

Introduction

1.0. INTRODUCTION

India is an agriculture and agro based industry dependent country (Reddy *et al.*, 2007). The global necessity to increase agricultural production from a steadily decreasing and degrading land resource has placed considerable strain on the fragile agro-ecosystems (Mubassara *et al.*, 2008). In order to meet out the nutritional demand of the increasing population, efforts are being made at the national and international level to increase the crop production per hectare (Rather *et al.*, 2010).

Fertilizers are the sources of plant nutrients that can be added to soil to supply its natural fertility. They are intended to supply plant needs directly rather than indirectly through modification of such properties as soil pH and structure. There is usually a dramatic improvement in both quantity and quality of plant growth when appropriate fertilizers are added. The change from an agrarian society and a subsistence type of agriculture to a modern mechanized society is accompanied by a marked increase in the use of fertilizers (Aziz, 2007).

The use of manure and fertilizer is inevitably associated with the loss of nitrogen to the environment. These losses can compromise the composition of ground water and hence it may be necessary to limit the use of manures and fertilizers (Schroder *et al.*, 2010).

Application of chemical fertilizers though increased the yield substantially could not sustain the soil fertility status (Sharma *et al.*, 2009). Indiscriminate use of chemical fertilizers has caused serious damage to the soil, rendering them less suitable for cultivation (Dalve *et al.*, 2009). There has been a growing awareness to reduce the inorganic fertilizer application to soil at global level to avoid adverse effects (Sangwan *et al.*, 2009).

The excessive use of agrochemicals has polluted the environment to a great extent and the food produced under such farm management may not be safe or of good quality. Public awareness to these problems has shifted the approach towards some alternative measures. Organic farming offers an alternative that can eliminate many of the environmental problems of conventional agriculture (Javaid and Shah, 2010). Organic farming system rely on large scale application of animal wastes or FYM, compost, crop rotation, crop residues, green manure, vermicompost, biofertilizers and biopesticides (Kannan *et al.*, 2005).

Organic manures not only increase the yield but also improve the physical, chemical and biological properties of the soil which in turn improve fertility, productivity and water holding capacity of the soil. Nowadays many commercial organization have brought some readymade organic fertilizers into the market. These are enriched with bio-inoculants and micronutrients (Kalalbandi *et al.*, 2007).

More recently, a real challenge faces the workers in the agricultural research field to stop using the high rates of agro- chemicals which negatively affect human health and environment. Some of these problems can be tackled by using biofertilizers, which are natural, beneficial and ecological friendly (Soleimanzadeh *et al.*, 2010).

Biofertilizers are inputs containing microorganisms, which are capable of mobilizing nutritive elements from non usable form to usable form through biological processes (Shaheen *et al.*, 2007). The biofertilizers enriched with bacteria and fungi have proven to be great importance in improving the yield and quality of various agricultural crops (Majumdar *et al.*, 2007). A variety of microorganisms have been used in soil inoculations intended to improve the supply of nutrients to crop plants, to stimulate plant growth, to control or inhibit the activity of plant pathogens and to improve soil structure (Shehata *et al.*, 2010).

The researchers pointed out that the inoculation of biofertilizers stimulated growth, enhanced the uptake of NPK and other micronutrients and thereby increased the survival rate of plant seedlings (Natarajan and Srimathi, 2010). Biofertilizers proved to eliminate the use of pesticides sometimes and rebalance the ratio between plant nutrients in the soil. Biofertilizers do not replace mineral fertilizers but significantly reduce their rate of application (Osman *et al.*, 2010).

Vermicompost is a biofertilizer enriched with all beneficial soil microbes and also contains all the essential plant nutrients like N, P and K (Sinha *et al.*, 2010). Vermicomposting is a non-thermophilic biodegradation of organic material through interaction between earthworms and microorganisms resulting in production of vermicompost. Vermicompost not only increase the soil fertility through the addition of plant growth hormones and increased level of soil enzymes, they are also responsible for the determination of important microorganisms as they are rich in microbial diversity,

population and activity (Gopal *et al.*, 2009). Earthworms act in the soil as aerator, grinders, crushers, chemical degraders and biological stimulators (Chauhan and Joshi, 2010).

Leafy vegetables are a valuable part of the diet owing to their nutritive values which plays an important role in the human diet. They are highly diverse in species, varieties and agro-ecological requirements. The quality of leafy vegetables may be divided into internal and external quality. It is well known that red and dark green colored leafy vegetables are richer in nutrient content than lighter colored vegetables (Ali *et al.*, 2009). In many countries leafy plants are eaten raw or lightly cooked to preserve the taste and this practice may also favors the likelihood of food- borne parasitic infections (Wafa and Mergrin, 2010).

The charismatic genus *Hibiscus* is familiar, particularly in the tropical and sub-tropical regions of the world where its diversity is especially concentrated (Bhalla *et al.*, 2009).

The plant selected for the present study is *Hibiscus surattensis* (L.) is a weak-stemmed, trailing plant covered with soft hairs and scattered prickles. The leaves are round, deeply and palmately 3- to 5-lobed, the lobes being toothed. The flowers are yellow, with a dark center. The capsules are hairy and ovoid. The seeds are downy. The plant yields a fiber of good quality and the leaves can be used medicinally for coughs (www.bpi.da.gov.ph/Publications/mp/pdf/l/labuag.pdf).

The present work is done to study the “**Effect of Liquid biofertilizers, Chemical fertilizers and Vermicompost on the Growth and Yield of *Hibiscus surattensis* (L.)**”.

The objective of the present study is

- ❖ To determine the biometric observations
- ❖ To evaluate the biochemical parameters
- ❖ To assess the enzymic and non - enzymic antioxidants
- ❖ To analyze the enzyme activity in the soil
- ❖ To analyze the physicochemical properties of the soil at the initial and at the post harvesting stage.