



Biological interactions between epazote *Dysphania ambrosioides*, the urbícola soft scale insect *Pulvinaria urbicula*, the ant *Dorymyrmex smithi* and the parasitoid *Coccophagus lycimnia* in Mexico

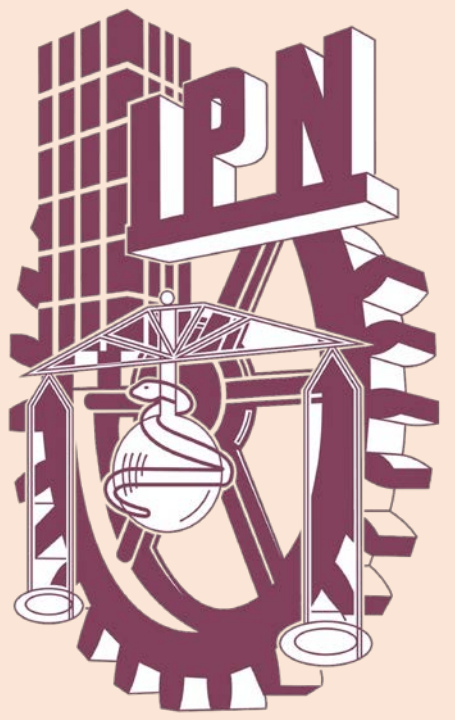
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INTRODUCTION

Around 8,000 species of scale insects have been described worldwide, grouped into 1,150 genera and 33 families belonging to the superfamily Coccoidea (Miller et al. 2014). Scale insects feed by sucking sap from host plants, which can cause stunted growth, chlorosis, foliage deformation, defoliation, and premature death of terminal branches. If the attack is very severe, they can completely dry out the plant.

The mutualistic relationships between ants and hemipteran species can be explained by the trophobiosis behavior of ants (Delabie and Fernández 2003). The mutualism between ants and honeydew-excreting hemipterans is sometimes so developed and intensive that both members have acquired certain morphological and behavioral adaptations (Sodano et al. 2023). There are also reports of entomophagous species associated with soft scales (Coccidae). Most entomophages are predators belonging to the families Chrysopidae (Neuroptera), Coccinellidae (Coleoptera), and Syrphidae (Diptera), while scale insect parasitoids are concentrated in the families Aphelinidae, Encyrtidae, Pteromalidae, Eulophidae (Hymenoptera) (Garcia et al., 2016).

Despite the importance of epazote for Mexico (SIAP 2024), there are few studies on the impact of scale insects on this crop and their potential as pests. Furthermore, little is known about their mutualistic relationship with ants, as well as their natural enemies. Therefore, the objective of this research was to determine the species of scale insect observed on epazote and the ant associated with its natural enemies.

MATERIALS AND METHODS

During February and March 2021, soft scale insects, ants and parasites associated with *D. ambrosioides* (Figure 1 A and B) were collected in a homegarden in the municipality of Petatlán, in the state of Guerrero, Mexico (17°32'50.0"N, 101°16'31.0"O, at an altitude of 41 meters above sea level).

The biological material was maintained in 70% alcohol. Adult female soft scale insects were mounted using the Kosztarab (1963) method. Williams and Watson (1990) and Hodgson (1994) keys were used for specific identification of the material while Fernández (2003) and AntWiki (2022) keys were used for specific identification of the ants. As for the parasitoid, scale colonies showing signs of parasitism were examined and placed individually in 2.0 ml Eppendorf tubes until the adults emerged. To identify the parasitoids, the procedure described by Myartseva et al. (2011).

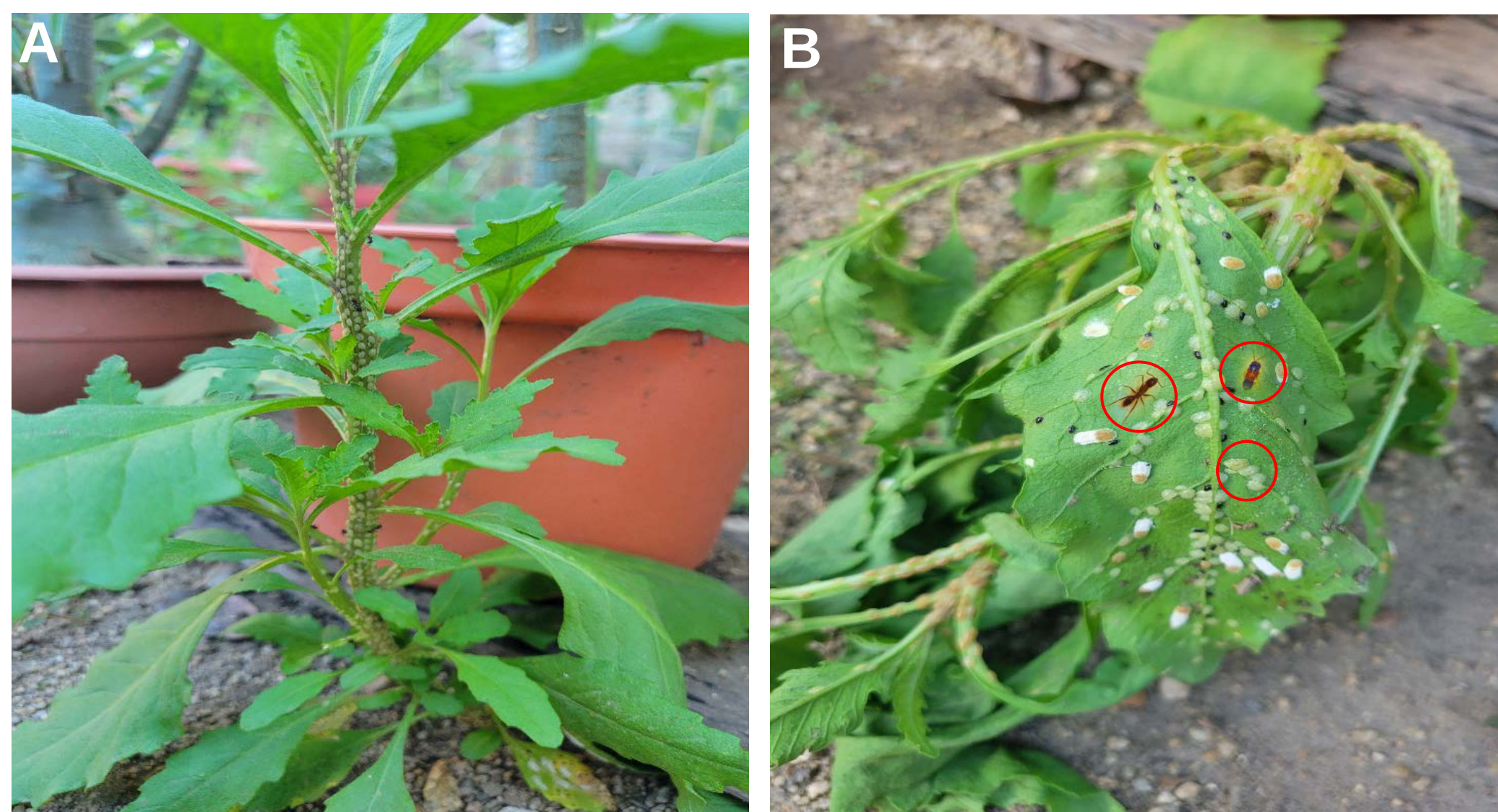


Figure 1. Scale colony on the epazote plant (A) and damage caused by its infestation (B).

RESULTS AND DISCUSSION

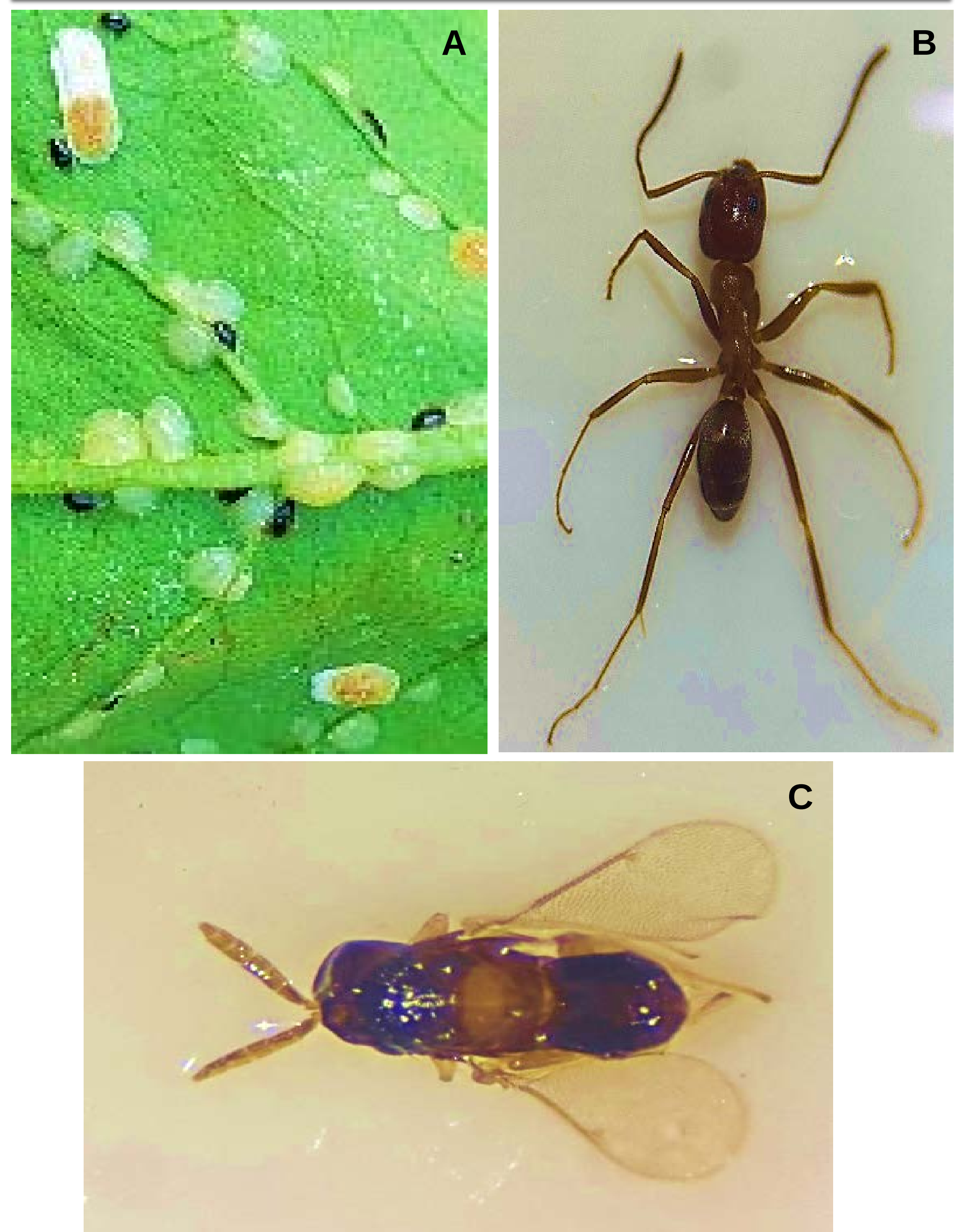


Figure 2. Soft scale *P. urbicola* on *D. ambrosioides* (A); *D. smithi* ant associated with soft scale (B) and the parasitoid *C. lycimnia* (C).

The scale insect *Pulvinaria urbicola* Cockerell (Figure 2A) (Hemiptera: Coccoidea) was recorded as the main phytophagous species present on the plant. Among the biotic interactions observed, it was documented for the first time that the ant *Dorymyrmex smithi* Cole (Hymenoptera: Formicidae) (Figure 2B) was associated with colonies of *P. urbicola*. Although *D. smithi* has previously been recorded interacting with scale insects and pseudococcids in Mexico, there are no reports of any interaction with *P. urbicola* (Hernández 2017). In terms of natural enemies, the parasitoid *Coccophagus lycimnia* (Walker) (Hymenoptera: Aphelinidae) (Figure 2C) was identified, a species introduced into Mexico in 1954 for the biological control of soft scale insects (Myartseva et al. 2012).

CONCLUSION

This study provides new records of interactions associated with a traditional Mexican crop.

REFERENCES

