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OVERVIEW OF INVASIVE SPECIES, *Thrips parvispinus* (KARNY) AND ITS MANAGEMENT STRATEGIES

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Introduction

Thrips parvispinus (Karny) (Thysanoptera: Thripidae), commonly known as the Western Flower Thrips, is a small, cosmopolitan insect that has emerged as a significant pest in various parts of the world, including India. This species is notorious for its ability to infest a wide range of crops and ornamental plants, causing substantial economic losses upto 30 to 40% in chilies. In India, Thrips parvispinus has been reported to infest several plant species including *Carica papaya* (Papaya), *Brugmansia sp.* (Angel's trumpet) and *Dahlia rosea* (Dahlia). Understanding its morphology, distribution, and effective management strategies is crucial for mitigating its impact.

1. Morphological Characteristics

1.1. General Appearance

Thrips parvispinus is a small insect, typically measuring about 0.8-1.2 mm in length. It is characterized by its slender, elongated body and fringed wings. The colouration can vary, but adults are usually yellow to light brown, with darker wings.

1.2. Head and Antennae

The head of T. parvispinus is relatively small with prominent compound eyes. The antennae are 7-segmented, with segments III and IV bearing forked sensoria (sense organs). The head has a pair of ocelli (simple eyes) that are typically red and prominent.

1.3. Thorax

The thorax is segmented into the prothorax, mesothorax and metathorax with well-developed legs and wings. The forewings are slender with longitudinal veins that are fringed with long hairs, which aid in their distinctive, erratic flight. The wings are narrow and fringed, which is a key identifying feature of thrips.

1.4. Abdomen

The abdomen of T. parvispinus is segmented and tapers toward the posterior end. The females possess a saw-like ovipositor that is used to insert eggs into plant tissues. The abdomen is typically yellow to light brown, with darker transverse bands in some individuals.

1.5. Larval Stages

The larvae of T. parvispinus are similar in shape to adults but are wingless and smaller, with a more rounded body. The first and second instar larvae are pale yellow and their small size makes them difficult to detect without magnification.

2. Identification

- Slender, elongated body shape.
- Yellow to light brown colouration in adults.

- Fringed wings with long hairs along the edges.
- 7-segmented antennae with forked sensoria on segments III and IV.
- Saw-like ovipositor in females.

3. Distribution

3.1. Global Distribution

Thrips parvispinus has a cosmopolitan distribution, being reported in regions such as Southeast Asia (Thailand, Indonesia), Australia, Europe (France, Greece, Spain, Netherlands), Africa (Tanzania, Mauritius) and islands like Hawaii and Reunion. This widespread distribution highlights its adaptability to different climatic conditions.

3.2. Distribution in India

In India, T. parvispinus was first recorded in Bengaluru, Karnataka, in 2015. Since then, it has spread to various states across the country, including Maharashtra, Tamil Nadu, Andhra Pradesh, and Gujarat. The spread of this pest is attributed to the movement of infested plant material and favourable climatic conditions.

3.3. Factors Influencing Distribution

Climate: Thrips thrive in warm, dry conditions which are prevalent in many parts of India. Host Availability: The presence of suitable host plants such as vegetables, fruit crops, and ornamentals facilitates its spread. Human Activity: Trade and transport of infested plants contribute significantly to its distribution.

4. Host Range and Economic Impact

4.1. Host Plants

Vegetable crops: Beans, eggplant, chilli, pepper and potato. Fruit crops: Papaya and strawberry. Ornamental plants: Anthurium, Chrysanthemum, Dahlia, Dipladenia, Gardenia and Ficus.

4.2. Economic Impact

The economic impact of T. parvispinus is significant due to its ability to cause direct damage to crops by feeding on leaves, flowers and fruits, leading to reduced yield and quality. Additionally, it acts as a vector for several plant viruses, compounding its impact on agriculture.

5. Life Cycle and Behavior

5.1. Life Cycle

The life cycle of Thrips parvispinus includes the following stages: Egg: Laid singly in plant tissues, where they are protected from environmental stresses. Larvae: Two larval stages occur, where they actively feed on plant tissues. Pupal stages: The prepupal and pupal stages are usually completed in the soil or in protected plant parts, where they do not feed. Adult: After emerging from the pupal stage, adults are ready to reproduce, completing the cycle. Under optimal conditions, the life cycle can be completed in as little as 12-15 days.

5.2. Feeding Behavior

Thrips parvispinus feeds by piercing plant cells and sucking out the contents, causing silvering, stippling or discolouration of the plant tissues. This feeding damage can lead to leaf distortion, stunted growth and reduced marketability of crops.

5.3. Reproduction

The reproduction of T. parvispinus is primarily parthenogenetic, with females capable of producing offspring without mating. This mode of reproduction allows for rapid population increases, especially under favourable conditions.

6. Management Strategies

6.1. Cultural Control

Sanitation is an essential practice in managing T. parvispinus populations, involving the removal and destruction of infested plant material and weeds including Parthenium hysterophorus, Calotropis gigantea, Tecoma stans, Prosopis sp., Lantana camara, Cleome viscosa and Abutilon indicum to reduce the number of pests in the field. Alongside sanitation, crop rotation is also an effective strategy; rotating crops with non-host plants like maize, sorghum and cowpea at the ratio of 10:3:1 can break the pest's life cycle, thereby reducing their ability to establish and thrive in a particular area. Additionally, the use of reflective mulches of 25-30 microns can help repel thrips and decrease infestation rates. These mulches reflect sunlight, creating an environment that is less favorable for thrips, thus serving as a physical barrier to deter them from infesting crops.

6.2. Biological Control

Encourage natural predators such as predatory mites (Amblyseius swirskii) and bugs (Orius insidiosus) that feed on thrips. Usage of Beauveria bassiana at a rate of 4.0 grams or millilitres per litre of water, Pseudomonas fluorescens (NBAIR-PFDWD) at 20 grams per litre, or Bacillus albus (NBAIR-BATP) at 20 grams per litre can significantly reduce thrips populations.

6.3. Chemical Control

To effectively manage thrips, the use of CIB & RC - approved chemicals such as Spinosad 45% SC (160g/500 litres of water), Spirotetramat 15.31% w/w OD (400g/500 litres of water), Imidacloprid 17.80% SL (250ml/500 litres of water), Thiamethoxam 30% FS, and Tolfenpyrad 15% EC (1 litre/500 litres of water) is recommended. Applying any one of these chemicals can help control thrips populations effectively. However, to prevent the development of resistance in thrips, it is crucial to rotate among these pesticides for multiple sprayings. Rotating chemicals with different modes of action ensures that thrips do not become resistant to a single type of pesticide, thereby maintaining the effectiveness of the management strategy over time.

6.4. Physical and Mechanical Control

Deploy blue or yellow sticky traps to monitor and reduce thrips populations. Netting: Use fine mesh nets to protect crops from thrips infestation.

6.5. Monitoring and Surveillance

Regular monitoring of thrips populations is crucial for early detection and effective management. This can be achieved through: Visual Inspections: Regularly inspect plants for signs of thrips damage. Sticky Traps: Use sticky traps to monitor adult thrips populations. Sampling: Conduct random sampling of leaves and flowers to estimate larval populations.

7. Future Directions and Research Needs

7.1. Developing Resistant Varieties

Research into breeding crop varieties resistant to T. parvispinus is a promising avenue for reducing pest impact.

7.2. Enhanced Biological Control

Exploring new biological control agents and enhancing the efficacy of existing ones could provide sustainable management options.

7.3. Improving Monitoring Techniques

Advancements in monitoring technologies, such as remote sensing and molecular diagnostics, could enhance early detection and management of T. parvispinus populations.

Conclusion

Thrips parvispinus poses a significant threat to agriculture and horticulture in India due to its wide host range and ability to cause extensive damage. Effective management of this pest requires a comprehensive understanding of its biology, distribution, and behaviour. Integrated pest management strategies, combining cultural, biological, chemical, and physical controls, offer the most sustainable approach to managing T. parvispinus populations and minimizing their impact on agriculture.

References

1. Rachana, R. R., Roselin, P., & Varatharajan, R. (2018). Report of invasive thrips species, Thrips parvispinus (Karny)(Thripidae: Thysanoptera) on Dahlia rosea (Asteraceae) in Karnataka. Pest Management in Horticultural Ecosystems, 24(2), 175-176.
2. Rachana, R. R., Roselin, P., Amutha, M., Sireesha, K., & Reddy, G. N. (2022). Invasive pest, Thrips parvispinus (Karny)(Thysanoptera: Thripidae) a looming threat to Indian agriculture. Current Science, 122(2), 211-213.
3. Tyagi, K., Kumar, V., Singha, D., & Chakraborty, R. (2015). Morphological and DNA barcoding evidence for invasive pest thrips, Thrips parvispinus (Thripidae: Thysanoptera), newly recorded from India. Journal of Insect Science, 15(1), 105.