I. INTRODUCTION

Globally, bananas are cultivated in more than 130 countries across the world in an area of 88.43 lakh ha, producing 97.15 million tones of banana and plantain. India is the largest producer of banana in the world, contributing 17.30% to the global production of banana with a total production of 16.81 million tons from an area of 0.49 million ha. However, total production of the banana is largely consumed domestically and has negligible share in the global trade. It is considered as the world’s most important fruit (Swennen and Vuylsteke, 2001). Banana is giant monocotyledonous perennial herbs, belonging to the order Zingiberales (Scitamineae) and family Musaceae. Banana is one of the few fruit crops in which all of the cultivated varieties are human selections. It ranks as the fourth major crop after rice, wheat and maize and is considered as a poor man’s crop in tropical and subtropical countries (Swennen et al., 2000; Jain and Swennen, 2004). They are cheap to produce, grow in a range of environmental conditions and produce year round fruits by vegetative propagation. There are more than 300 kinds of banana but only a few are commercially important. Banana is the man's oldest and most valued fruit crop. It is prized for its nutritive value with high carbohydrates (22.2%), fiber (0.84%) and protein (1.1%) with less fat (0.2%) and water (75.7%). Out of the world production of banana most of the production is consumed locally.

Micropropagation is the practice of rapidly multiplying stock plant material to produce a large number of progeny plants under aseptic conditions using modern plant tissue culture methods. The rate of multiplication in banana is restricted to 5-20 suckers per plant during its growth period, which makes it difficult to obtain sufficient amount of planting material of a clone of choice. Micropropagation facilitates production of large number of plantlets/ unit time,
thus helping in rapid introduction and dissemination of new varieties. The rapid multiplication technology ensures that limited number of mother plants is required for raising large number of progeny plants. These few mother plants can be maintained with required care at a limited cost. Being a vegetative reproduction method, micropropagation results a high degree of genotypic and phenotypic uniformity of the progeny plants. The limited variation seen sometimes can be overcome by following appropriate micropropagation. In conventional field propagation, the production of suckers is highly season dependent and, hence, availability of planting material in a given season is often a limiting factor. The planting season in most of the banana production areas starts with the onset of monsoon, which creates a heavy demand for the planting material often leading to supply of substandard material. Using micropropagation, the production of planting material can be achieved as per needs.

Micropropagated plants exhibit uniform growth and maturity. The once over harvest provides a gain of 60-70 days which allows the farmers to take a short duration that adds to the income and soil fertility. It also saves on labour and energy for transportation. Using tissue culture, it is possible to develop planting material which is free from sucker borne diseases and pests. Use of healthy planting material complemented with integrated pest management program is the key to a good crop stand in the field. Production of the plants in test tubes facilitates safe movement and easy handling of germplasm between laboratories within and across countries. Since the micropropagation based progeny is genotypically and phenotypically similar to the mother plant, which is often a superior selection, the yield and returns are expectedly higher. In India, it is the most important fruit crop and is grown in 4.3 million hectare with a total production of 13.9 million tones. Several cultivars of banana are cultivated in the country among
which, resistance to strong winds and shoot cropping duration besides a good profit margin (Singh 1990). In addition to these, cultivars such as Poovan, Rasthali, Lalkela, Safed velchi and Kaeibale, Monthan also grown.

Bananas and plantains are giant perennial herbs and provide an essential food source for more than 400 million people throughout the developing countries of the tropics and the subtropics (Frison, et.al 1999). Bananas are most widely produced tropical fruit. India ranks first among 10 largest banana and plantain producing countries of the world. Acclaimed as a delicious fruit, banana is quite popular as a multipurpose crop. Besides being one of the cheapest commodities to produce, it comes up in a wide range of environments producing fruits year the round. Banana has overtaken all other fruits occupying number one position and highest per capita consumption. In tropical countries, banana has had high per capita consumption and has been a staple food for centuries. While fresh bananas are widely consumed in developed countries, uses of processed banana products are not as high.

Recognizing the importance of banana and plantain, in improving the national economy and quality of life of the small and marginal farmers engaged in its production and marketing. Banana is an important fruit of India grown extensively in the tropical regions of the country. The are well ahead of the other major banana producing countries like Brazil and China. While bananas are cherished as a fruit, they are also used as a vegetable in the raw form. Both banana and plantains are consumed widely in the country, easily accessed and affordable providing food and nutritional security. It is encouraging to note that productivity of banana in some of the major banana producing states is comparable to that in the developed countries. Credit must go
to the innovative approaches as adopted by our farmers and able back-up provided by research and developmental agencies of the government. The government and developmental agencies have been pumping huge amounts of funds in promoting rural agro-based industries to create employment opportunities. Against this backdrop and in view of the strength we have in terms of natural and human resources (unskilled, skilled and technical), banana processing for value addition and diversifying from farm to nonfarm activities in rural areas can provide tremendous scope for generation of employment.

India is largest producer of banana and plantain in the world. Of the 40 million tones of fruits produced in India, banana occupies first position in India with an annual production. About 19 pests have been found associated with banana in India, which include insects, mite and mollusk. Insect attack is noticed from planting to harvesting. Among insect pests, banana weevils, aphids and fruits caring beetles are considered as of national importance, whereas others are of minor and regional significance. In the recent past India has made significant strides in the production of banana and we have emerged as world leaders in the production of the fruit. Banana and plantain provide staple food to a large population, particularly in the developing countries. In India, the crop is grown in almost all parts of the country. It is being exported to as many as 70 countries and is earning foreign exchange to the tune of Rs.180 million every year. The productivity of Indian bananas is much above the world average, which has been possible through concerted efforts in terms of research and development. The Indian Council of Agricultural Research (ICAR) has been providing support for the development of the crop through the National Research Centre on banana, Trichyrapalli, besides through All India
Coordinated Projects of Tropical and Sub-Tropical Fruits. Through the research efforts it has been possible to develop package of improved practices coupled release of improved varieties.

Banana is known both for its nutritive value and medicinal properties. It is a rich source of carbohydrates and potassium and contains several vitamins. It is also used in management of many physiological disorders of kidney, digestive system, urinary track, heart and throat. It is a boon to several million people suffering from malnutrition. While global area under banana has not undergone much change, its total production has increased as a result of improvement in productivity per ha. This has been the result of the emphasis laid on banana research and development infrastructure in the world. Food security to the fastest growing population, under the circumstances of dwindling land and water resources, both in terms of availability and accessibility is a challenge, which has received attention worldwide. Banana known for its antiquity in India, from its mention in the Ramayana (2020 BC), Kautiliya’s Arthasastra (300-400 BC) and its presence in paintings and sculptures of Ajantha and Ellora (600 BC), is an important fruit grown commercially. It is interwoven in cultural heritage and its plant, leaves and fruits are auspicious in all the festive occasions and are it a social function or worship to God.

In India, banana is largely grown by small and marginal farmers which constitute more than 90% of holdings. It is one of the most important fruit crops grown in the country, contributing 37% of the total fruit production. Banana contributes 1.99% to GDP alone. The country had developed infrastructure for research and development. Interestingly, much more significance to banana has been attached during the decade which has impacted production and productivity.
The major banana growing states are Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and West Bengal. Tamil Nadu has largest area (0.92 lakh ha) followed by Maharashtra (0.72 lakh ha) and Karnataka (0.61 lakh ha). Tamil Nadu also ranks first in production (4.85 million tons), followed closely by Maharashtra (4.33 million tons). Karnataka and Andhra Pradesh are next with a production of 2.01 and 1.21 million tons respectively. However, highest productivity is recorded in Maharashtra followed by Tamil Nadu and Madhya Pradesh.

India is endowed with diverse agro-climatic conditions which have encouraged the development and sustenance of a large number of varieties catering to local needs. Though more than 20 varieties have assumed the status of commercial cultivation, Dwarf Cavendish forms the main stay of Indian banana industry, owing to its high yield, wide market acceptability, short crop duration and high economic returns per unit area. But this is not common in coastal region due to high susceptibility to sigatoka leaf spot disease. Poovan is another cultivar grown commercially in different regions for its wider adaptability. Rasthali is significant in commercial production and its success largely depends on higher price it fetches. Virupakshi, Monthan, Karpuravalli and Chakia are also important in some regions of the country. Rajali are grown in Kerala and Tamil Nadu. The clonal situation prevailing in different regions indicates that varietal need cannot be unified and would need regional consideration. Interestingly, Cavendish group of banana has larger area and production and contribution is more than 50% to the production.
Poovan

This is a popular cultivar grown all over the country in a perennial cropping system and is the leading commercial cultivar of southern and north-eastern states. Distinguishing character of these cultivars is pink pigmentation on ventral side of midrib when young. It bears heavy bunches weighing 20-24kg each with closely packed short and stout fruits having a conspicuous beak. Though fruits are slightly acidic and crop duration is 16-17 months, its ease of cultivation and hardiness make Poovan a popular cultivar.

Monthan

This vegetable banana is becoming popular due to its therapeutic value. There is a vide variation in this group. It has regional preference. Yenugo Bontha selected and promoted for cultivation has wider acceptability. There is a potential for widening its commercial cultivation.

Rasthali

This is the choicest table banana for its tasty, crisp, good sour/ sweet blended and pleasant flavoured fruits. Plant is medium statured, takes 13-15 months to come to harvest with bunches weighing 15-18kg each. Hard lumps especially when grown in acidic soils occur. Fusarium wilt is a major threat to this cultivar resulting in restricted cultivation. There has been a significant achievement in selecting a cultivar under the group which can tolerate the infestation.

Banana export

Banana is fifth most important agricultural commodity in world trade after cereals, sugar, coffee and cocoa. Of the 97 million tones of bananas and plantains produced annually, only 14%
is traded globally. The world’s buyers of banana purchased a total volume of 14.65 million tons valued at US$ 4.41 billion. The USA remains the major importer of banana with a share of 30% of global import. In 2000, USA imported banana worth US $ 1.50 billion. Other major importing countries of banana and plantain are Germany, Japan, Belgium and United Kingdom. The Latin American countries dominate the US market for banana. Costa Rica and Ecuador are top exporters, capturing half of the US market for banana (1.8 million tons). Honduras, Guatemala and Colombia are major players in the US market with combined share of nearly 40% of the US market for banana. The Asian countries have a meager share of approximately 0.04% in the US market for banana, the Philippines having biggest share. The USA and European Union consume major traded banana and consumption is on increase in USA. However, in European Union very little increase is noticed during the decade. Other parts of Europe and Middle-East have growing market for banana. World export of banana has shown, increase during the decade largely contributed by Latin America and Caribbean. In Far East, Philippines is a major exporter. India has invisible share in export of banana. Interestingly price of banana has changed very little during the decade in International markets.

**Medicinal value**

Banana skin extract is popularly used for overcoming urinary tract infection and loose motion. Banana with sugar and honey has been a popular folk medicine to combat cough. Though these are a few of the therapeutic uses of banana, Indian folk medicine still treasures a lot of other uses which require scientific reasoning and commercial exploitation. Being a crop of small holders, it is a source of income, ensuring food and nutritional security to about a billion of people across the globe. In the traditional system of Indian medicine, banana is regarded as
nature’s secret of perpetual youth. It is also known for promoting healthy digestion and creating a feeling of youthfulness. It helps promote consumption and retention of calcium, phosphorus and nitrogen which build sound and regenerate tissues. Banana also contains invert sugar which is an aid to youthful growth and metabolism. Banana is good for energetic activity. The starch in less ripe bananas resists digestion and along with the fruits soluble fiber, provides a gentler, longer lasting. Energy rises than most foods and is good for stamina. Banana fruit possesses mild laxative properties, the sugars present tend to increase gram positive or acidic group of microorganisms in the intestines and decrease gram negative organisms. The fruit aids in combating diarrhea and dysentery and promotes the healing of intestinal lesions in ulcerative colitis. The ripe fruits are useful in diabetes, nephritis, gout, hypertension and cardiac diseases. Their usefulness in constipation is due to their richness in pectin, which is water-absorbent and thus gives them a bulk producing ability.

**Conclusion**

Recognizing the role of banana and plantain in livelihood security to a billion people globally, there have been international initiatives, which resulted in use of science-based technologies and focused attention on improvement for sustainable production. Development scenario in India is also highly appreciable, with 116% increase in production and 68% in productivity due to adoption of improved production technologies and efficient management of pests and diseases. The task ahead is to reduce regional imbalances. There is also an urgent need to exploit biotechnological tools for improving
In *vitro* clonal propagation of banana through shoot tip culture with emphasis on certification holds promise for the supply of adequate disease-free, quality planting material to farmers. Global scenario of *in vitro* based orchards indicate that tissue cultured plants under fustigation have good potential for higher productivity. Though tissue cultured plants warrant an additional investment of Rs 30,000-35,000/ha, it gets compensated with its enhanced production and productivity.

By keeping all the said things in view, the present investigation is undertaken with the following objectives.

1. To select the popular cultivars of banana in Tamil Nadu state.

2. To standardize the *in vitro* and improvement methods cultivars selected.

3. To test the suitability and advantages of *in vitro* mode of improvement in the selected cultivars.

4. To standardize the hardening technique and better establishment of *in vitro* developed banana in the field condition.

5. To make the society particularly farmers community to know the benefits of banana raised through *in vitro* mode.

6. To make molecular markers studies in conventional and *in vitro* developed banana cultivars to know the genetically variability among them.