Chapter - 1

Introduction
Agriculture is the backbone of India and main profession of majority of population. More than 70 per cent of the population depends on Agriculture including Horticulture. Horticulture crops cover large varieties of fruits, vegetables, flowers and plantation or spice crops. Among these, vegetable farming is the major attraction for the farmers since it is comparatively more remunerative than field crops. The wider adaptability of vegetables to different kinds of abiotic stresses like water, soil, weather, etc. offers enormous scope for growing vegetables in stress prone areas of dry land, desert, high altitudes, high rainfall and saline waste land areas. They are playing an important role in Indian economy, particularly through food processing and export of commodities (Anonymous, 1999). Vegetable crops provide an important source of income for the small and marginal farmers of our country. The per capita consumption of the vegetables in India is 160 g/day/person as against recommendation of 280 g/day/person. According to this standard we need to produce approximately 0.3 million tonnes of vegetables per day to the requirement of present day population (Anonymous, 2000). The present earning through vegetable export is little over Rs. 300 crores. Karnataka is one of the progressive states with great potential for horticulture crops including vegetables. The state is blessed with ten agro-climatic zones suitable for growing variety of fruits and vegetables round the year (Anonymous, 2003a). Because of the presence of minerals and vitamins, vegetables are considered as protective foods of great value (Reddy, 1996).

Efforts have been made to increase the production of vegetables by developing large number of high yielding, good quality and disease resistant varieties/hybrids and other required cultivation packages. The high yielding varieties/hybrids are more input responsive. The critical input viz., fertilizer, if applied in excess, make the plants succulent and thus attract more pests. To minimise the pest attack, farmers usually depend
on chemical pesticides and their indiscriminate usage creates many problems like pest resurgence, destruction of natural enemies and other beneficial insects. About 90,000 metric tones of technical grade pesticides are currently produced and more than 67 per cent of it is used in agriculture and horticulture sector alone (Nigam and Murthy, 2000).

The problems associated with misuse and overuse of pesticides in vegetable production remains serious and acute. Extensive use of pesticides on vegetables results in unsustainable production practices arising from undesirable externalities such as pesticide resistance by pests, widespread environmental pollution, health hazards to farmers and their families, toxic residues in food for consumers and negative international trade implications. Development of resistance to synthetic pyrethroids and many other commonly used insecticides was observed by Saxena et al. (1989) and Talekar and Shelton (1993) noticed elimination of natural enemies resulting in the control failures throughout the world. In addition to these problems associated with use of chemical pesticides, vegetable farmers depend heavily on chemical fertilizers. Vegetable yields are highly variable and vegetable production has become an ever riskier business for farmers.

The pesticides are basically used to control pests and diseases which destroy crops in the fields. It has been estimated that crop losses in India vary from 10 to 30 per cent depending upon the crop and region. In monetary terms these losses amounts to ₹2,90,000 million/year. Even if half of the losses were avoided, substantial quantity of food will be available to wipe-off the persisting malnutrition. Besides the yield loss, the marketability of the pest infected produce is a problem. The area under pesticide cover has increased from six million hectares in 1980 to about 150 million hectares in 2000 (Anonymous, 2000). During this period, pesticide consumption has increased by 60 folds. At present about 145 pesticides are registered for use with current consumption of about 90,000 million tonnes and this consumption is likely to increase.

There has been a wide spread contamination of food chain due to residual toxicity because of non-judicious and unscientific use of pesticides. In a recent survey carried out by Indian Council of Medical Research, New Delhi, it was found that 51 percent of our
food commodities were contaminated with pesticide residues and out of these 20 percent had pesticide residue above maximum residual limit value, as compared to 21 percent contamination with only 2 percent above maximum residual limit on world wide bases (Anonymous, 2000).

The current consumption of organically produced fruits and vegetables at the global level is valued at ₹12,150 crores. To a large extent this sale is also based on individual initiative of the farmers, Non Governmental Organizations and some entrepreneurial traders. The Agricultural Products Export Development Agency (APEDA) had proposed to export organically produced fruits and vegetables to a value of ₹ 5,500 crores annually during the Tenth Five Year Plan period. This would require enormous efforts to produce and use biopesticides and pheromones in the context of IPM. It is estimated that by the year 2015, about 20 to 30 percent of the chemical pesticides would be replaced by bio-rotational agents (Anonymous, 2000). Smith (2011) pointed out that bio-pesticide market was expanding annually at approximately 10 per cent while the market for conventional pesticides lagged at around 2 per cent growth. It is projected that an overall increase in bio-pesticide market value will be US $ 2.7 billion by 2015.

The concept of Integrated Pest Management (IPM) for sustainable development has emerged with increasing realization of the importance of sustainable agriculture. IPM is an important principle on which sustainable crop protection is based (Wahab, 2004). IPM involves the need based use of pesticides only when the pest reaches the economic threshold level, which promotes the build up of many bio-control agents in the crop ecosystem. In this regard, the use of bio-pesticides, bio-agents and pheromones has assumed significance as an important component of IPM due to their economic viability and eco-friendly nature.

Without appropriate training on Integrated Production and Pest Management (IPPM), farmers will continue to try to increase crop yields through higher inputs of agro-chemicals without realizing the negative consequences. Therefore, now it is imperative to develop a holistic system of tackling harmful pests to make it more eco-friendly,
economically viable and socially acceptable practices to the farmers. In this regard to tackle the major pests and diseases of major crops, biotechnological approaches are gaining momentum. Compared with the usage of chemical pesticides, the biopesticides constitute around 2% in the country. Hence the biotechnological approaches of pest control such as use of botanical pesticides, use of microbial pesticides, augmentative biocontrol by inundative releases, pheromones and attractants in pest management are the need of the hour.

Statement of the Problem

Brinjal, Cabbage and Tomato are the important commercial vegetable crops being grown on a large scale by the farmers of Kolar, Bangalore, Hubli, Dharawad and Belgaum to meet the supply and demand of urban areas.

High yielding varieties of these three vegetables viz., Brinjal, Cabbage and Tomato are more susceptible to pests and diseases. The control of pests and diseases is stupendous and normally farmers resort to high insecticidal inputs. Increased use of pesticides has contaminated soil, human and animal health and ground water affecting the production and productivity. Judicious use of chemicals as a component of Integrated Pest Management (IPM) is the safest means of the pest management among the methods available now. But increased use of bio-pesticides, pheromones and other alternative measures may help to decrease the dependency on chemical insecticides and bio-intensive Integrated Pest Management (BIPM) is important at this juncture.

With this background, present study was undertaken to understand the farmers awareness about IPM and developed simple, adaptable IPM module and validated the same in Eastern Dry Zone (EDZ), Northern Transition Zone (NTZ), Northern Dry Zone (NDZ) and finally analysed the impact of the developed module.
Objectives

1. Preliminary survey for the pest management practices adopted by brinjal, cabbage and tomato growers in selected villages of the 3 agro-climatic zones of Karnataka.

2. Validations of bio-intensive integrated pest management (BIPM) module through farmer’s participatory approach on selected vegetable crops.

3. Dissemination of the validated BIPM module among the vegetable growers.

4. Assessment of the impact of adoption of the new BIPM module on the vegetable growers during the post-demonstration phase.

Scope of the study

This research study, which help us to understand adoption behaviour of farmers towards Integrated Pest Management and there are no systematic research studies done on these lines. Therefore, these findings will reveal the level of knowledge and adoption behaviour towards IPM practices which are very useful for government departments like Departments of Horticulture, Agriculture, and Pollution Control Board, other environmental concern departments and non-governmental organizations working on sustainable agriculture. The government of India is making efforts to popularize the use of biocontrol agents and bio-pesticides to curtail the use of synthetic pesticides. The Karnataka State Department of Agriculture has developed a policy framework of introducing organic farming, integrated system of pest control and balanced nutrient application in all the districts in phased manner. Hence, this type of research studies is most timely and typical and suits to the policies of the government.

This study is helpful in programming of training to extension personnel to encourage farmers to take up bio-intensive integrated control of pests and an eye opener regarding bio-intensive IPM practices and help the planners to develop strategy to adopt the same on large scale.
The present research study is an attempt to assess the knowledge level and extent of adoption of BIPM practices of brinjal, cabbage and tomato growers. The findings of this study provide valuable information to all public and private extension agents, researchers and policy makers to orient their efforts for greater diffusion and adoption of BIPM practices on a large scale. The results of the study pertaining to the constraints and suggestions would help to take appropriate remedial measures by the agencies concerned. The newly developed module also gives new direction to the farmers in reducing chemical sprays and costs. They also can have the satisfaction of producing and consuming less chemical or non-chemical treated food and contributing safer food to the society.