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Taxonomic and functional diversity of insect visitors to the flowers of four tree species in the Sahelian savannah of Ferlo, Senegal

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Introduction

Study context

Degradation and restoration are two central processes within the Great Green Wall initiative in Senegal. Degradation caused by human activities, in interaction with global changes, leads to the loss of habitats and the disappearance of many species. It is therefore necessary to know the state of diversity in order to be able to protect it and better understand how to restore it, in particular by re-establishing interspecific interactions within the ecosystems concerned by the restoration. One class of interactions that provides important ecosystem services is pollination. Pollination is necessary for tree reproduction and for the production of fruits consumed by human populations and their livestock. In addition, floral resources support insects that, besides being pollinators, have multiple other roles in ecosystem functioning. The objective of my study is to characterise the taxonomic and functional composition of the insect pollinator fauna associated with certain tree species in the Ferlo (northern Senegal). These first observations have allowed us to better define the quantitative and more detailed monitoring, which is currently being carried out. It also gives us a first idea of what is found in these environments, knowing that they are semi-arid environments with strong pressures, on which the populations depend heavily. We are also looking at some of these species to assess the status and see the effects of different environments.

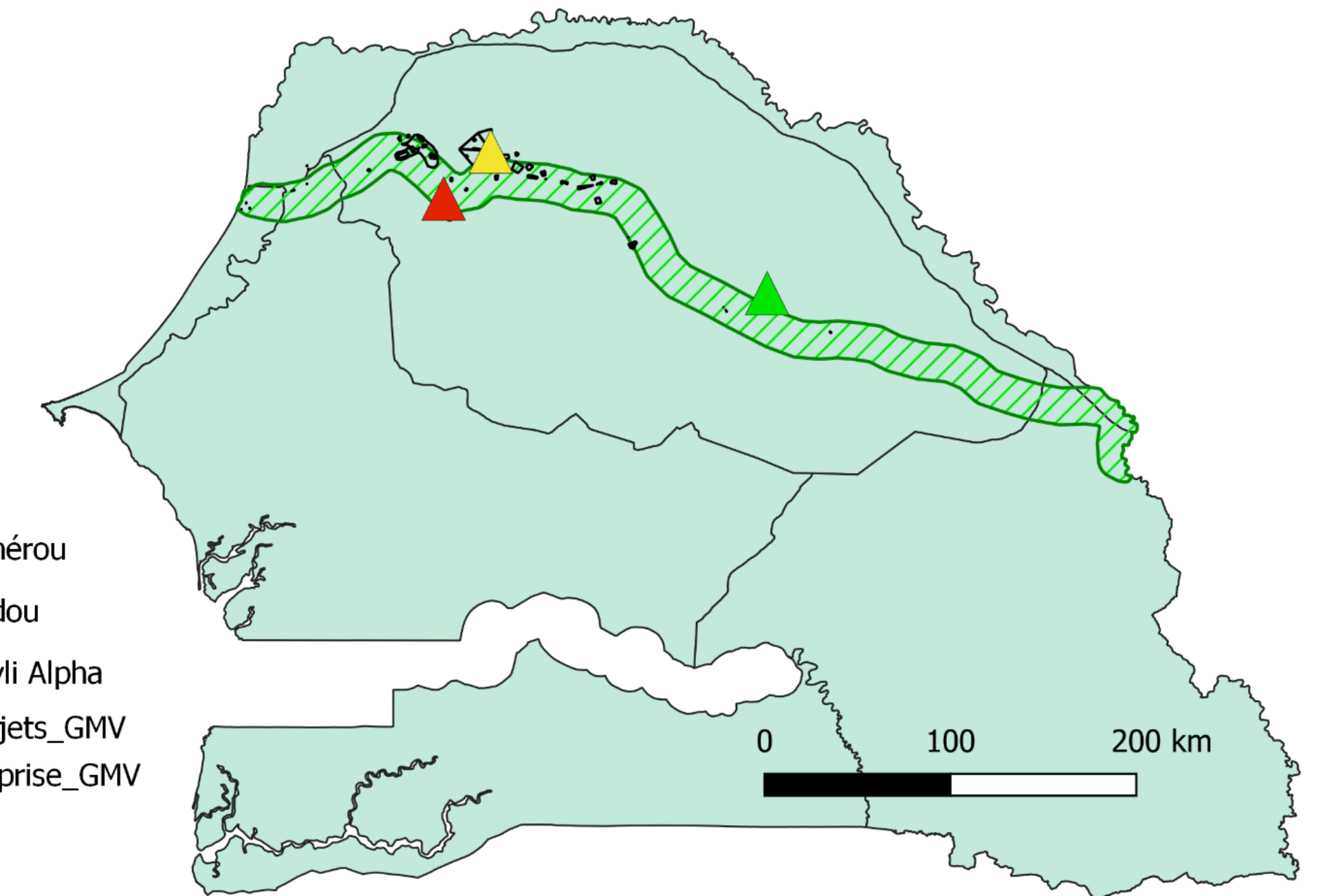


Figure 1. Geographical study area and Great Green Wall area of intervention

Materials and methods

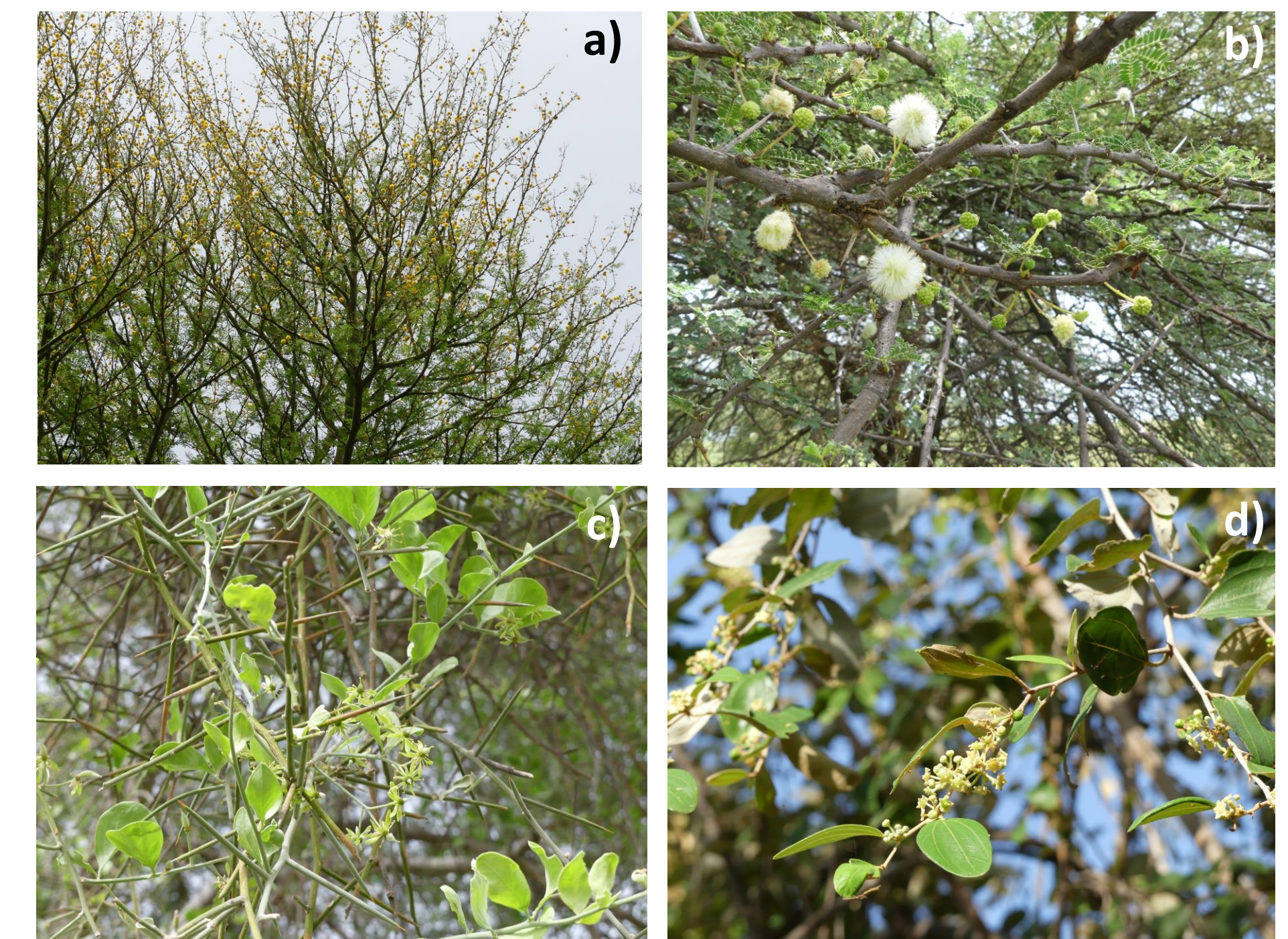
Capture and observation

Observations were made to see which insect species were found on flowers, then these flower-visiting insects were captured with butterfly nets.

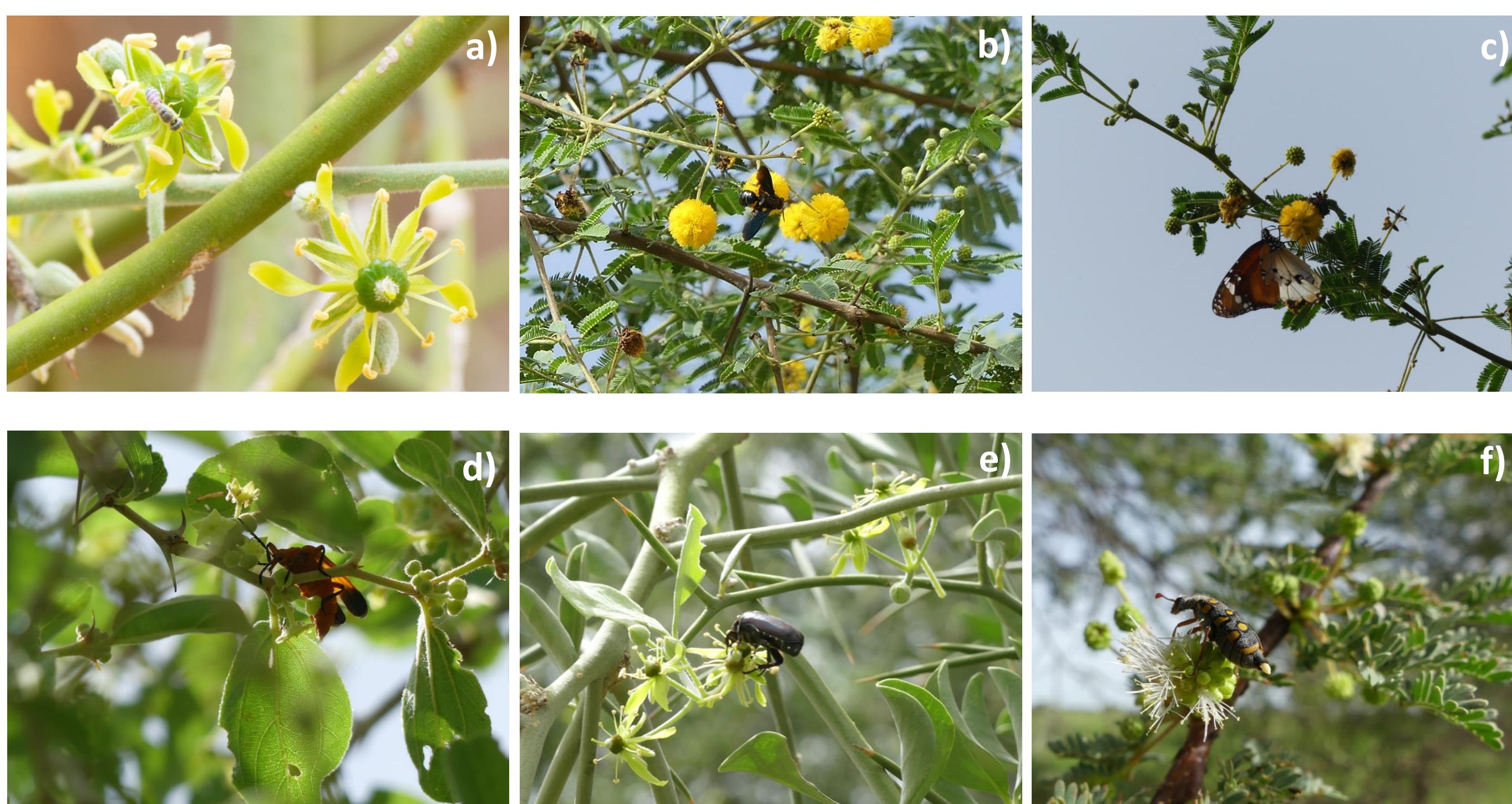
Identification

Using identification keys, the insects were determined, most of them to the family level and classified as morphospecies. The individuals sampled were compared with reference specimens in the entomology collection of IFAN (Institut Fondamental d'Afrique Noire). Some entomologists were contacted through INaturalist for confirmation of some of the identifications done.

List of tree species observed and randomly sampled	Family associated
<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb (a)	Fabaceae
<i>Vachellia tortilis</i> subsp. <i>raddiana</i> (Savi) Kyal. & Boatwr. (b)	Fabaceae
<i>Balanites aegyptiaca</i> (L.) Delile (c)	Rhamnaceae
<i>Ziziphus mauritiana</i> Lam. (d)	Zygophyllaceae



Results



a) Halictidae on a flower of *Balanites aegyptiaca*, b) Pompilidae on a flower of *Vachellia nilotica*, c) Nymphalidae on a flower of *Vachellia nilotica*, d) Lygaeidae on a flower of *Ziziphus mauritiana*, e) Scarabeidae on a flower of *Balanites aegyptiaca*, f) Meloidae on a flower of *Vachellia tortilis*.

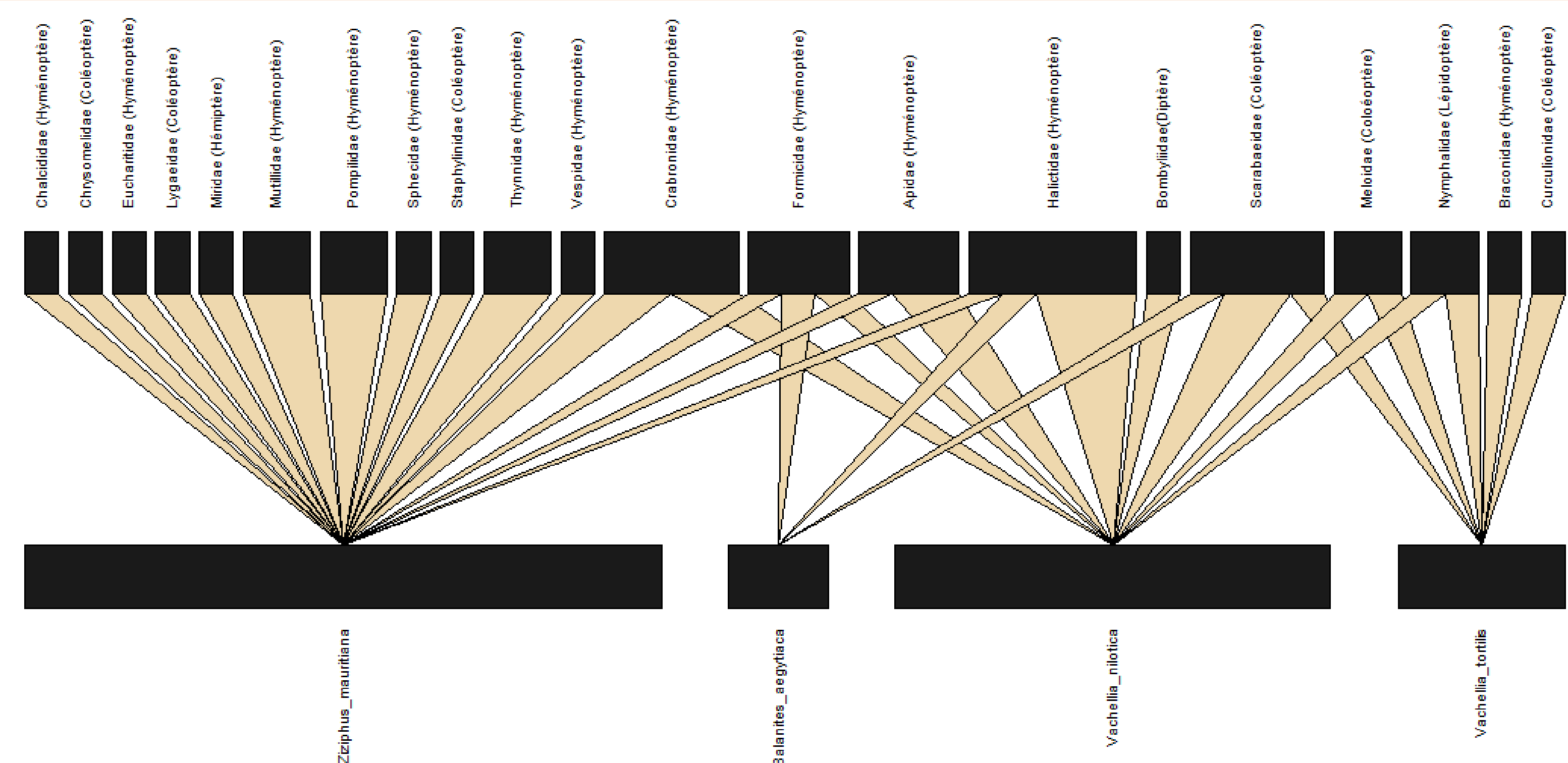


Figure 2. Bipartite graph produced by plotweb (RStudio2022.02.3) representing the interactions between the family insects observed and the tree species.

Discussion

Tree protection actions must take into account the different interactions of trees with other organisms. This project is a step towards an ecosystem approach to the evaluation of restoration in this region. Pollination offers a privileged entry point for this approach, as pollinators play multiple other roles. For example, wasps are not only pollinators but also predators of insect pests; the larval stages of insect pollinators can be phytophagous or decomposers, enemies or partners of trees. The study of flower-visiting insects thus opens the way to the analysis of the functioning of all food webs underlying ecosystem services. It is therefore crucial to have knowledge about the phenology of the trees studied and the variations that exist between the different locations. These first observations allowed us to adapt the monitoring that started these year, to study the effects of the Great Green Wall interventions and the diversity associated to these indigenous species in the region of the Ferlo.

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