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## Occurrence of two spotted spider mite, *Tetranychus urticae* Koch (Arachnida: Acari: Tetranychidae) on ashwagandha in Gujarat

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#### Abstract

Incidence level of mite attack was observed in the field of ashwagandha, *Withania somnifera* Dunal at ICAR-DMAPR, Boriavi, Anand (Gujarat) during the month of February, 2019. As reviewed, ashwagandha is mentioned as an important drug in ancient Ayurvedic literature. Ashwagandha is infested by many insect pests. Among the sucking pests and defoliators recorded on this crop, some of the important pests recorded are aphids, mites, scales, mealy bugs and Hadda beetle. Our major finding was about mite infestations caused severe damage, as affected plants exhibited stunted growth, yellowing, defoliation and drying leading to economic yield loss. During the present investigation 77.75% significant damage level was recorded in Germplasm blocks of JA-134, DWS-95 B, DWS-135 and DWS-137 showed incidence level like 65, 100, 61.87 and 85% respectively. Keeping view of this incidence level NSKE and Neem oil likes botanicals have admissible for management of *Tetranychus urticae* on *W. somnifera*.

**Keywords:** Ashwagandha, germplasm, mites, pests, management, predatory mites

#### 1. Introduction

In India, the use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times. The indigenous system of medicine namely ayurvedic, sidha and Unani have been in existence for several centuries. This system of medicine caters to the needs of nearly 70% of our population residing in the villages. Apart from India, these systems of medicines are prevalent in Korea, China, Singapore, West Asia and many other countries. India has the leading position in the production and world trade in plant drugs and intermediaries obtained from the opium poppy, Isabgol, Senna, Rauwolfia, cinchona, periwinkle, Gloriosa, papaya (papain) and ipecac<sup>[8]</sup>. Ashwagandha, *Withania somnifera* (L.) Dunal (Solanaceae family) is an important medicinal plant known for its rejuvenating properties is also called as the "Indian Ashwagandha"<sup>[3]</sup> and comparable to Chinese ginseng (*Panax ginseng*). Roots, leaves and occasionally seeds are used in ayurvedic and unani medicines. Roots contain several alkaloids and withaniols prescribed as medication for hiccups, several female disorders, rheumatism, dropsy, lung inflammation, stomach, skin diseases and anti-cancer activity<sup>[14]</sup>. It is also an ingredient of tonics prescribed for curing disability and sexual weakness in males. It is a traditional Indian medicinal plant of high repute; prone to a number of diseases and pests both under wild and cultivated conditions<sup>[5, 2, 9, 11]</sup>. Extracts from different plant parts including root, shoot, leaves, seed and berry have been commonly used in various remedies.

In general, among the sucking pests and defoliators recorded on medicinal plants, some of the important pests recorded are aphids, mites, scales, mealy bugs and hadda beetle<sup>[4]</sup>. Like other crops, Ashwagandha is infested by many insect pests<sup>[7]</sup>. In all 26 phyto-phagous species of arthropods viz. sap suckers, defoliators, borer & miner were recorded on Ashwagandha. Infestation of hadda beetle, mite, mealybug and aphid were severe in Ashwagandha<sup>[1]</sup>. First time record of *Tetranychus urticae* on *W. somnifera* in Punjab region, India<sup>[12]</sup>, but necessary to know the incidence level of *T. urticae* on *W. somnifera* for effective management of this pest. In this regard, this study will help to know the incidence level of tetranychid mite on *W. somnifera*.

## 2. Materials and Methods

The present field experiment study was recorded the incidence level of two spotted spider mite, *T. urticae* (Arachnida: Acari: Tetranychidae) on Ashwagandha, *W. somnifera* was conducted in Anand region of Gujarat state, at ICAR-DMAPR, Boriavi (Latitude N 22° 35' 55.495", Longitude E 72° 55' 56.756") (Fig. 1). Observation were made on germplasm of *W. somnifera* viz., JA-134 (01 Block), DWS-135 (08 Block), DWS-137 (02 Block) and DWS-95B (01 block) during February, 2019. In each germplasm block 20 plants were randomly selected and within the each plant 3 leaves were selected from top, middle and the bottom portion of the plant and observations were recorded using hand lens by critically counting the number of mites. Incidence level was calculated by using this formula <sup>[14]</sup>.

$$DI = (n/N) * 100$$

Where, *DI*=Disease incidence

*n*= Number of diseased plants sampled

*N*= Total number of plants sampled



**Fig 1:** Field view of infected plants of Ashwagandha, *Withania somnifera* (L.) Dunal.

## 3. Results

In present observation, nearly 77.75% of mite incidence was recorded in the field. In the Germplasm blocks of JA-134, DWS-95 B, DWS-135 and DWS-137, the incidence of mite was recorded 65, 100, 61.87 and 85% respectively. Here, highest and lowest level of incidence like 100 and 61.87% was recorded in DWS-95 B and DWS-135, respectively. Due to severe attack, leaves are gradually turn Gray–white, light brown (Fig. 2), sudden leaf fall (Fig. 3) and plants showed stunted growth and finally complete defoliation was observed during the study period. Mites are generally feeds on the lower side of the leaves and forms spider web–like structures were observed (Fig. 4).



**Fig 2:** Infected plant parts



**Fig 3:** Complete defoliation of plant



**Fig 4:** Mite presence on leaf

## 4. Discussion

Mite, *T. urticae* is usually found on a wide range of hosts like groundnut, vegetables and fruit trees <sup>[6]</sup> but their attack is more common on eggplant and okra <sup>[15]</sup>. The spider mite eggs are usually attached to fine silk webbing and hatch in three days approximately. The life cycle is composed of the egg, the larva, two Nymphal stages (Protonymph and Deutonymph) and the adult. The length of time from egg to adult varies greatly depending on temperature. Under optimum conditions (approximately 80°F), spider mites complete their development in five to twenty days. There are

many overlapping generations per year. The adult female lives two to four weeks and is capable of laying several hundred eggs during her life <sup>[16]</sup>. They generally feed on the plants growing in strong sunlight and are most virulent during hot and dry periods of the year. The pest leaves behind white and silvery spots on leaves after feeding on them. They penetrate the leaf tissues with the help of Cheliceral-Stylets and then suck in the liberated plant fluid. The mites spread in the whole field and it may lead to 90-100% defoliation of the leaves. The mites develop very rapidly on its host plants causing distress and quick leaf fall and ultimately leading to

death of the plants. The pest is transmitted to adjacent uninfested plants by spider web/net-like structure created by the mites, connecting the leaves of adjacent plants<sup>[12]</sup>. Mite infestation, nature of damage was observed similarly as reported in Punjab region, but we recorded the incidence level of tetranychid mite on different germplasm lines of *W. somnifera*.

In order to manage this pest, adoption of non-chemical approach is suggested as much as possible to avoid spread in other medicinal plants due to its wide host range, so it is very much important because of their medicinal values of plant. Botanicals and predatory mites like *Phytoseiulus persimilis*, *Galendromus occidentalis*, *Amblyseius fallacis*, *Neoseiulus californicus* and *Mesoseiulus longipes* are predominant predatory mites for management of this pest<sup>[10]</sup>, another study was revealed that the efficacy of botanicals such as Neem oil+ pongam oil, NSKE etc. treatments excluding insecticides in ascending order was *Datura* leaf extract, *Calotropis* leaf extract, cow urine, *karanj* seed extract, Neem oil and NSKE<sup>[13]</sup> and finally concluded that NSKE and Neem oil can be included in IPM package against mites in ashwagandha to minimize chemical usage<sup>[12]</sup>.

## 5. Conclusion

The present study on *T. urticae* infestation on *W. somnifera* has concluded that the incidence level of pest status was shown to be ranging from 65 to 100% on some of the germplasm, meanwhile the crop yield was drastically reduced by the action of the pest. Before going to any of the management aspects, assessment of pest infestation status is of utmost importance and this will be helpful for the quick adoption of management strategies. As *W. somnifera*, being rich in medicinal value, management of this pest using various cost effective and non-chemical approaches is required for better production of good quality of yield.

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