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## Survey on occurrence of Tetranychidae mites (Acari: Tetranychidae) in various agro-climatic zones of Tamil Nadu

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#### Abstract

The family Tetranychidae, which includes a huge number of diverse species that colonize on a wide variety of plants. A survey was conducted in order to document more about on spider mites in the various agro-climatic zones of Tamil Nadu. The objective of this survey was to record the status of spider mites on horticultural and agricultural crops, the amount of loss that was caused by the mites in associated with the level of infestation and documentation on control measures performed by farmers in several regions of Tamil Nadu. A preliminary assessment was carried out by inspecting and questioning the farmers regarding pest status, pesticide usage pattern, and cropping pattern within visited agro-climatic zones. According to the information gathered, the red spider mite (*Tetranychus spp.*) was noticed to be a significant pest on bhendi, tomato, and brinjal. The yield of bhendi has decreased in greater amount in response to the infestation of red spider mites and also carnation in Flower crops. Farmers in these areas employed certain pesticides as their primary management technique to tackle the significant crop loss.

**Keywords:** Spider mites, survey, agricultural and horticultural crops, different agro climatic zones, pesticides

#### Introduction

The Tetranychidae family is one of the most important Acarina groups (Maina *et al.*, 2014) [3]. This family includes over 1250 phytophagous species (Migeon *et al.*, 2010) [4], and it harms ornamentals, horticultural crops, fruit crops, and some staple food crops has been observed (Jeppson *et al.*, 1975) [2]. Because of their vast host plant range, high fertility, and rapid development rate, spider mites can attack and inflict economic damage to virtually any plant (Maina *et al.*, 2014) [3]. The majority of harmful species are members of the *Tetranychus* genus, which can be found in a wide range of habitats.

The two-spotted spider mites have achieved key pest status on the majority of the economically important crops, both in the open field and closed cultivation systems. The potential of the Tetranychidae to develop quickly facilitated the mites' ability to become major pest in various crops at different ecological conditions. The mites are considered the major non-insect pest imperiling the successful cultivation of economically important crops by their ability to complete the life cycle within the shortest period (Bounfour & Tanigoshi, 2001) [1].

Tetranychidae Mite damage mechanisms were first noticed as yellowish-white discoloration of leaves, which combined to create distinctive silvery spots. Tetranychidae mites feeding causes the leaves to dry out and die, eventually killing the plants (Reddy & Latha, 2013) [5]. The survey was carried out in Tamil Nadu in various agro-climatic areas to determine the condition of Tetranychidae pests in agriculture and horticultural crops. The mites switch from sedentary to dispersal mode and gather on the tops of the plants when the plant begins to decay, resulting in a diminished food source. Dispersal includes both intra-plant and interplant mobility. To begin airborne distribution, the mites congregate on the uppermost portions of the plants. Silk threads are produced by the mites, which they use to "balloon" into the wind, allowing them to travel large distances (Smitley & Kennedy, 1985) [6].

#### Materials and Methods

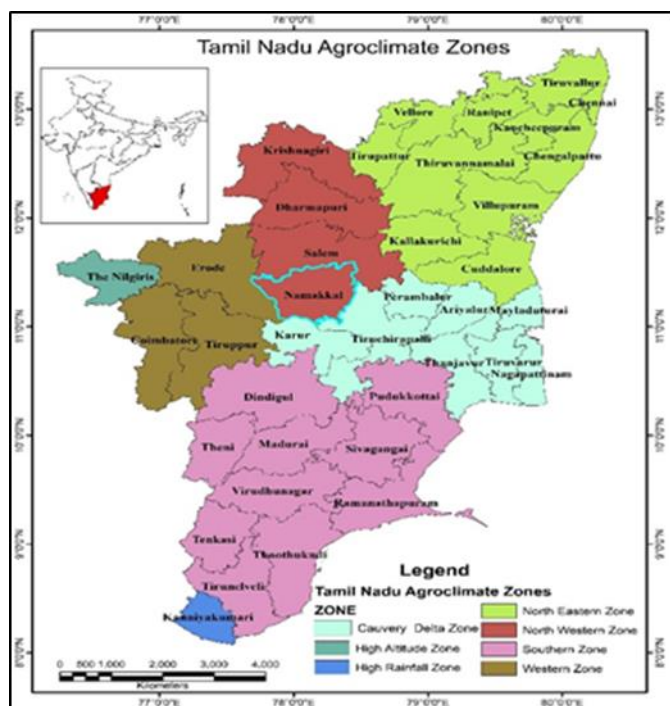
To date, the incidence of tetranychids is predominant and creates the necessity for observation of incidence and their relative status compared to the other major pests of economically important crops.

**Study area**

The survey was conducted in major agro-climatic regions of Tamil Nadu to record the incidence of mites belonging to the family Tetranychidae. The survey was focused on four selected agro-climatic zones.

**Data collection**

The structured questionnaire was prepared and information was collected as per the prepared questionnaire. Information on pest incidence, cropping pattern, spray pattern, and climatic factors were also recorded during the survey. The survey was generally conducted in a pattern such as block-wise from each district and samples of mites were also collected to examine the presence of morphological and genetic variation of Tetranychidae collected from the various climatic regions of Tamil Nadu.



**Fig 1:** Tamil Nadu Agro climate Zones

**Results and Discussion**

Tetranychids are members of the Tetranychidae family and have become important pests in economically important horticulture and agricultural crops. The tetranychids have become an important versatile non insect pest and have started to attack various important horticultural crops. Generally, mites have the potential to develop within 10 days and complete many generations within a crop period. This objectivity to study to assessing the pest status of

economically important agriculture and horticulture crops, as well as the status of mites in relation to other insect pests. A survey was conducted and the investigation on cropping pattern, pesticide usage pattern, and knowledge on the incidence of non-insect pests was documented from various villages in different agro-climatic zones. The incidence of tetranychids cause greater yield loss compared to the other insect pests, and the availability of management tools to control these mites was also not familiar in the farmers community from various agro climatic zones. The documentation from a survey conducted across various agro-climatic zones revealed that 90 percent of farmers were not aware of the availability of various synthetic acaricides and bio control agents as the farmers had no knowledge on the non-insect pests such as tetranychids and other non-insect pests belonging to the order ACARI. The report of this survey indicated that the incidence of Tetranychidae mites was noticed mostly on horticulture crops and their yield was threatened by the mites as they have achieved a major pest status. Among the various crops investigated, bhendi (*Abelmoschus esculentus*) was found to be destroyed by the incidence of tetranychids in the highest proportion. The crops found to be attacked by the incidence of mites were listed in the table (2) and the pesticide usage pattern by the farmers was listed in the table (3). The horticulture crops Viz., tomato, brinjal, gourds, cucumber, and agriculture crops Viz., rice, lab-lab, black gram, and green gram were among the crops observed. The mite population under protected conditions were also recorded during the survey, and observation revealed that the mite population under controlled conditions increased exponentially as they had a positive correlation with the increased temperature (Tehri & Gulati, 2014) [7]. The mite population was also collected during the survey from each location and cultured at the laboratory at the insectary, Department of Agricultural Entomology, Coimbatore for further study.

**Conclusion**

The survey was conducted to collect data on the incidence of mites and their relative per cent infestation among various economically important agriculture and horticulture crops. The data on pest status, pesticide usage pattern, and cropping pattern provide a valuable record on the incidence and contribution of mites to yield reduction of various crops from various agro-climatic zones. Further investigation into the morphology and molecular analysis of mites will be conducted to confirm and characterize the species dispersal of Tetranychidae collected from the different locations during the survey.

**Table 1:** Area covered during the period of survey in Tamil Nadu

S. No	Zones	Districts	Blocks	Villages
1	North Eastern Zone	Villupuram	Vikkravandi	Thoravi, Radhapuram, Panapakkam, Siruvallikuppam
		Cuddalore	Tittagudi	Tittagudi
2	North Western Zone	Krishnagiri	Kelamangalam	Royakottai, Pillariagraharam, Nellur, Kadudhanapalli,
			Hosur	Ayaranapalli, Uddanapalli
		Dharamapuri	Nallampalli	Adiyamankottai, Narthampatti
		Perambalur	Kunnam	Thungapuram
3	Western Zone	Coimbatore	Thondamathur	Booluvampatti, Madhampatti, Narasipuram, Pullagoundenpudur, Kuppanur, Selampanur, Kalampalayam
			Karamadai	Karamadai
			Annur	Pachampalayam

		Erode	Bhavanisagar	Bhavanisagar
4	Hilly Zone	The Nilgris	Kotagiri	Milidhane, Kairkombai, Kappatty

**Table 2:** Cropping pattern in different agro-climatic zones

S. No	Zones	Major crops grown in that zones	Susceptible crops for Tetranychids
1	North Eastern Zone (Villupuram, Cuddalore)	Rice, sugarcane, Pulses, Millets, Oilseeds, Vegetables, Flower crops	Brinjal, Bhendi, Lab Lab, Tomato, Gourds, Jasmine
2	North Western Zone (Perambalur, Dharmapuri, Krishnagiri)	Rice, sugarcane, Pulses, Millets, Oilseeds, Vegetables, Commercial crops, Flower crops	Brinjal, Bhendi, Lab Lab, Tomato, Cotton, Gerbera, Carnation, Rose
3	Western Zone (Coimbatore, Erode)	Rice, sugarcane, Pulses, Millets, Oilseeds, Vegetables, Commercial crops, Turmeric,	Brinjal, Bhendi, Lab Lab, Tomato, Cucumber
4	Hilly Zone (The Nilgris)	Vegetables, Flower and Fruit crops	Carnation, Strawberry, Beans, Gerbera

**Table 3:** Pesticide usage pattern in different agro-climatic zones

S. No	District	Insecticides
1	North Eastern Zone (Villupuram, Cuddalore)	Propargite – 2ml/lit
		Fenazaquin – 1.5ml/lit
		Spiromesifen – 1ml/lit
2	North Western Zone (Perambalur, Dharmapuri, Krishnagiri)	Fenazaquin – 1.5ml/lit
		Hexythiazox – 1ml/lit
		Abamectin – 2ml/lit
3	Western Zone (Coimbatore, Erode)	Propargite – 2ml/lit
		<i>Hirsutella thompsonii</i> – 3ml/lit
		Hexythiazox – 1ml/lit
		<i>Beaveria Bassiana</i> – 3ml/lit
4	Hilly Zone (The Nilgris)	Propargite – 2ml/lit
		Fenpyroximate – 1ml/lit
		Fenazaquin – 1.5ml/lit
		Hexythiazox – 1ml/lit

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