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First record of the zig-zag leaf hopper, *Maiestas dorsalis* (Motschulsky) (Hemiptera: Cicadellidae) infesting Ashwagandha, *Withania somnifera* (L.) Dunal

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Abstract

The zig-zag leaf hoppers were observed on the aerial parts of Ashwagandha during two distinct periods: mid-October to mid-December 2021 and mid-January to mid-March 2022. Both the nymphs and adult hoppers were found feeding on the upper side of the leaves throughout the vegetative and maturity stages of the Ashwagandha plants. The identification of the pest as *Maiestas dorsalis* (Motschulsky) (Hemiptera: Cicadellidae) was conducted by the Zoological Survey of India, Jabalpur.

This report highlights a new pest infestation on Ashwagandha in the Jabalpur region, and it is significant for agricultural researchers and practitioners to be aware of this pest and its potential impact on *Withania somnifera* cultivation. It is important to monitor the situation closely and develop appropriate strategies for pest control and management to minimize the damage caused by the zig-zag leaf hoppers. It appears to be the first reported case of this particular pest infesting *Withania somnifera* (Ashwagandha) in Jabalpur, Madhya Pradesh, and possibly worldwide, as per the knowledge up to April, 2022.

Keywords: Ashwagandha, medicinal, pest, *Maiestas dorsalis*

Introduction

Withania somnifera (Linn.) Dunal (Family: Solanaceae), commonly known as Ashwagandha, Indian ginseng or Indian Winter Cherry, is a high value medicinal plant and have been employed in Indian traditional systems of medicine to cure various body ailments (Farooqi and Khan, 1991)^[4]. Being hardy and drought tolerant and having enormous biocompounds, it holds monopoly in many parts of India, especially in Madhya Pradesh, where it is cultivated in more than 5000 ha area (Patra *et al.*, 2004)^[5]. The plant is native to Mediterranean region and is found growing naturally in forests, particularly in drier regions of India. This is considered as an important medicinal cash crop in Mandsaur district of Madhya Pradesh and the adjoining areas in Rajasthan villages and Garhwal hills. The estimated production of *Withania somnifera* roots in India is more than 1500 tonnes, whereas, the annual requirement is about 7000 tonnes (Suman and Swaminathan, 2007)^[8].

It contains several types of alkaloids like 'Withanine' (antibacterial and anti-tumour properties) and 'Somniferine'. The paste made from its leaves is used to treat tubercular gland irritation, and of roots is used to treat skin conditions, bronchitis, and ulcers. As an insecticide, leaves are useful in killing lice which are infesting the body. Fruits and seeds are diuretic in nature (Bhattacharjee, 1998)^[2]. Some work has been carried out by the workers against phototactic insect pests of medicinal plants through light trap (Sharma *et al.*, 2022; Bhargava *et al.*, 2019; Sharma *et al.*, 2015)^[6, 1, 7], but very little information is available on insect pests of medicinal plants in field conditions. Ashwagandha suffers attack by many insect pests, therefore, the present study is aimed at identifying various pests infesting *W. somnifera* and to study their population dynamics under natural field conditions. To the best of our knowledge, the present investigation is the first report of the zig-zag leaf hopper, *Maiestas dorsalis* (Motschulsky) (Hemiptera: Cicadellidae), infesting Ashwagandha, *Withania somnifera* (L.) Dunal in Jabalpur, Madhya Pradesh, India and most probably worldwide.

Materials and Methods

The experiment was carried out on the field of All India Coordinated Research Project (Medicinal, Aromatic Plants and Betelvine) of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (Madhya Pradesh) during *Rabi*, October 2021 to April 2022. Jabalpur is located in the central part of Madhya Pradesh and is situated between 22°49' and 24°8' North latitude and 78°21' and 80°58' East longitude and at an altitude of 411.78 metres above the mean sea level with a total area of 5198 km². To record the observations on succession of the insect on *W. somnifera*, ten plants were randomly selected from untreated crop and the observations were recorded twice during a standard meteorological week (SMW). The population of the pest was recorded by counting the number of nymphs and adult /six leaves / plant *i.e.* 2 leaves each from top, middle and bottom of plant canopy (Chouhan, 2021) [3]. The observations were recorded from the first appearance of the insect and continued till their availability. The identification of insect was done from the Zoological Survey of India, Jabalpur (M.P.).

Results and Discussion

In the present study, the zig-zag leaf hopper *Maiestas dorsalis* (Hemiptera: Cicadellidae) (nymph and adult) was first observed when the crop age was about 46 days old and reappeared when the crop age was 137 days. The insects measured 3.5-4.5 mm long, with convex face, having brown colored triangular pattern on the forewings and was found feeding on the upper surface of the leaves.



Fig. 1: *M. dorsalis* infesting *W. somnifera* leaves

The zig-zag leaf hopper appeared twice on the crop *i.e.* during the vegetative stage (18th October to 21st December, 2021) and maturity stage (17th January to 11th March, 2022). First incidence of the pest was recorded on 18th October, 2021 during the 42nd SMW (*i.e.* 15th to 21st October, 2021) (5.9 leaf hoppers per six leaves per plant). Thereafter, the population gradually increased and first peak (13.3 leaf hoppers per six leaves per plant) during the 46th SMW (*i.e.* 12th to 18th November, 2021). After 46th SMW, there was a gradual decline in the pest population and was available upto 51st SMW (*i.e.* 17th to 23rd December, 2021) and then it disappeared. It again reappeared during the 3rd SMW (*i.e.* 15th to 21st January, 2022) (3.9 leaf hoppers per six leaves per plant) and subsequently the population gradually increased and was present till harvest of the crop. Table 1 indicates the incidence of Zig-zag leaf hopper, *M. dorsalis* on Ashwagandha, *W. somnifera* during *Rabi*, 2021-22.

Table 1: Incidence of Zig-zag leaf hopper, *M. dorsalis* on Ashwagandha, *W. somnifera* during *Rabi*, 2021-22

SMW	Mean population per six leaves (N + A)
42	5.9
43	7.25
44	9.55
45	11.4
46	13.3*
47	12.3
48	10.5
49	8.4
50	5.8
51	1.4
52	0
01	0
02	0
03	3.9
04	4.8
05	7.5
06	6.8
07	8.5
08	9.25
09	9.95
10	11.3

SMW = Standard Meteorological Week, *Peak population, N = Nymph, A = Adult

Conclusion

The zig-zag leaf hopper, *M. dorsalis* was active from mid-October (42nd SMW) to mid-December 2021 (51st SMW), and reappeared from mid-January (3rd SMW) to mid-March 2022 (10th SMW) on Ashwagandha. As per the literature available, zig-zag leaf hopper has not been reported on Ashwagandha earlier. Therefore, on the basis of available information, this is the first report of *Withania somnifera* (L.) Dunal as a new host for Zig-zag leaf hopper, *Maiestas dorsalis* (Motschulsky) in Jabalpur, Madhya Pradesh, India and most probably worldwide.

Hence, conducting well-planned and long-term research on the insects affecting Ashwagandha is essential to understand their incidence, extent of damage, seasonal abundance, potential bioagents and the impact of infestation on biocompounds. Analyzing the economic threshold level and damage intensity is also crucial for developing economically viable and environmentally safe management strategies for Ashwagandha. By conducting comprehensive research on these aspects, scientists can develop effective and sustainable pest management strategies specific to Ashwagandha cultivation.

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