

## 1. Background of the Study

With the increase of human population, natural lands have been continuously transformed into agricultural lands. Some crops are cultivated for food production, and some others are planted to generate an income (Figure 1a). The shift from natural to agricultural lands is followed by environmental degradation. Land use change also reduces human's benefits from natural environments such as woods, timber, and water resources.

To solve this problem, restoration activities were encouraged through tree forest plantations. In this regard, trees comprising either native or introduced species were planted (Figure 1b).

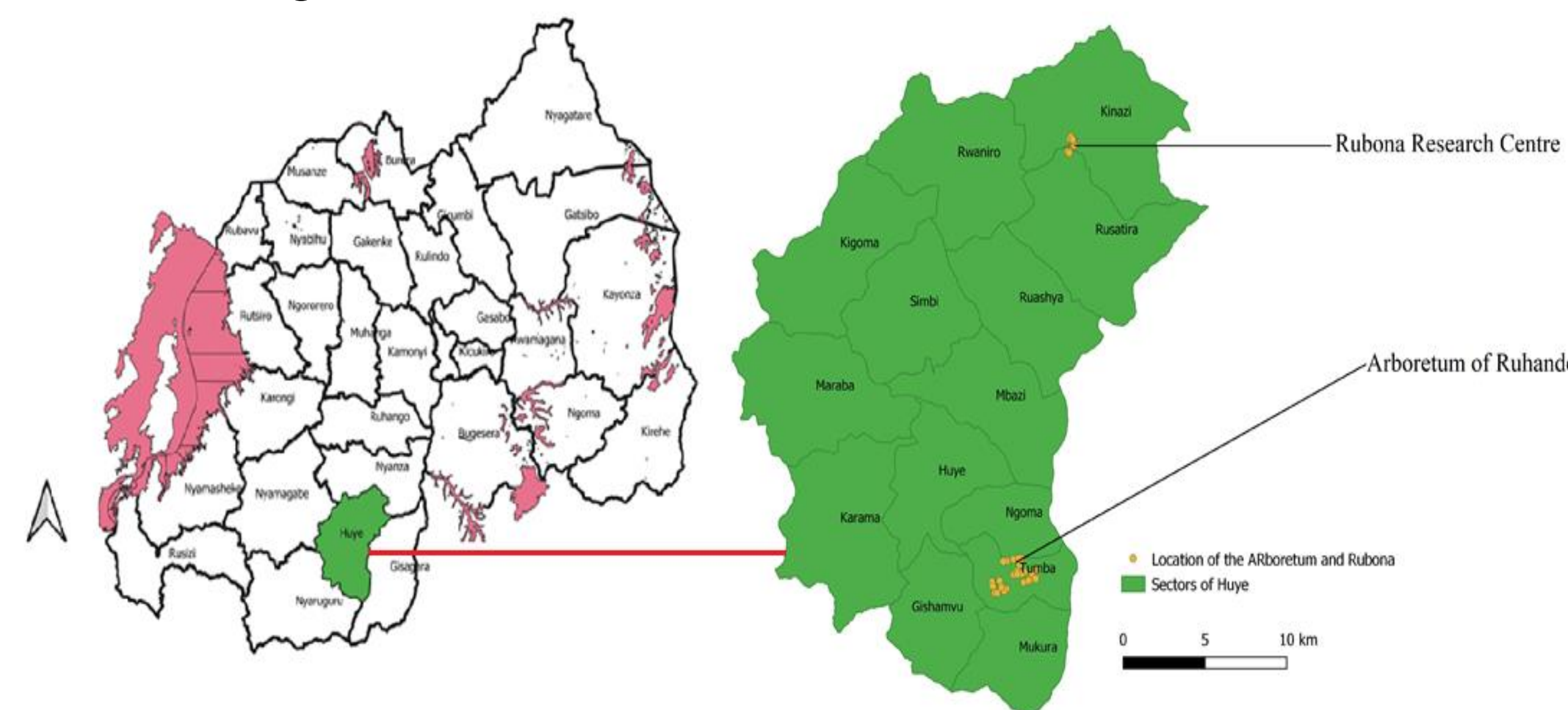


**Figure 1:** Natural lands were transformed into (a) banana, coffee and (b) forest plantations (Photos taken during field data collection at Rubona and Arboretum, southern Rwanda)

Natural lands also provide suitable habitats to living organisms including soil and litter ants. Less is known whether the shift from natural land to the agricultural and forest plantation land use affects the diversity and abundance of ants. This research fills the gap and provide prior information about the effects of land use change on soil and litter ants.

## 2. Materials and Methods

A research was conducted in planted native and exotic tree species at the Arboretum of Ruhande, and in varieties of coffee and banana plantations at the Rubona agricultural research station, in Southern Rwanda (Figure 2a, b). The Arboretum was used as human settlement, while Rubona was dominated by natural vegetation until the 1960s.



**Figure 2a:** Area of Study (Shapefiles adapted from data of the Centre of Geographic Information System – University of Rwanda, College of Science and Technology)



**Figure 1b:** Types of the land use sampled. From left to right: Forest, banana and coffee plantations. (Photos taken during field data collection)

Ants were collected by different sampling techniques including hand collection and pitfall traps, and then identified to species level per each land use (Figure 2).

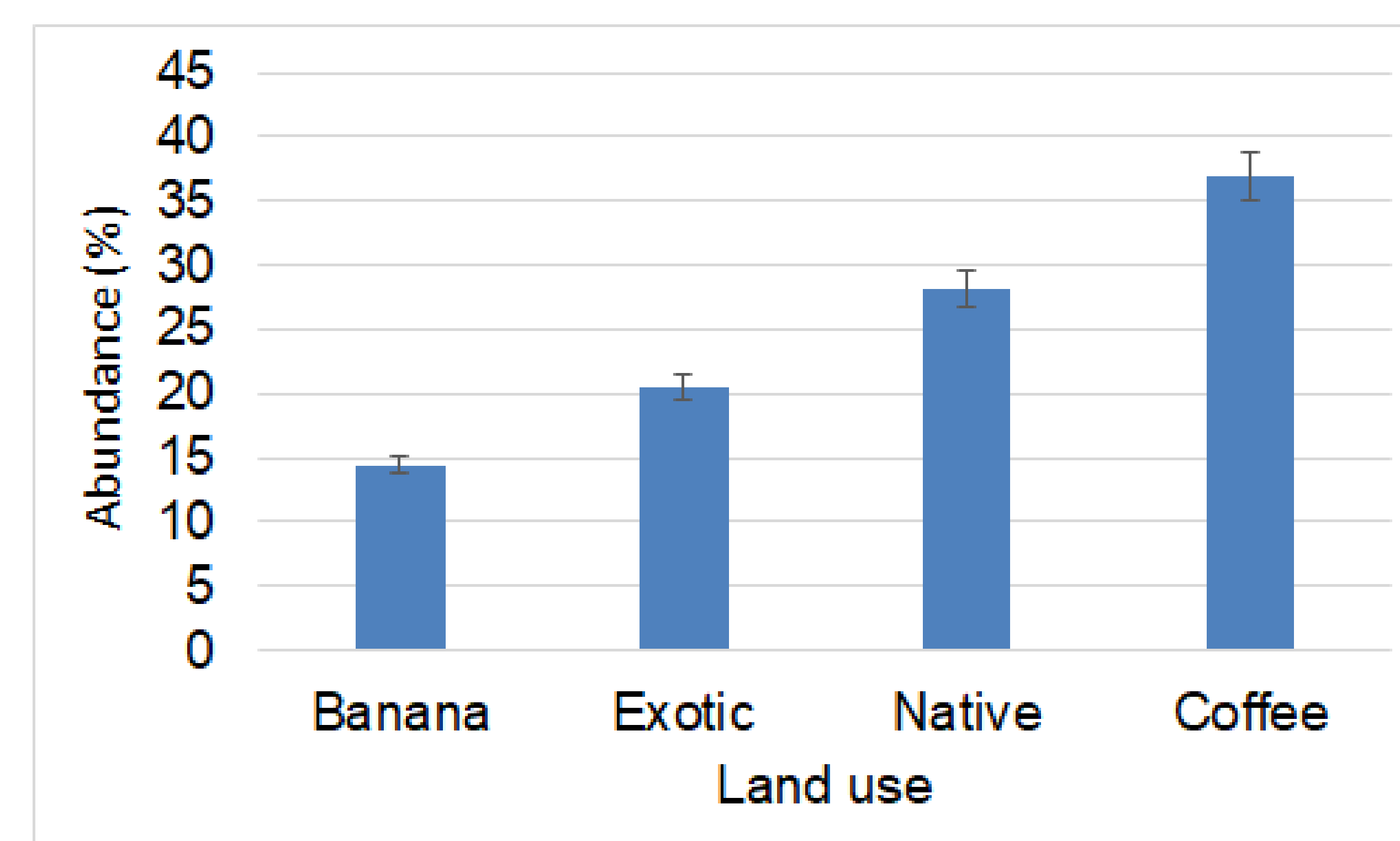


**Figure 2b:** Techniques used for sampling soil and litter ants. From left to right: hand collection, Pitfall traps and light funnels (Photos taken during field data collection)

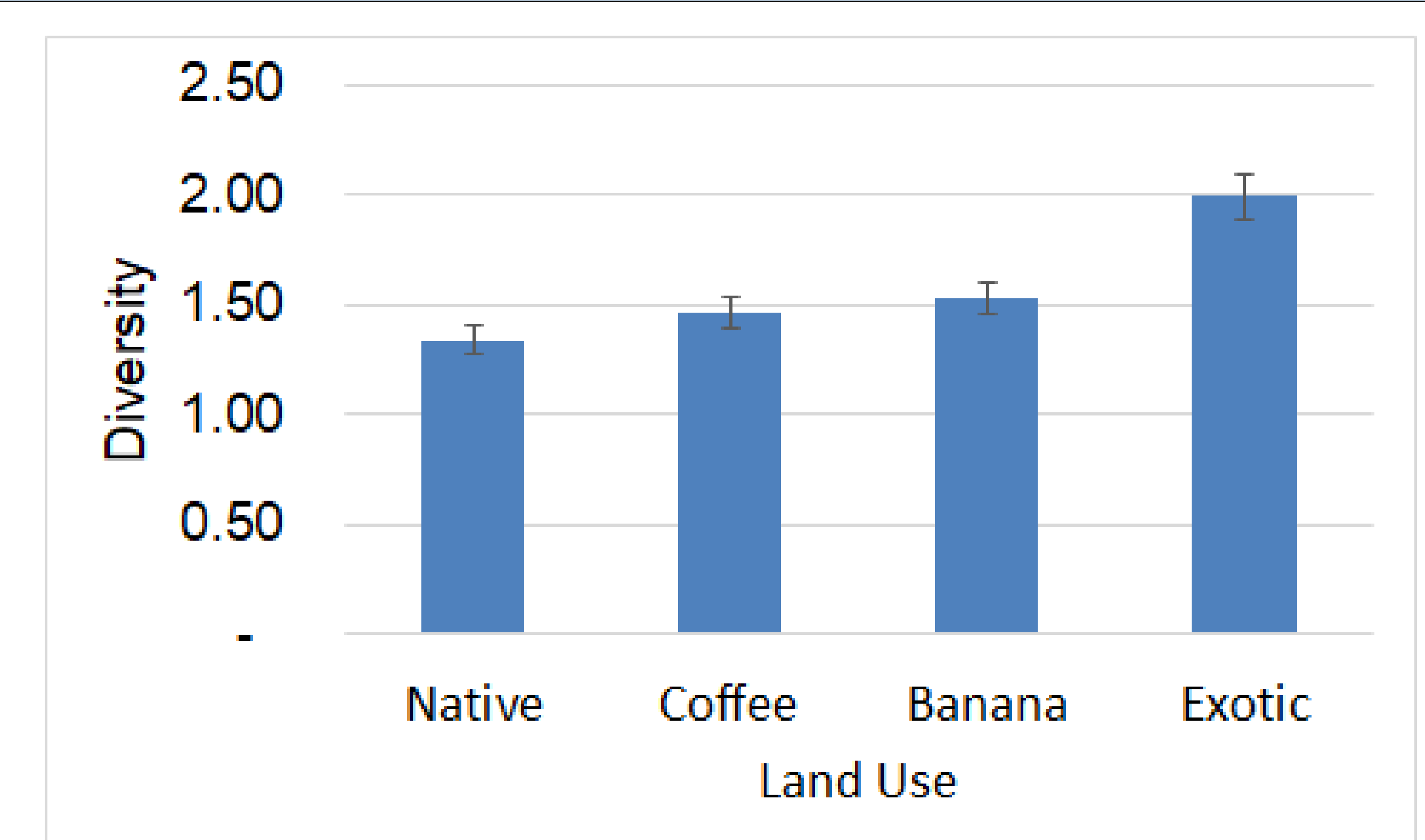
## 3. Results

Results indicated a total of 1680 individuals comprising 30 species, 14 genera and 4 subfamilies. Higher abundance was found in plots of coffee plantations and native tree species (Figure 3). Higher diversity was found in plots of exotic and native tree species (Figure 4).

The findings indicated a decreasing in diversity of soil and litter ant species from exotic tree species and coffee plantations to native tree species and varieties of banana plantations.



**Figure 3:** Abundance (%) of soil and litter ants per land use (Figure from collected data)



**Figure 4:** Diversity of soil and litter ants per land use (Figure from collected data)

## 4. Conclusion

There is an important role of exotic tree species and coffee plantations in conservation of soil and litter ant species. Hence, the land use change affects the abundance and diversity of soil and litter ants.

## 5. Future Perspectives

Future studies may be conducted in other regions of Rwanda. They shall also be done in other land uses of Rwanda in order to verify which land use offer better conditions for soil and litter ants.

## 6. Acknowledgments

We thank the Belgian Development Cooperation (BDC) part in Global Taxonomy Initiative (GTI) within the framework of Capacities for Biodiversity and Sustainable Development (CEBioS) for the financial support for taxonomic training and access to entomological collections at the Royal Belgium Institute of Natural Sciences (RBINS).

We also thank UR-ARES (University of Rwanda - Académie de Recherche et d'Enseignement Supérieur) and the UR-Sweden programme (Central research grants sub-program) for the financial support for field data collection.

## 7. References

Nsengimana V, B.A.Kaplin, F. Francis, M.M Lombart Kouakou, Dekoninck Wouter, and D. Nsabimana. 2018. Use of Soil and Litter Ants (Hymenoptera: Formicidae) as Biological Indicators of Soil Quality Under Different Land Uses in Southern Rwanda. *Environmental Entomology*, 47(6), 2018, 1394–1401 doi: 10.1093/ee/nvy144