



# Florivory on floral buds and its effect on floral display in *Chamaecrista chamaecristoides* in a Mexican dune system

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## INTRODUCTION

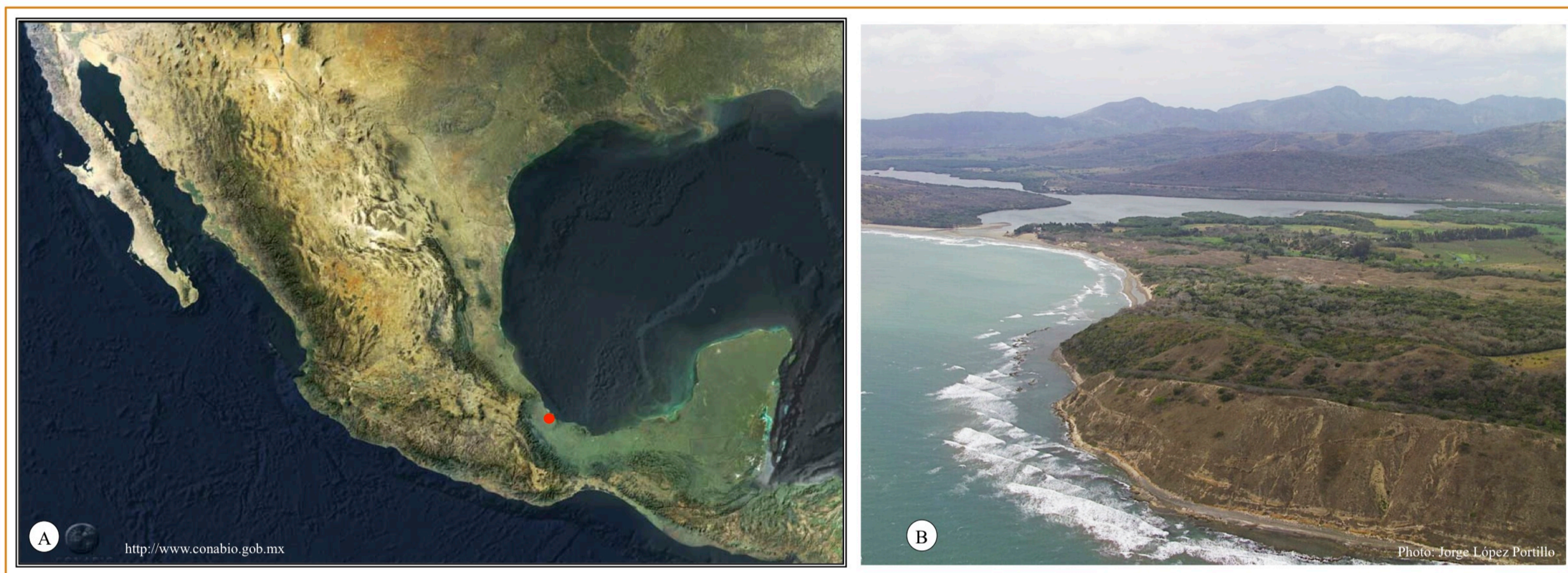
Florivory is a plant-animal interaction where the herbivores consume reproductive structures. This has a direct effect on plant reproduction, and depending on the damage level may reduce the attraction of visitors and the number of flowers available. This antagonistic interaction could have a great effect on plants with sexual dimorphism that promotes outcrossing (e.g., dioecious, monoecious and enantiostily). *Chamaecrista chamaecristoides* (Fabaceae) is a pioneer species in sand dune systems, its flowers living for one day and flowering by 15 days, once a year.

We assessed the damage to flower buds and its effect on the floral display, both floral morphs, and we identify insects that damage buds.



## METHODS

**A) Study site:** La Mancha is a biological station of INECOL, is located in the Gulf Coastal Plain of Mexico, at the center of the state of Veracruz (19° 36'N, 96° 22'W, precipitation <50 m asl), has a surface area of 83.29 ha, the climate in this area is warm and humid with summer rains and an annual mean temperature between 22-26 °C (Fig. 1). This site has a great environmental heterogeneity since it has dry forest, tropical semi evergreen forest, as well as wetland, mangrove and coastal dunes.



**Figure 1.** Location of the state of Veracruz (red circle) (A). Biological station La Mancha with different types of vegetation (B).

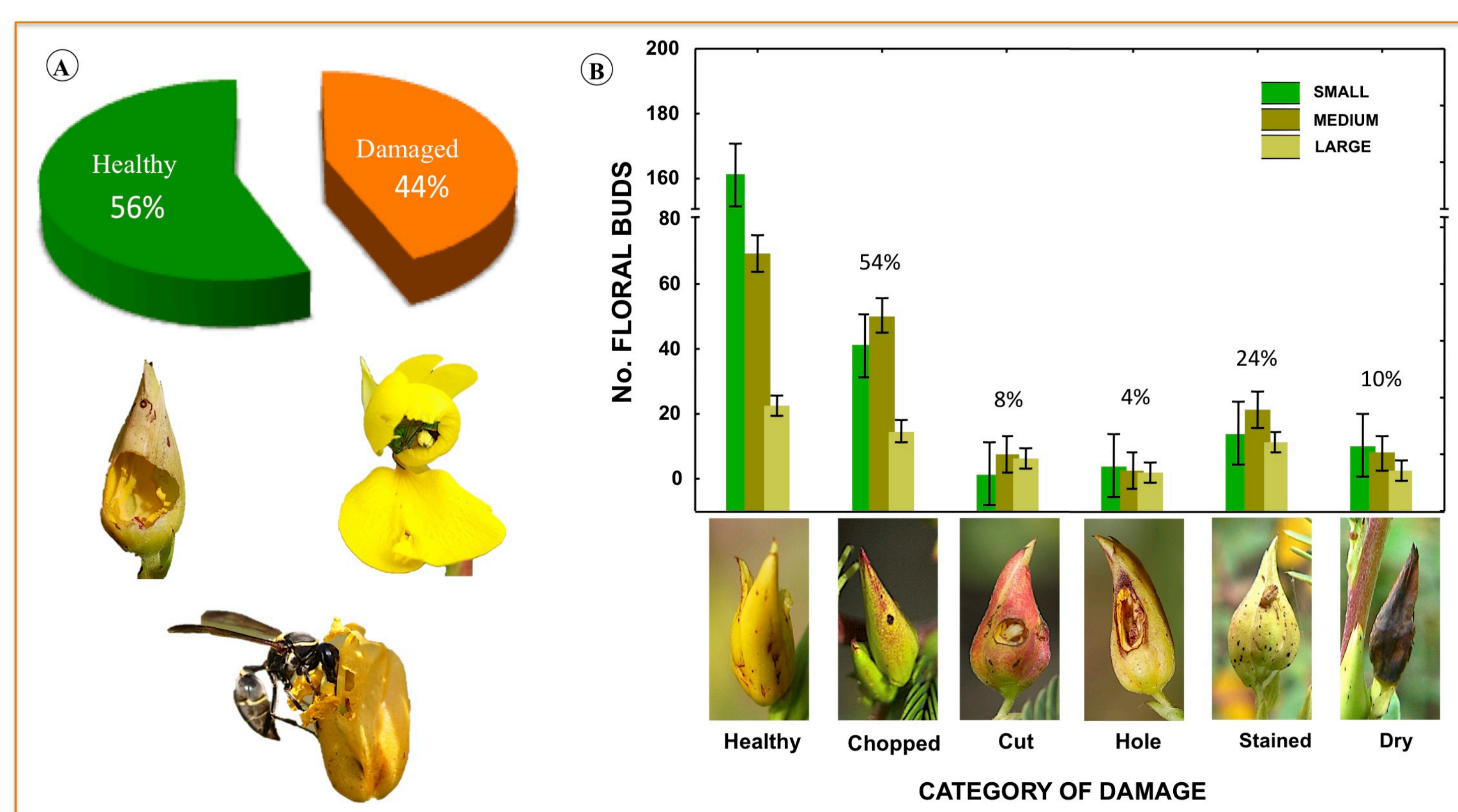
**B) Damage on buds and flowers:** along the beach we selected 10 patches of plants, for 5 days we recorded the damage flower buds and flowers of the plants. The number of flower buds were recorded according to six categories of damage (healthy, chopped, cut, hole, stained and dry) (Fig. 2) in 5 branches per patch. In the case of flowers ca. 50 flowers per patch were also assigning to each of five different categories, according to the damage on the reproductive structures or petals (healthy, damage petals, stamens damaged and without stigma).

**C) Collection of the florivorous insects:** we collected branches with flower buds with oviposition marks. Branches were placed in containers with water to prevent dehydrate and covered with a fine net; later flower buds with larvae were withdrawn. The flower buds that had larvae were placed in growth chambers to obtain the adult insects.



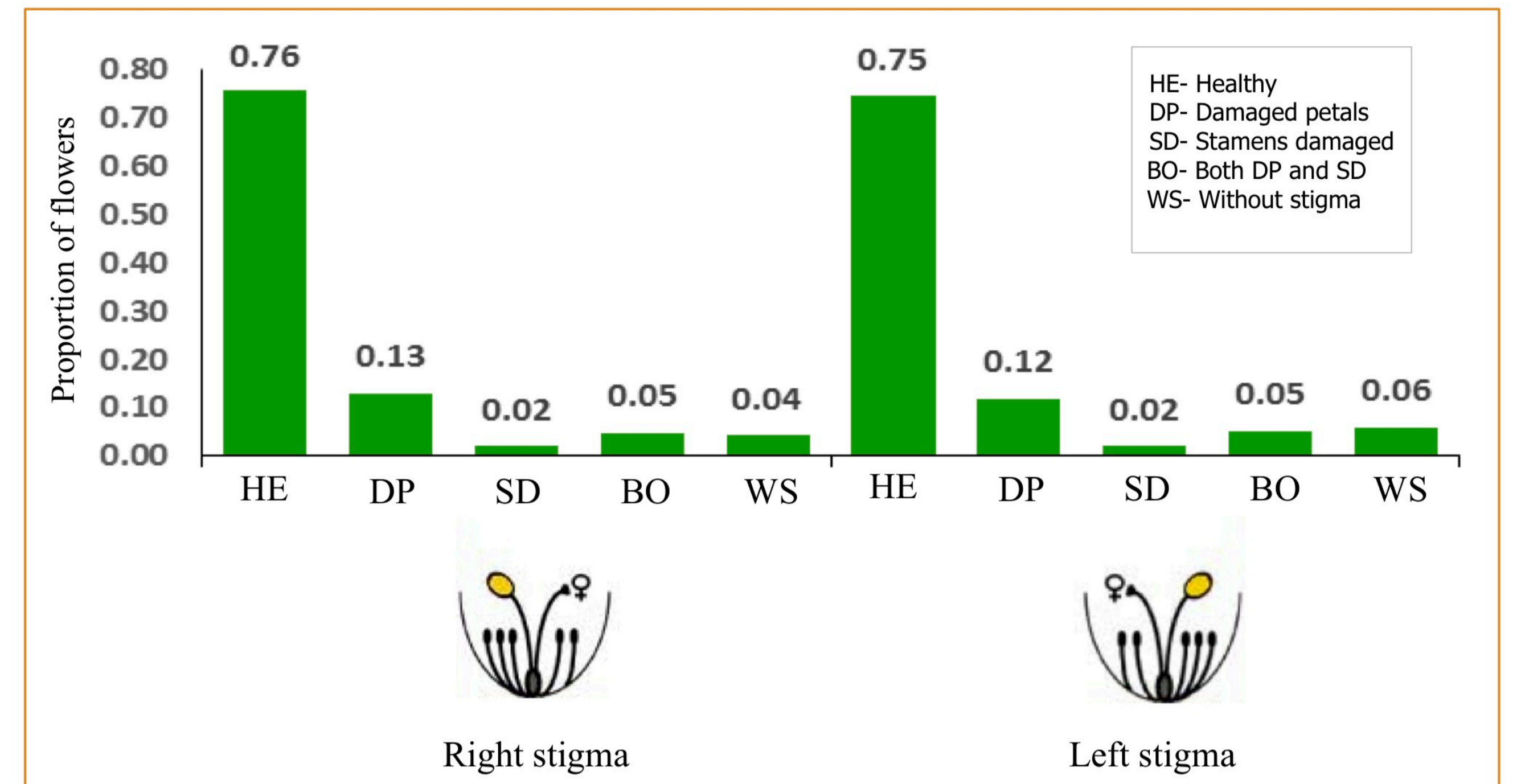
## RESULTS

**A) Bud damage quantification:** around half of the buttons showed some level of florivory (56% intact, 44% damaged) (Fig. 2A). The chopped damage category was the most frequent (54%), followed by stained category (24%), suggesting insect oviposition and suction for feed. The damage categories: hole, cut and dry buttons (4%, 8% and 10%, respectively) likely indicate the emergence of adult insects (Fig. 2B).



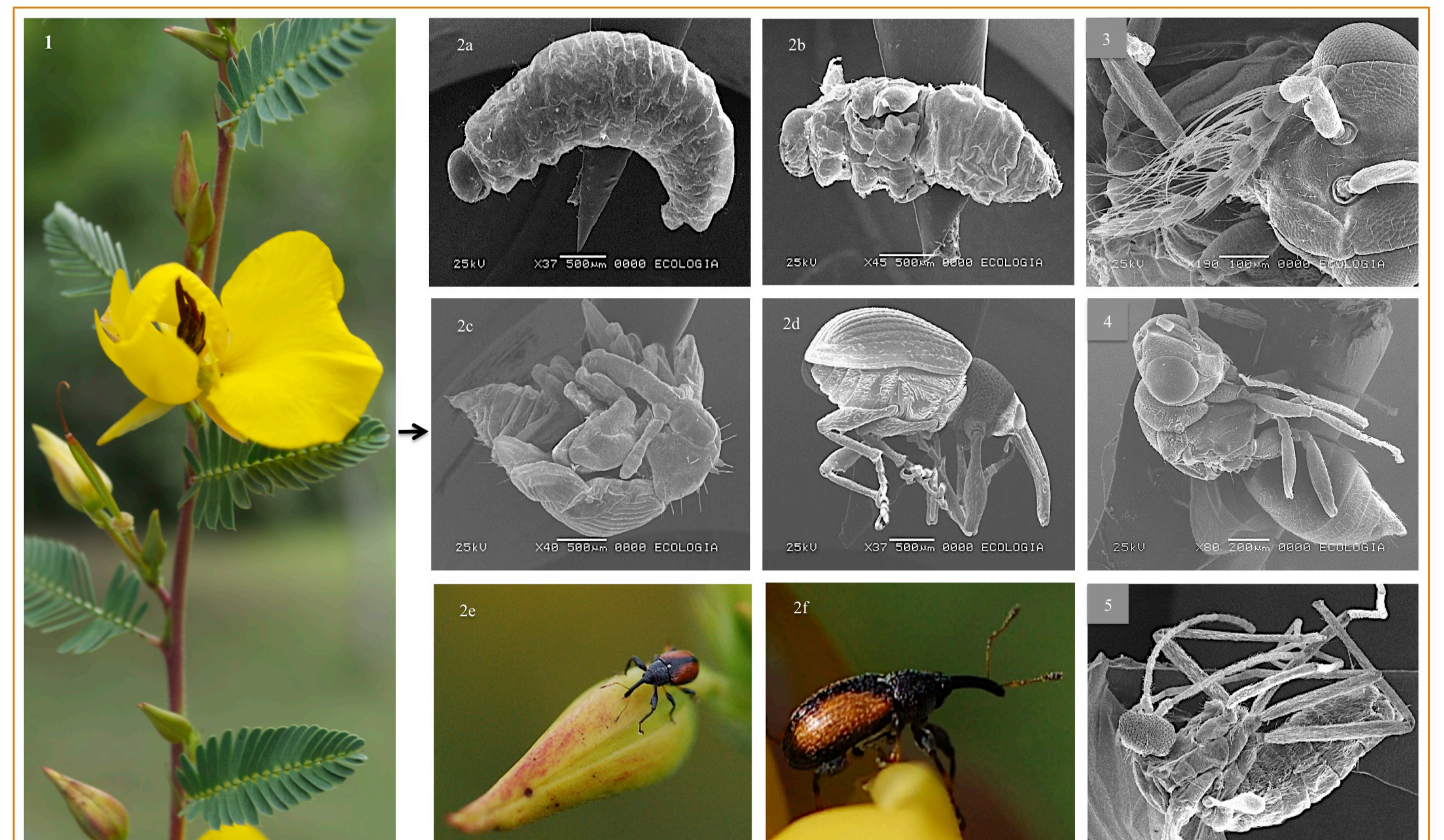
**Figure 2.** Proportion of damaged and healthy buds (A). Number of flower buds in different categories of damage regarding size of these. Figures in the lower part show how is the damage of flower buds (B).

**B) Flowers damage quantification:** the number of intact flowers was greater than those damaged (75% and 25%, respectively); however, the proportion was similar for floral morph (left: intact 37%, 13% damaged: right: intact 38%, damaged 12%). The number of flowers in the categories of damage were few both left and right flowers (Fig. 3).

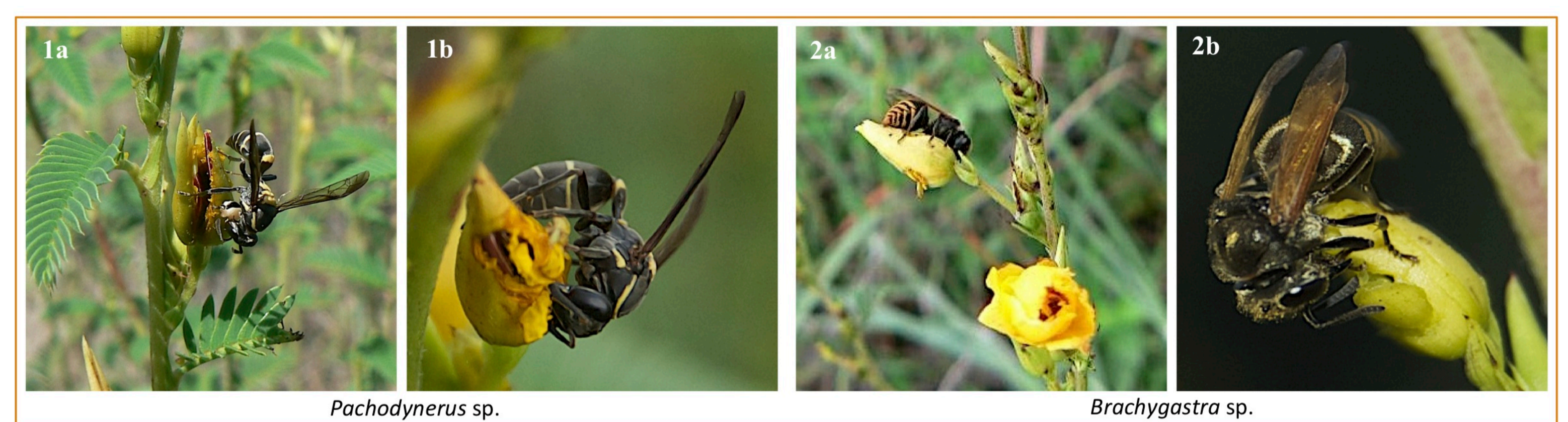


**Figure 3.** Proportion of flowers according to the categories of damage left and right morphs, noting that there are more healthy flowers for both morphs.

**C) Insects florivorous:** within the flower buds mainly found insects than develop all their life cycle, like beetles *Anthonomus sp.* (Curculionidae) and in fewer proportion two species of Diptera and one of Hymenoptera (Fig. 4). On another hand, flower buds are damaged by adult wasps (Vespidae) who seek larvae that are developing within them (Fig. 5). The behavior of these wasps consists of patrolling and make a hole in the flower buds have larvae, to extract and devour (Fig. 5).



**Figure 4.** *Chamaecrista chamaecristoides* inflorescence with flower buds and flower (1); development of *Anthonomus sp.* (2a-d); adult insect approximately 5 mm (2e,f); Diptera (3 and 5) and hymenoptera insect (4). ACKNOWLEDGEMENTS. We appreciate the support of Mr. T. Laes-Aponte (INECOL) with the SEM work.



**Figure 5.** Two species of wasps of the family Vespidae. *Pachodynerus sp.* (1a,b) and *Brachygastra sp.* (2a,b) which damage the flower buds to the extract from them the larvae such as observed in the images.



## CONCLUSIONS

The proportion of healthy and damaged flower buds is similar, as well as healthy flower between morphs, latter is very important in this species that promotes cross pollination between floral morphs. However although florivory reduces the number of flowers available during the period of flowering, proportion between floral morphs remain equal, therefore the opportunity to cross pollination is maintained. It is important to evaluate how the damage to the reproductive structures as well as the change in the symmetry of the flowers affect floral visitors.



## FUTURE WORK

The Evaluation whether extrafloral nectaries in *Ch. chamaecristoides* have a positive effect on the defense and plant reproductive success (fruit set and seed set), against herbivores because ants foraging nectar defending this plant.

