



Chapter - 1

INTRODUCTION

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Papaya (*Carica papaya* L) belongs to the family Caricaceae, is an evergreen, picturesque, straight growing and softwood plant. It is sixth most important fruit in India in both area and production. The total 70,100 hectare, area is covered under papaya with a total production of 1.75 mt in India (Kalloo, 2003). Papaya is grown in tropical and subtropical regions of country covering Andhra Pradesh, Tamil Nadu, Assam, Bihar, Maharashtra, Uttar Pradesh, Gujarat, Punjab, Haryana, Madhya Pradesh, Karnataka, Kerala and West Bengal states.

Papaya is a nutritive fruit which contains 0.5 per cent protein and an equivalent amount of minerals, consisting mainly of iron, calcium and phosphorus. The 100g of papaya fruit contains 2,500 international unit of Vitamin A and 70 mg of Vitamin C. The fruit is also rich in the enzyme papain, which helps in the digestion of proteins, because of its photolytic enzymatic activity. Papain is also used for the tenderization of meat, manufacturing of chewing gum, cosmetics and dental pastes and preparation of drugs etc. The papain is commercially obtained from unripe papaya fruit (Joshi et al; 1976 and Huet, 1956). In addition unripe fruits are also used for preparation of vegetables whereas the ripe papaya fruits are very delicious such as jam, jelly, nectar, soft drinks, ice-cream, flavouring, crystallized fruits, canned slice and syrup are also prepared from the ripe papaya fruits. The high nutritive value, industrial importance, high remunerative price and fruiting throughout the year put the papaya at an important place in fruit industry and it becomes very important for growers, consumers, traders, exporters and processors.

The nutrition of papaya crop differs from other fruit crops because of its quick growth, continuous fruiting habit and heavy fruit yield. On the basis of earlier work. Done the application of chemical fertilizers @ 200-250 g N, 200-250 g P₂O₅ and 250-500 g K₂O plant year⁻¹ (Ram, 1982) 250 g N, 110g P₂O₅ and 415 g K₂O Plant⁻¹ (Purohit, 1977) have been recommended to meet out the nutrients requirement of papaya. In addition to higher cost and energy involves in the production of chemical fertilizer (Das and Biswas, 2002) the use of chemical fertilizers concern on decline in productivity due to deteriorating effect on soil physical and chemical environment (Nambiar and Abrol, 1989; Lal and Mathur, 1989) and depleting conventional energy sources. During the last decade the productivity of the crop in the country has been more and less static due to excessive use of chemical inputs without adequate organic manure addition. These problems draw the attention of scientist to search some other alternative not dependent solely on chemical fertilizers. AN INM (Integrated Nutrients Management) is one of most effective alternatives which involves use of chemical fertilizers organic manures and bio-fertilizers for the maintenance of long term soil fertility and productivity along with sustainable production of crops

The basic concept underlying the principle of INM is the maintenance and improvement of soil fertility for sustaining the crop productivity on long term basis which may be achieved through combined use of all possible sources of nutrients and their scientific management for optimum growth, yield and quality of different crops in specific agro-ecological situation. The recent concept of integrated nutrient supply involving organic, inorganic and bio-fertilizer has developed to meet the growing need for nutrient supply system. The basic goal is to improve the soil fertility and plant nutrient supply to an

optimum level to sustaining the desired crop productivity through optimization of the benefits from all the possible sources of plant nutrients in an integrated manner.

Bio-fertilizers are micro-organism which are capable of mobilizing nutrient elements from non-usable form to usable form through biological process. They are cost effective and inexpensive source of plant nutrients, do not require non-renewable source of energy during their production, improve crop growth and quality of the products by producing plant hormones help in sustainable crop production through maintenance of soil productivity (Sukhada, 1999). They are useful as bio-control agent, since they control may plant pathogens and harmful micro-organism. Bio-fertilizers like *Azotobacter* and phosphorus Solubilizing Bacteria (P.S.B) increased the availability of nutrients in the soil (Rani and Sathiamoorthy, 1997 and Ganeshmurthy *et al.* 2004).

Potentiality of using organic manures alongwith balanced fertilizers are well established in increasing crop yield and sustained crop production (Nambiar and Abrol, 1989). Greatest growth enhancement was observed in papaya cv. CO-6, when 50 per cent of the nitrogen fertilizer was substituted by FYM and neem cake, and 50 per cent of the phosphorus fertilizer requirement by steam meal and bio-fertilizer mixture (Rani and Sthiamoorthy, 1997). Contrary of chemical fertilizer, organic manures and bio-fertilizers are available indigenously al lower cost which improve soul health and in turn enhanced crop yield per unit of applied nutrients and thereby save energy (Meelu and Moris, 1984). Thus, the concept of INM assumes importance in achieving and sustaining the high productivity and quality fruit of papaya.

Scanty works on integrated nutrient management in papaya has been done in Utter Pradesh so far. Therefore, keeping above facts in view the present investigation entitled "Integrated nutrient management in papaya (*Carica papaya* Linn.) was carried out during the year 2006-2007 and 2007-08 at Department of Horticulture, Udai Pratap Autonomous College Varanasi, U.P. with the following objectives.

1. To study the effect of INM on growth, yield and quality of papaya.
2. To assess the effect of INM on physico-chemical properties of soil.
3. To find out the economic feasibility of the treatments.