People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
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Faculty of Sciences
Department of Agricultural Sciences

**Laboratory (BASE)**
**Biology: Applications in health and the environment.**

# Biodiversity of Cucurbitaceae fruit flies (Diptera: Tephritidae) in Algeria.

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**2025/2026**

## Work plan:

01 Introduction.

02 Bibliographical Review Of Fruit Flies.

03 Work methodology.

04 Results.

05 Conclusion.

- The Tephritidae fruit flies are one of the most prominent pests on a wide range of crops in many parts of the world (Dhillon et al., 2005; Elfékih and Haymer, 2010; Layodé et al., 2020; Boulahia-Khedher, 2020) and have a vast capacity for being invasive in new areas (Elfékih and Haymer, 2010). They exhibit endophagous feeding behavior, which causes both quantitative and qualitative yield reductions. As a result, they pose significant threats to global fruit and vegetable production (Clarke et al,2005, Hossain et al, 2020). More than 4,000 species of this family are known worldwide, with a wide distribution covering tropical and subtropical zones as well as temperate zones, occupying a wide range of habitats from humid forests to dry savannahs (Raghu, 2002) . The presence of these pests was first observed in Taiwan Island, China, in 1912 (Jaffar et al, 2022, Wan et al, 2012).The most widespread genera of fruit flies are Bactrocera, Ceratitis, Rhagoletis, Toxotrypana, and Anastrepha (Diptera: Tephritidae).Few studies were devoted to the fruit flies in North African countries including Morocco, Algeria, Tunisia, Libya, Mauritania and Egypt. Dacinae fruit flies are recorded as economic importance pests in much horticultural production (Christenson & Foote, 1960).
- This is why we are particularly interested in studying Biodiversity of Cucurbitaceae fruit flies (Diptera:Tephritidae) in Algeria. The objective of this work is:
- *Prepare a list of Cucurbitaceae fruit flies and assess their attacks in several plots in our study region.

# Systematic:

**Fruit flies**

- **Arthropoda**
- Insects
- Diptera
- Tephritidae
  - **Dacinae**
  - **Ceratinae**

(White, 2006)

# The principal fruit flies

*Ceratitis capitata* (weid.1824)

**Citrus fruits (Peach citrus (*Prunus persica* Batsch,1801), apricots (*Prunus armeniaca* L, 1753), figs (*Ficus carica* L, 1753), apples (Malus Mill,1754)).**

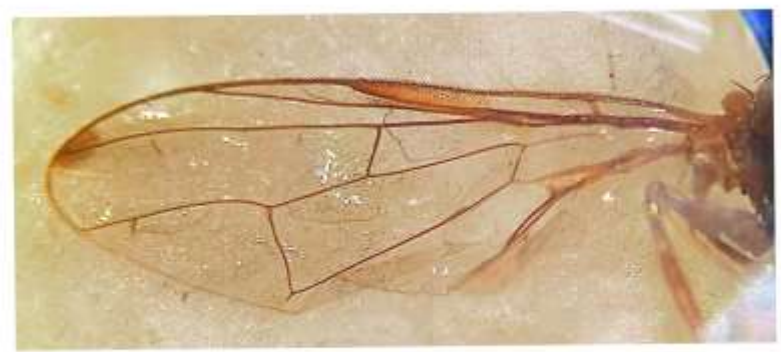
*Bactrocera oleae* (Rossi, 1790)

**Olive (*Olea europea* L, 1753).**

*Dacus frontalis* (Becker,,1922)

**Pumpkin (*Cucurbita maxima* Duchesne, 1786)**

**Bactrocera oleae (Female)(Rossi, 1790)**



**Bactrocera oleae (Male)(Rossi, 1790)**

*Ceratitis capitata (Female)*
(weid.1824)

*Ceratitis capitata (Male)*
(weid.1824)

*Dacus frontalis (Male)*
(Becker,,1922)

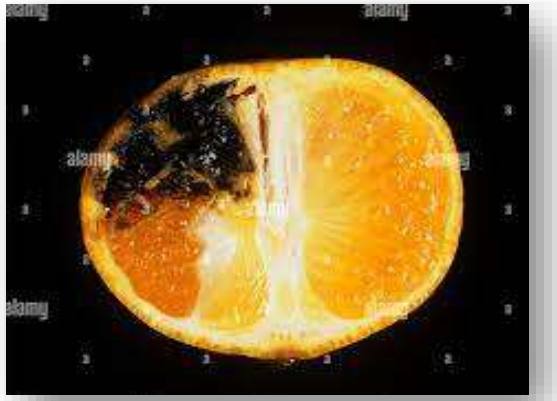
*Dacus frontalis (Female)*
(Becker,,1922)

# Damage characteristics

Oviposit in the host plants.

Entry perforation in the skin of the fruit.

Larvae consume fruit pulp.



Rotting, premature and yellowing .

- Infested fruits usually contain egg-laying or exit holes (Hafsi et al., 2015).
- Pale yellow coloration generally is observed around the egg-laying holes, which then turn brownish-yellow (Elghadi, 2016).
- Direct damage of D.frontalis is caused by the larval stage, which decreases the quality and quantity of fruit production, making the fruit unsalable (Elghadi and Port, 2019).
- Emerged larvae cause rot by consuming the fruit from the inside (Hafsi et al., 2015) and facilitate infection by pathogens (Elghadi, 2016) (Fig. 1).
- In the Cape Verde Islands, with the absence of good control strategy, D.frontalis attacks all cultivated cucurbits and causes high yield losses, sometimes reaching one hundred percent (Steffens, 1983).

**Figure 1**. Pumpkin fruits (*Cucurbita maxima* Duchesne, 1786) rotten due to the D. frontalis fly attacks in the study site.

# PRESENTATION OF THE STUDY AREA

- This study was carried out in the Tebessa region, in the eastern part of Algeria for one year , between November 2023 and December 2024. One plot was selected (Fig.1).

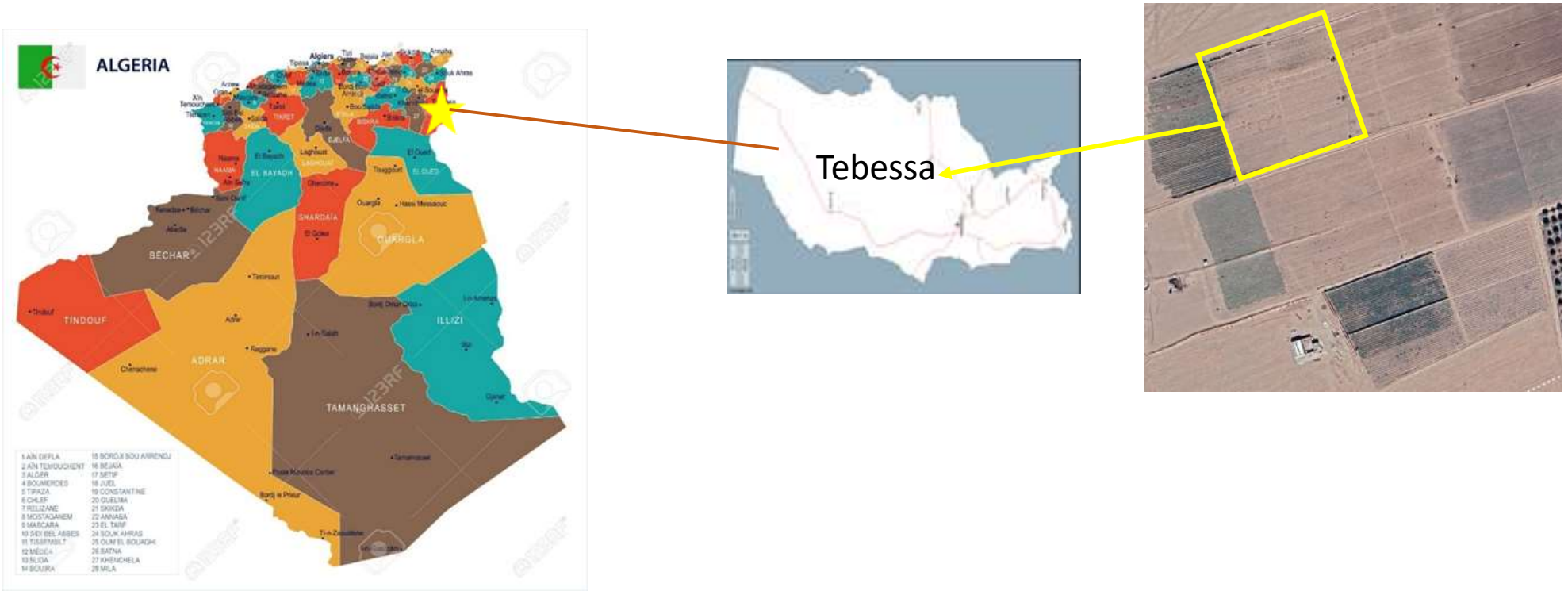



**Fig.1:** Location of the study site in the eastern region of Algeria.

- We chose one plot which cover an area of 2ha.

Pumpkin plot (original photo)

# METHODS USED TO CAPTURE FLIES

- After eclosion, tephritid fruit flies need to feed on sugar and protein for normal growth and development of eggs and sex organs (Liang et al,1993). Depending on this property, food source attractants have been developed, such as hydrolyzed protein baits, food source synthetic baits, as well as bacterial fermentation broth and its secondary metabolites.
- Female fruit flies are attracted to fruit by both odour and color (especially yellow, orange and red).

- Each bottle has 6 holes (3 mm in diameter) in the upper part of the bottle, just below its conical part. with 10 traps.
- water,
- apple cider vinegar
- sugar and yeast.

Droso traps (Original photo)

- We used another type of trap, with 25 traps for each plot) represented by plastic bottles of mineral water.
- Diammonium phosphate dissolved in 1L of water.

Olip trap (Original photo).

# FRUIT INCUBATION

- We collected fruits from the plot then we back to the laboratory and placed them in tulle-covered pots in order to capture the various arthropods specimens as they emerge between 21/12/2023 and 02/11/2024. Small-mesh tulle is used to ensure aeration of the fruits. They are then exposed to light and placed in conditions of ambient temperature and humidity that favor the emergence of the arthropods that use the fruits as hosts.

Pumpkin incubation (Original photo)

# SOIL SAMPLING

- On the same plot, soil samples are taken (a volume corresponding to a surface area of 15 cm by 15 cm and a depth of 3 cm) to determine the presence or absence of pupae in several places in the plot where the presence of pitted fruit has been noted.
- Each sample is sieved (3 mm x 3 mm mesh), to recover any pupae present. These are then placed in rearing conditions in the laboratory to count the number of adults of different species that have emerged.

Sampling of pupae present in the soil. (Original photo)

# SAMPLE SORTING METHODS :

Insects collected using both trapping methods are cleaned in the laboratory. The method consists in rinsing them with water, then spreading them out on absorbent paper to dry out. They are then returned to Petri dishes containing 70° alcohol to preserve them until they are identified.

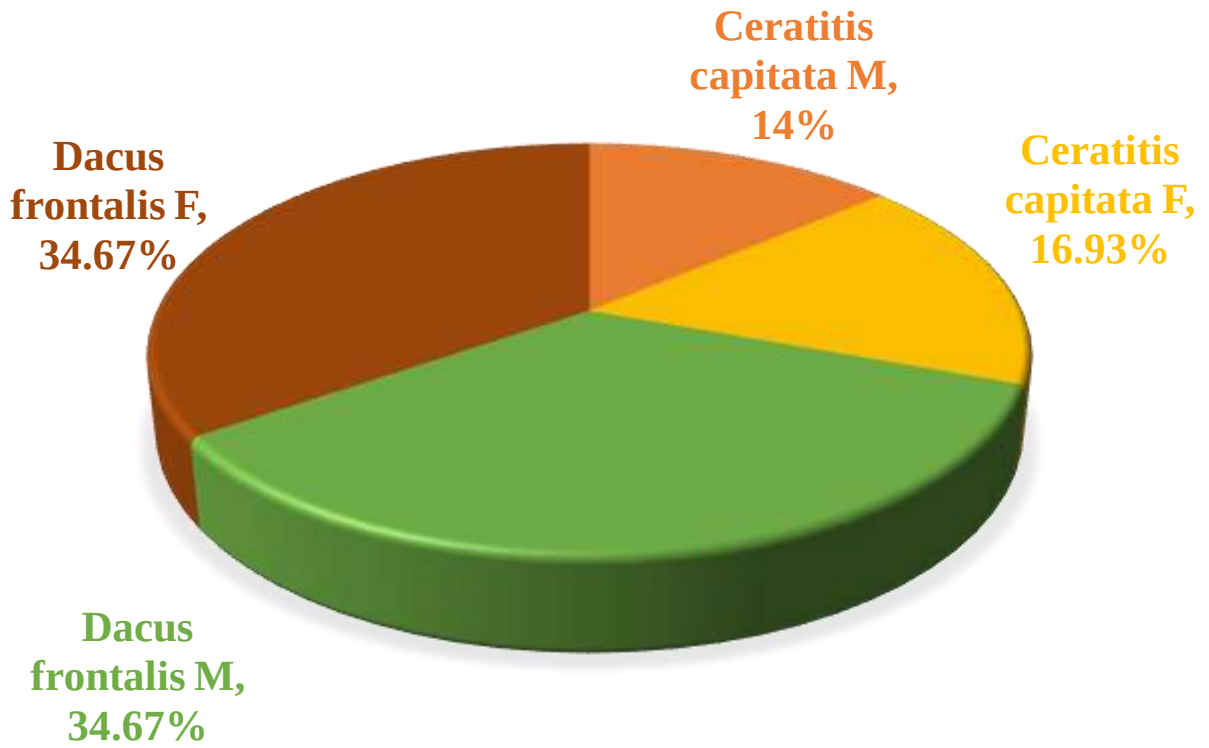
The specimens were examined in the laboratory using a stereomicroscope. Taxonomic determination of tiphritide flies was done by different determination keys.

Preservation of samples in a petri dish (original photo).

# RESULTS

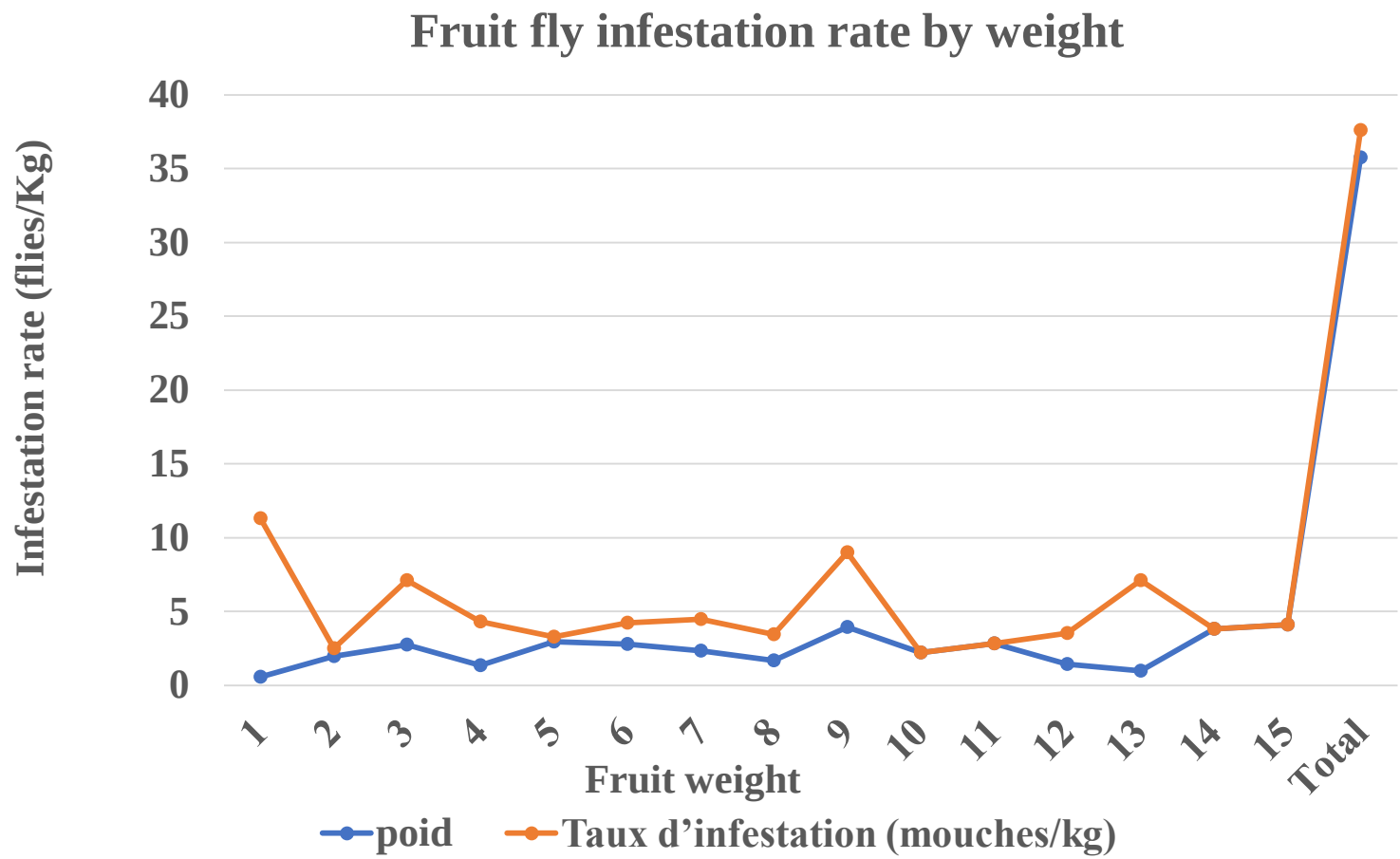
The results of the flies captured by olip and droso traps indicated the presence of two species: *Ceratitis capitata* (Wiedemann, 1824) (17 Males, 21 females), *Dacus frontalis* (Becker, 1922) (43 males,43 females).

| Genus | Species | Sex | Pumpkin |
|---|---|---|---|
| Ceratitis | capitata | M | 17 |
| | | F | 21 |
| Dacus | frontalis | M | 43 |
| | | F | 43 |




PERCENTAGE OF SPECIES FOUND

# FRUIT FLY INFESTATION RATE




# RESULT OF SOIL SAMPLING

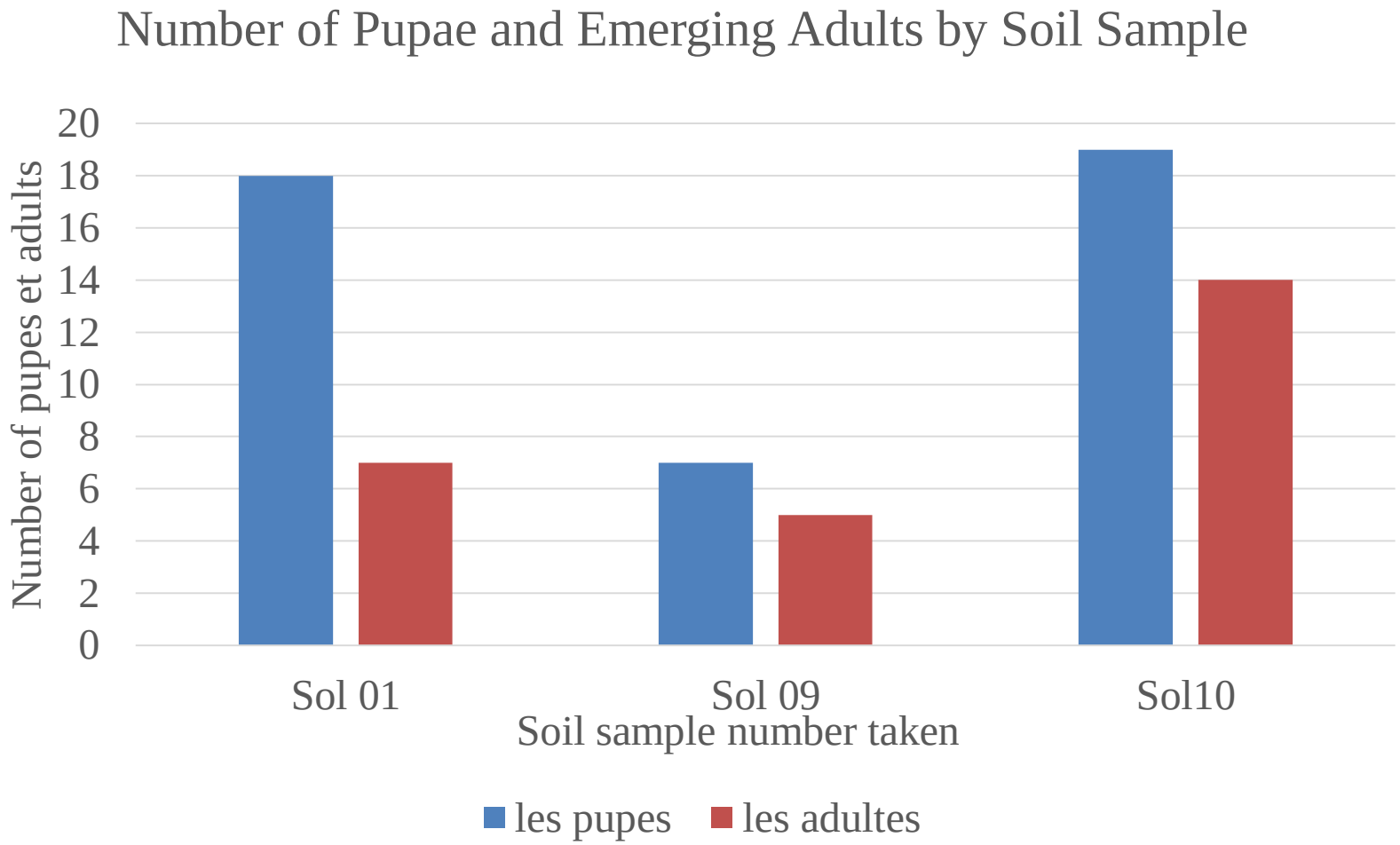



**Figure**. *Ceratitis capitata* (Wiedemann, 1824) : (left♂) (right, ♀).

**Figure**. *Dacus frontalis* (Becker, 1922): (Right♂) (left, ♀).

# CONCLUSION

The study we conducted to assess the biodiversity of Cucurbitaceae fruit flies in eastern Algeria, specifically in Gourriger, Wilaya of Tebessa, revealed the presence of two species of Tephritidae: *Dacus frontalis* (Becker, 1922) and *Ceratitis capitata* (Wiedemann, 1824). *Dacus frontalis* was found to be more prevalent in the study area, which could be explained by the specificity of its host plant mainly pumpkin (*Cucurbita maxima* Duchesne, 1786) compared to *Ceratitis capitata* (Wiedemann, 1824), which is polyphagous and develops on a wide range of host plants. The prospect of knowing even more about the range of insect pests, especially fruit flies because they can occasionally cause serious damage to different types of fruit.

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# CERTIFICATE

of participation

Presented to

**Kenza TAMRABET**

To honor your valuable participation in **the 14th Arab Congress of Plant Protection (ACPP 2025)** held from **November 03rd to 07th, 2025**,

organized by **The Arab Society for Plant Protection**, in collaboration with **The National Higher School of Agronomy (ENSA)**, and **Plant Protection and Technical Controls Directorate (DPVCT).**

in an **oral** presentation titled: **Biodiversity of Cucurbitaceae fruit flies (Diptera: Tephritidae) in Algeria** co-authored by: **BARECH Ghania, KHALDI Mourad, DE MEYER Marc.**

14th Acpp 2025
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رئيس اللجنة العلمية

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