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FIRST REPORT OF TURNIP APHID, *LIPAPHIS PSEUDOBRASSICAE* (DAVIS) (APHIDIDAE: HEMIPTERA) INFESTING KNOL-KHOL (*BRASSICA OLERACEA* VAR. *GONGYLODES*) IN GUJARAT, INDIA

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ABSTRACT

Aphids are among the most destructive pests of cruciferous crops, and recent observations have highlighted a heavy incidence of *Lipaphis pseudobrassicae (Davis)* on knol-khol (*Brassica oleracea* var. *gongylodes*) at the Horticulture Farm, College of Horticulture, Anand Agricultural University (AAU), Anand. This aphid species, comprising both nymphs and adults, infests the crop by lacerating leaf tissues and sucking sap, leading to visible symptoms such as leaf curling, yellowing, stunted growth and a general decline in plant vigour. The damage caused significantly reduces the marketable yield and aesthetic quality of knol-khol, making it a matter of economic concern. In addition to its impact on knol-khol, *L. pseudobrassicae* is known for its polyphagous nature and wide host range, which includes various other economically important crops. This amplifies the pest's threat level and raises concerns over its potential to spread across different agro-ecosystems. The possibility of overlapping host crops grown in the vicinity increases the chances of cross-infestation and makes the management of this pest more challenging. Therefore, to mitigate the risk posed by *L. pseudobrassicae*, it is imperative to carry out systematic monitoring and research focused on its geographic distribution, host preference, seasonal incidence and damage potential. Understanding these aspects will facilitate the development of integrated pest management (IPM) strategies, including cultural, biological and chemical control methods. This will not only help safeguard knol-khol crops but also prevent potential outbreaks in other susceptible crops, thereby ensuring sustainable agricultural productivity.

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Keywords: Knol-khol, Turnip aphid, *Lipaphis pseudobrassicae* (Davis)

1. INTRODUCTION

Knol-khol (*Brassica oleracea* var. *gongylodes*), a member of the Brassicaceae family, originated in the Mediterranean coastal regions (Choudhari et al., 2017). It has a chromosome number of 2n=18 and is cultivated in tropical and temperate regions worldwide. Though less popular than cabbage and cauliflower in India, it is widely grown in Northern India, Rajasthan, Maharashtra and especially in Kashmir. This cool-season vegetable is known for its swollen, edible stem, which develops above ground and stores starch and sugars. It has a mildly sweet taste and crisp texture, with variations in pale green and cranberry hues. Commonly called Ganth Ghobi or Kohlrabi, it is grown year-round.

Knol-khol is rich in antioxidants, which play a vital role in neutralizing harmful free radicals in the body, thereby reducing the risk of cancer, particularly colon cancer. Its high dietary fiber content supports proper digestive health, promoting overall well-being. Additionally, knol-khol contains bioactive compounds such as sulforaphanes and isothiocyanates, which stimulate the production of protective enzymes and strengthen the immune system (Kurilich et al., 2002). Sulforaphane, a specific type of isothiocyanate and a phytochemical found in plant-based foods, functions by inhibiting enzymes that activate cancer-promoting substances. Furthermore, it enhances the production of detoxifying enzymes, which help neutralize carcinogens and minimize their potential to damage cells.

Vegetables are more prone to insect pests and diseases mainly due to their tenderness and succulent nature as compared to other crops and virtual absence of resistance characters because of intensive hybrid cultivation. The insect pests inflict crop losses up to 40 per cent in vegetable production (Bhati et al., 2015). The production losses have shown an increasing trend over the years. Several biotic and abiotic factors are posing a threat to the production of knol-khol including many insect pests, diseases and abiotic factors. Knol-khol is susceptible to various pests, including aphids, cabbage butterfly, semilooper and mustard sawfly. Among these, aphids are the most destructive among the sucking pests.

Lipaphis pseudobrassicae (Davis), commonly known as the turnip aphid, is a phloem-feeding insect pest that poses a serious threat to *Brassica* crops, particularly Indian mustard (*Brassica juncea* L.) during the winter season. The aphid causes the most damage during the flowering and pod formation stages, significantly contributing to reduced productivity of *B. juncea* in India (Ahuja et al., 2009). This species predominantly infests the inflorescences, buds, young leaves and stems of host plants. Both nymphs and adults, in winged and wingless forms, feed by sucking sap from the plant tissues. This feeding activity leads to a range of physiological disturbances, including wilting, flower drop and deformation of plant parts such as crinkled leaves

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and twisted shoots, ultimately impairing plant growth and development. In addition to direct physical damage, *L. pseudobrassicae* secretes large quantities of honeydew, which promotes the growth of sooty mould. This fungal growth forms a black coating on leaf surfaces, interfering with the photosynthetic efficiency of the plant (Singh, 2024). Moreover, the aphid feeds primarily on the undersides of leaves, young shoots and inflorescences, causing leaf yellowing and distortion. Beyond its feeding damage, *L. pseudobrassicae* is also a known vector of at least 16 plant viruses, further complicating its management and increasing its threat to crop health (Tran et al., 2016). Originally native to the Palearctic region, *L. pseudobrassicae* has now become a cosmopolitan pest. Its global distribution was marked by its first report in the kale-growing regions of Brazil in 2006 (Resende et al., 2006), emphasizing its potential to adapt and spread under favorable environmental conditions.

The study was carried out during the 2024-25 period at the College of Horticulture, AAU, Anand, Gujarat, India. Aphid infestation was found on the leaves and inflorescences of knol-khol. Various developmental stages of aphids were collected from the infested leaves and inflorescences throughout the field experiment. The specimens were examined for their morphological features under a microscope. Some of the specimens were placed in glass vials containing 70 per cent ethanol for preservation. The samples were then sent to the National Bureau of Agricultural Insect Resources in Bengaluru for species identification and confirmation.

The species was confirmed as *L. pseudobrassicae* by Dr. Sunil Joshi. During the observation, the infestation was noticed on knol-khol in the first week of january, 2025 and remained up to 4th week of February 2024. Knol-khol aphids mainly cause damage to the knob and leaves. The highest incidence was observed during 4th week of January 2025.

2. RESULTS AND DISCUSSION

Turnip aphid, *L. pseudobrassicae* was very first time observed infesting knol-khol (*Brassica oleracea* var. *gongylodes*) at College of Horticulture AAU, Anand, Gujarat.

2.1 Taxonomic tree:

Kingdom	Animalia
Phylum	Arthropod
Class	Insecta
Order	Hemiptera

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Family	Aphididae
Genus	*Lipaphis*
Species	pseudobrassicae

2.2 Morphological characters *of L. pseudobrassicae*

L. pseudobrassicae is small to medium-sized aphids with a yellowish-green, gray-green or olive-green coloration, often covered with a fine white wax bloom. In humid conditions, they may develop a denser wax coating. These aphids feature two longitudinal rows of dark bands on the thorax and abdomen, which merge into a single band near the tip of the abdomen. The combined length of antennal segment III and the terminal process is typically more than 2.4 times the length of the siphunculus. *L. pseudobrassicae* primarily feeds on plants from the mustard family (*Brassicaceae*), with a particular preference for *Brassica* crops. It inhabits the undersides of leaves, as well as inflorescences, young shoots and growing points. While sexual morphs have been observed in some regions, the species remains predominantly anholocyclic in warm climates (Mathur, 2022).

2.3 Nature of damage of *L. Pseudobrassicae*

Aphid attacks typically occur from the last week of December through February, with both nymphs and adults feeding on plant sap, leading to a reduction in plant vigour. pseudobrassicae is a cosmopolitan pest of Brassica, directly damaging crops by feeding on the leaves causing deformation (Maia et al., 2020). Their excreted honeydew promotes the growth of sooty mold, which diminishes photosynthesis. Additionally, the honeydew attracts other pests like ants and serves as a medium for fungal growth. Aphid feeding causes distorted growth, yellowing of leaves and in severe cases, plant death. They are also vectors for several plant viruses (Souza et al., 2023). Turnip aphid is known to transmit about 13 viruses, including major pathogens of the Brassicaceae family, such as Beet mosaic virus, Cabbage black ring spot virus, Cauliflower mosaic virus and Radish mosaic virus (Kennedy et al., 1962). Aphid can cause significant damage to knol-khol by feeding on tender tissues, leading to distorted heads that reduce both quality and yield. In India, mustard aphids are responsible for yield losses ranging from 9 to 95 per cent in Brassica crops (Singh and Singh, 2014). These aphid feed by sucking sap from their host plant, leading to stunted growth and they excrete honeydew, which leads to fungal growth (sooty mold) and causing over 50 per cent yield loss (Fening et al., 2020). Turnip aphid, *L. pseudobrassicae*, is a significant pest of cruciferous crops. As a result, it is important to note that previous research did not report the presence of *L. pseudobrassicae* infesting knol-khol in Gujarat, a finding observed in this study.

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Fig. 1: Aphid infested leaf of knol-khol

Fig. 2: Different forms of *L. pseudobrassicae*

2.4 Host range:

The host range of this species is extensive and includes a wide variety of cultivated and wild plants. Major crop hosts comprise cabbage, cauliflower, collards, mustard, radish, tomato and zucchini (Sampson et al., 2005); kale, rape, rutabaga or Swedish turnip, lettuce and bean (Britton, 1917) and broccoli (Jovičić, 2024). Additionally, it has also been reported on wild hosts such as *Rorippa*

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indica (Agarwala et al., 2009) and *Tithonia rotundifolia* (Evans et al., 2007), indicating its broad adaptability and potential threat to diverse agroecosystems.

2.5 Distribution:

The species has been reported from a wide range of geographical locations across the globe, indicating its adaptability and widespread distribution. In India, it has been documented in Chintapalli, Andhra Pradesh (Karthik et al., 2022) and Jammu and Kashmir (Verma, 1992). In Africa, it has been found in countries such as Ghana, Benin, Mali and South Africa (Fening et al., 2020). In Kenya, it has been recorded in Wamunyoro, Nyeri and Likoni, Mombasa (Khakasa et al., 2016). As well as in Canada (Caesarm, 1927), Uberlândia, Brazil (Oliveira et al., 2013), Crookston and Lamberton in Minnesota (Lagos-Kutz et al., 2022), New Caledonia (Masunari et al., 2020) and Gantsevichi, Belarus (Buga et al., 2012). These findings collectively highlight the species broad ecological range and potential to thrive in diverse climatic conditions.

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