CHAPTER - I

INTRODUCTION

Rose (Rosa sp.) is one of the nature's beautiful creations and is universally called as ‘queen of flower’. The word rose is derived from the name ‘Erose’ meaning ‘The god of love’. In Sanskrit literature, rose is referred as ‘Tarunipushpa’, ‘Atimanjula’ and ‘Semantika’. Rose belongs to the family Rosaceae. The genus Rose consists of about 120 species out of which only eight species are cultivated viz., Rosa chinensis (Jacquin) Rosa damascena (Miller), Rosa foetida (Herrm), Rosa gallica (Linnaeus), Rosa gigantea (Collett), Rosa moschata (Herrm), Rosa multiflora (Thunberg) and Rosa wishuriana (Crepin). Rose is used for worship, in making garlands and bouquets. Rose oil is used in ayurvedic medicine, in perfuming soaps and cosmetics, flavouring soft drinks and alcoholic liquors. Rose water is used in medicine, confectionary and eye lotion. Rose petals are used in making gulkand (A semisolid made by mixing with sugar). In European countries, roses are used in flavouring wines, jams, jellies and syrups (Bose and Yadav, 1989).

Commercial floriculture has been of recent origin in India through cultivation of traditional flowers has been going on for centuries. Now emphasis has been shifted from traditional use to cut flowers for export purpose. There are about 80 species of plants which produce commercially important cut flowers. The top 3 cut flowers in the international trade are rose, chrysanthemum and carnation followed by tulip, lily, fressia, gerbera, gypsophilla, cymbidium, iris, gladiolus, anthurium. The varied agro climatic conditions in India are suitable for commercial cultivation of all these crops either in open field or under protected conditions. However, commercial cultivation of flowers in the country has so far been restricted to rose, chrysanthemum, carnation, jasmine, marigold, tuberose, gladiolus, mainly due to absence of domestic market of other flowers. Cut flowers are mainly used for ornamental purpose i.e., for use in preparation of bouquet, floral arrangements, worship and social occasions.

The potential of world market for all floricultural products has been estimated to be US $ 50 billion with a 15 per cent annual growth rate. In view of a number of features favour of India, namely varied agro climate, skilled manpower, proximity to consuming markets, Government of India has identified floriculture, without flowers
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as an extreme focus segment for boosting export potential of the country. The expert group of the planning commission has proposed an annual export target of Rs. 100 crores of cut flowers.

The main cut flowers importing countries are Germany, France, United Kingdom, United States of America, Switzerland, Italy, Austria, Denmark, Sweden, Belgium and Japan. The major exporting countries are Holland (70%), Columbia (9.2%), Israel (5.8%), Italy (4.95%), Spain (2.3%), Kenya (1.4 %) and the Canary Island (1.1%). The five flowers viz., rose, chrysanthemum, carnation, tulip and lily account for 70-75 per cent of the world trade. For cut flowers target markets identified by the floriculture committee of the Commerce Ministry are Europe, Middle East United States of America, Japan, Far East (Hongkong, Singapore).

India has about 88,607 hectare of land under floriculture with a production of 6,80,600tonn of flowers. The estimated area under flowers in Gujarat is about 15,955 hectare with a production of 1, 35,493 MT of flowers. Among the flowers, rose occupies an area of about 4106 hectare with a production of 32,135 MT/ha with the productivity of 7.83 MT/ha (Anon., 2012). It is extensively grown in and around the cities of Delhi, Pune, Bangalore and Chandigarh.

Agriculture has tremendous impact on human economics but with the changing cropping system and emergence of mite as a serious pest, a ‘let-alone’ approach to its management the demands for an abundant and high quality food supply. This concern steps in part from increasing incidence of phytophagous mites in various agricultural crops. Currently, 17 species of mites have attained the status of major pests and 30 as minor pests. Acarines are of considerable economic significance and can threaten the sustainability of agro ecosystem. There is an urgent need to create awareness about acarines and their behavior in different ecosystems for timely management of harmful species.

Acarini, because of its small size and cryptic appearance, are difficult to detect and hence most of the time infestations are unnoticed. Once established in a new area, certain biological characteristics like high fecundity, shorter life cycles, a myriad of dispersal technique sand adaptability to diverse ecological conditions allow rapid escalation to pest status. In the current scenario when world trade is showing
exponential increase, these traits are putting mites on a stage of considerable economic significance where devastating situations may occur to threaten the sustainability of agro ecosystems. These small but might creatures attracted the attention of man when these were recorded as vector of the most destructive and lethal disease agent.

Among the arachnids, acari are the only group, which feed on plants. Changing in agricultural practices including increased usage of fertilizers, pesticides, irrigation and mono-cropping have aggravated the problem of destructive mites’ pests on different crops.

The mites become serious pests because they have several generations per season. Phytophagous nature, high reproductive potential and short life cycle contributed rapid resistance development to many acaricides often after a few applications showed marked resistance to fenbutation oxide and tebufenpyrad in glasshouse by *T. urticae*. Failure in the chemical control of *T. urticae* due to development of high level of resistance have been reported in chemicals like TEPP, parathion, malathion, tetradifon, clofentezine, binaacryl, dicofol, hexythiazox, fenoyroximate, dimethoate, monocrotophos and mevinphos etc.

Cut flowers are generally grown in polyhouses. Polyhouse is a protective shade made up of polyethelene used for growing high value agricultural products. Temperature, humidity, ventilation of air is controlled by the equipment fixed in the polyhouse. The modern breeding techniques have helped in obtaining attractive colourful flowers with greater export value. However, such plants are more susceptible to pests and diseases. Polyhouse red spider mite thrives in warm, dry conditions and is usually only a problem from March to October, but damage can occur at other times in a heated greenhouse. It will also cause problems outdoors in summer, especially in hot, dry weather. The nutritional status of the plants affects the population growth rate of phytophagous mite in plants in high nitrogen levels.

In field condition, rose is highly susceptible to sucking pests. The red spider mite, *Tetranychus urticae* Koch, is a serious pest of numerous greenhouse plants, nursery-grown ornamentals and field crops. Both nymphs and adults cause damage by sucking the cell sap from under surface of the leaf and produce white spots which later get overed by thick web. It results discoloration of infested leaves, which turn
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bronze and dry up. Severely infested plant remains stunted. Red spider mite damage includes webbing, fine stippling, leaf yellowing, drop and even plant death. Species in its host range include numerous herbaceous and woody landscape plants such as rose, ivy and Euonymus japonicus. Female T. urticae can develop from egg to adult in approximately 6.5 days at 30°C and females can lay as many as 60 eggs in five days. The expense of new acaricides and the loss of production time associated with pesticide applications has made frequent acaricide applications costly. Development of resistance by T. urticae to numerous acaricides has caused difficulties in controlling outbreaks. These conditions have raised interest by growers in using predatory phytoseiid mites to manage red spidermites to reduce their need for acaricide applications.

Chemical control is practiced by farmers for higher production, but its injudicious use has created many problems like resistance, resurgence of pests, pesticide residues, destruction of beneficial fauna and environmental pollution. Under such circumstances, the optimum use of pesticides and resistant varieties in pest management are considered as prerequisite ecologically viable proposition which overcome the above mentioned problems. In addition, there may some relationship between mite and weather in their activity. Further, to develop economically feasible management strategy and to reduce unwanted pesticide load in the environment, knowledge on safer pesticides also very much essential. Apart from its polyphagous nature, high reproductive potential and shorter life cycle, factors such as change in climatic conditions and overuse of plant protection chemicals also have helped to compound the mite problem. Once the sequences and relationship among them is established, the strategy for the management of mite becomes sound and economical.

It attacks a wide range of house plants and greenhouse plants, both ornamentals and edibles, including: vines, peach, nectarines, cucumbers, tomatoes, aubergines, peppers, Fuchsia, Pelargonium, poinsettias, orchids and Impatiens. It is polyphagous pest which feeds on 183 species of plant. Chemical control is generally practiced by farmers for higher production, but its more use creates resistance, resurgence of pest, pesticide residue, destruction of beneficial fauna and environmental pollution. For this optimum use of acaricides and development of management strategy to reduce unwanted pesticide load in environment and use of
safer pesticides is essential. This study helps the farmer to know the most effective stage of pest and effective dose of pesticide. The rose is used in many cosmetic products and petals are used in making gulkand and soft drinks. Thus the study on residual toxicity of pesticides helps to know the effect of pesticide residue in cosmetic product and in food product of rose.

In view of the importance of rose and seriousness of this pest, it becomes necessary to have comprehensive information on different aspect of the pest management. Hence, the detailed study on the bionomics and management of red spider mite, *T. urticae* in rose under protected condition was conducted with the following objectives.

2. Efficacy of acaricides against red spider mite in rose in protected cultivation.
3. Residual persistent toxicity of different acaricides to the adult of *T. urticae*. 