries in the country, pollution in natural resources by the industrial wastes has increased tremendously. A huge demand of fabrics has brought about the existence of textile industry along with various sectors such as garments, silk, woolen and cotton textiles etc. This industry including the garments sector has had a continual increase in the FDI inflow from Rs. 80.99 million in 2000 to Rs. 234.73 million in 2002 (January-May). Contribution of this industry to gross export is about 37% and it adds less than 1.5% to the gross import to the country. At present the contribution of the textile industry to GDP is about 4%. It provides direct employment to about more than 30 million people, being the largest employment provider in India (Source: Ministry of Textiles). The dyes are back bone of this industry.

This rapid increase in textile industries had resulted in speedily development of dyes/industries. They are highly stable and also resistant to microbial attack therefore are readily and are not removed from water by conventional waste water treatment system. While most dyes are not particularly toxic they are considered to be causing pollution problem. As many as 139 organic chemicals, heavy metals (Zn, Pb, Cr, Hg, Mo, Ba) and their salts are used in manufacturing of dye. The textile industry require
huge amount of dyes. It is estimated that 19,000 tones of dyes stuff is used in country. It was reported about 5% of the total dye stuff production of the world. Enormous volumes of effluents are generated at different stages of textile manufacturing. They are the results of the use of copious amount of chemicals and dyes. Their indiscriminate discharges provoke a serious environmental impact in the neighboring water bodies. They eventually poisoned, damage or affected one or more species of the ecological balance.

The dye stuff industry and dying process both discharge large quantity of intermediate compound along with final product into near by water reservoir, which in turn being utilization for the irrigation purpose. There are many reports where the heavy metal toxicity affects the micro-biological biofertilizer. Some important information available regarding to the toxicity of dyes and metal on bacteria and cyanobacteria (Palsia and Para, 1983).

Our flora and fauna are also found to be affected by most of the textile and dyes industry effluent. Colour interfere with transmission of sunlight into the stream and thus reduce photosynthetic action (Upadhyay and Pandey, 1991). Crops are drastically affected by the dyes on various parameters such as percentage seed germination, growth rate, productivity and the visible structural changes including injury but their response on vital physiological processes and quality of yield has not been given due attention. Besides being responsive to the dyes, the
crops plants also show response to various physical variables such as humidity, temperature and different soil conditions. Therefore the gross response cannot adequate serve as reliable and sensitive indicators of tolerance of crop plants to the dyes effluent. This necessitates a detailed study of the dyes effluent interaction to plants so that sensitive parameters of tolerance level could be established.

Basically all metabolic processes are regulated by enzymes (Kiermier, 1962). Their gross effects are therefore, manifestation of altered activity of concerned enzymes in metabolic process. While the enzymes are well known for their sensitivity to even slight changes in microenvironment i.e. to cellular environment, they are likely to be directly affected by physical conditions of soil and water etc. Therefore, dyes treated relevant response of enzymes will be more reliable and sensitive indicator to toxicity.

The Ministry of Agriculture now added the biofertilizer to FCO (Fertilizer Control Order 1985) which are mainly-Rhizobium, Azotobactor, Azospirillum and phosphates solubulizer and BIS (Bureau of Indian Standard) develops a different standard for these biofertilizers-

- **Rhizobium**: IS : 8268-2001
- **Azotobactor**: IS : 9138-2002
- **Azospirillum**: IS 14806-2000
Phosphates solubulazing- IS : 14807-2000


The literature survey clearly indicates that no work has conducted regarding effect of dyes on Rhizobium and nodulation of pulse crops. A little work has reported about effect of dyes on crop productivity but the actual mechanism of action of physiological processes are still lacking. It is assumed that the bacteria affect plant growth mainly by producing plant growth promoting substances. It leads to an improvement in root development and increase in the rate of water and mineral uptake. The immediate response of soil inoculation with associative non-symbiotic PGPB but also for rhizobial varies considerably depending upon the bacteria, plant species, soil type, inoculant density and environment conditions.

The present work is undertaken to study the effect of the dye and Rhizobium inoculant on nodulation, growth and productivity of Green gram (Vigna, radiata (L.) Wilczek). Its effect on various morphological and physiological activities are still not studied. Therefore effect of Rhizobium species and dye on greengram is under taken. This study includes study of effect of Rhizobium species and different concentration of dye (monastral fast blue) on different parameters of nodulation, growth and productivity of green gram. Therefore, the proposed work will be helpful to study the effect of dye toxicity, possible route of action
and to ensure better growth and productivity of pulses like *Vigna radiata* (L.) Wilczek.

*******