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Role of Thrips in pollination of angiospermic plants

Hemanta Saha
Department of Botany, Suri Vidyasagar College, Suri, Birbhum, West Bengal, India

Abstract
Thrips are drawn to flowers that are white or cream in color, have a nice scent, and have a unique shape. These insects are usually found in medium-sized blooms with light-white to soft yellow petals that may or may not generate nectar. The floral structure is compact and spherical, with a pollen chamber, and the pollen grains are tiny and dry. Thrips gather live pollen grains on their bodies and carry them to the stigma as they pass from the anther. These small pollinators carry a lot of pollen and forage for pollen and nectar day and night. As a result, Thrips support the processes of cross-pollination and self-pollination.

Keywords: Pollination, pollen chamber, stigma, self-pollination and cross-pollination

Introduction

Ecological function of Thrips in flower pollination, known as "Thripophily," is frequently disregarded. Thrips play a vital role in pollination, despite their diminutive size and restricted flight capabilities, which include a lack of specialized structures for pollen delivery (Thien *et al*., 2000) [21]. There is a close relationship between flower design, blooming patterns, and the evolutionary dynamics of pollinator partnerships. The early researchers, including, Robertson (1895), Kevan (1972) [10], and Sprengel (1972) [20], are largely responsible for the basic studies of these plant-pollinator interactions.

Thrips are little insects ranging in length from 0.5 to 15 mm. Their bodies are long and slender, with mouthparts optimized for scraping and sucking. Some Thrips species lack of wings altogether, although their two pairs of thin, membrane-covered wings can be fringed with fine hairs. According to Kirk (1997), flowers pollinated by Thrips usually have the following traits: they are frequently medium-sized, have a sweet scent, and may or may not contain nectar. These flowers typically have little, dry pollen grains and light-colored petals that range from white to yellow. Their pollen-chambered flower structures are often compact, globose, or urn-shaped.

Although Thrips' crucial function in pollen transmission dynamics is often overlooked, Shaw's 1914 [19] research on Sugarbeet by Annand's 1926 [1] study on Sugarbeet and other species like Alfalfa, Plum, and Daisy highlighted their potential contributions. Work by Hagerup (1950) [11] on Calluna and Erica plants (Hagerup and Hagerup, 1953) [12], Billes (1941) [5] on cocoa, Frankliniella odland and Porter (1941) [18] on Capsicum annuum, and Carlson (1964) [6] on onions further supported their active pollination role. In several investigations conducted in the early 1980s, Anantha Krishnan *et al*.1091 also reported their participation in a variety of Asteraceae family.

Material and Methods

Regular weekly counts of Thrips were conducted on 20 different flowers of angiosperm, with records kept on their population changes and the amount of pollen they carried by tallying the pollen grains on various body parts.

A comparison of how well different pollinators, including Thrips, performed in pollination was made by evaluating how many seeds were set based on three experiments: (i) manual pollination, (ii) pollination by Thrips alone, and (iii) natural conditions where other insects also played a role.

Research was done on how Thrips attach pollen grains to their bodies, by dissolving the Thrips with ether and then drying them in a critical point dryer. (Mathur and Mahan Ram 1978; Faegri and Van der Pijl 1966) [8, 16].

Results and Discussion

Thrips pollinate flowers that are often white or cream in color and have a characteristic form, frequently with a concave surface. At their base, these blooms may have small holes or cracks that serve as both hiding areas and egg-laying locations for insects. Even the tiniest thrips have a special resilience within because, although their primary food sources are nectar and pollen, they can also harm other areas of the flower. The sheer number of Thrips greatly aids in pollination attempts, even though they may not always transmit pollen consciously. The structure of the flowers is specifically made to draw in and house Thrips.

However, Thrips' crucial contributions may be undervalued because they are commonly perceived as ineffective pollinators for different flower varieties. They mostly aid in self-pollination, while they can occasionally help with cross-pollination because they prefer to stay on one plant rather than travelling between them.

It was clear from watching the pollination process that a sizable number of fruits formed, demonstrating successful self-pollination. As they search for nectar and pollen day and night, thrips move pollen grains that adhere to their bodies from the anther to the stigma (Fig. 1&2). Thrips play a crucial function in encouraging both self-pollination and cross-pollination since each one carries a significant amount of pollen.

Fig 1: Thrips on Flowers

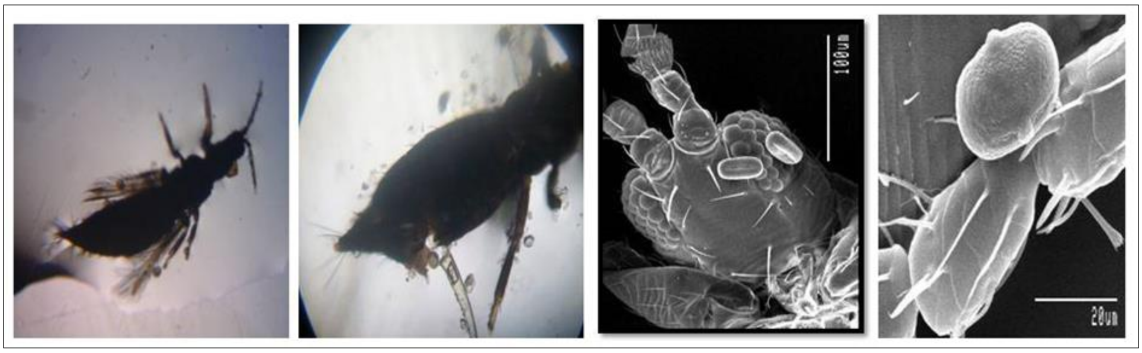

Fig 2: Pollen Grains are attached in body part of thrips

Co-evolution is demonstrated by the complex link between these insects and flowers; the design of the flower complements the behavior of the insect to promote pollen transfer. The availability of food, the timing of the stigma's pollen release, and favorable conditions inside the flower all work together to provide the perfect environment for Thrips larvae, ensuring that they come into contact with pollen as they move from the base of the flower to the anther or stigma.

Thrips are able to carry this essential material in large quantities due to the unique qualities of pollen and its adhesive qualities. As Thrips walk around, pollen grains adhere to their wings, legs, and other body parts before spreading onto the stigma.

They groom their bodies with their hind legs, brush their abdomens against the stigmatic surface, and use their wings in a special combing motion (Ananthakrishnan 1982 and1984) [3, 4].

The arrangement of stigma and stamens suggests that Thrips, particularly the larvae, which have a propensity to travel within a single flower, are probably the main method for pollen transport from the anther to the stigma. With the help of wind currents, mature Thrips fly briefly between flowers, facilitating a tiny degree of cross-pollination. Thrips are typically thought of being single-species pollinators, primarily moving pollen from one plant species to another (Ananthakrishnan *et al* 1981, Velayudhan and Annadurai 1986) [2, 22].

Thrips are drawn to flowers that are often white or cream in color, have a pleasing scent, and have unique forms. These flowers frequently have a concave shape with tiny holes or slender clefts at the base, which gives eggs and larvae a place to hide and lay their eggs. Even the tiniest blooms are robust because thrips can harm plant tissues even though they consume pollen and nectar. Thrips' sheer numbers greatly aid plant pollination attempts, even though they may inadvertently aid in pollen transmission. However, their awareness for the vital tasks they play is diminished because they are frequently perceived as ineffective pollinators for a variety of flower kinds. Although their primary activity is self-pollination, they also facilitate cross-pollination.

Thrips use their legs, wings, and the tiny hairs on their abdomens to gather pollen as they move through flowers (Fig. 1 & 2). They may carry a significant amount of pollen thanks to their delicate hair texture.

According to research, the extensive use of synthetic pesticides (Claire *et al*., 2002) [7] and environmental deterioration (Mustajarvi *et al*., 2001) [17] are causing a decline in the number and diversity of pollinators. Pollinator populations may be indirectly reduced by farming practices such as shifting cultivation and the removal of specific plant hosts (Kunte, 2000) [14]. Thrips seem to be mostly unaffected by these difficulties because of a number of adaptations.

These include the ability to lay eggs inside plant tissues, live in secretive microenvironments, have a quick life cycle, reproduce at high rates because they eat pollen, and have defense mechanisms against natural predators. However, lowering the likelihood of species extinction requires protecting plant environments.

A mutualistic pollination system is best illustrated by the interaction between Thrips and flowers. Thrips help pollinate the flowers, and the incentives they receive from the blossoms improve their chances of surviving. Thrips generally consume chemicals released by the stigma, pollen, and nectar in flowers. They interact with flowers in day and night, moving through the style to the stigma, which aids in pollination.

Thrips can carry large amounts of pollen and aid in pollination because of the flowers' structure, which is engineered to provide a favorable environment for them.

They work around the clock, moving quickly within and outside the flowers to transfer pollen from anthers to stigmas. Thrips' presence and the successful pollination demonstrate how important they are to the pollination process.

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