

## Objective

The software Tree Analyser (TA) was developed to estimate total leaf area of isolated trees from digital photography (Phattaralerphong and Sinoquet, 2005). Estimations are based on gap fraction inversion. Our objective was to test this method to estimate total and browsed leaf area of three tree species grown in an agroforestry system for livestock feeding.

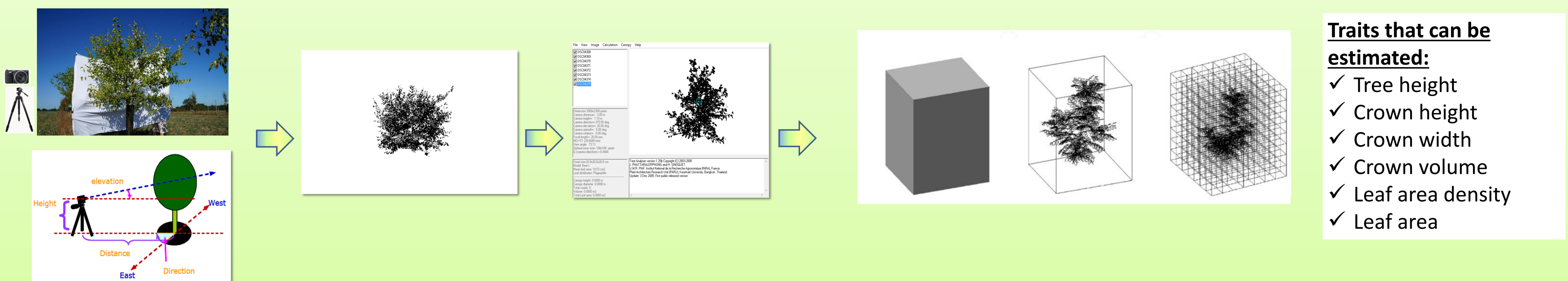
## Materials and methods

- ✓ Two branches were collected on 4 trees per species in June and August.
- ✓ Pictures were implemented on branches and trees.
- ✓ Leaf area (LA) was measured using the image processing software ImageJ

3 Species studied, 4 years old



Implementation and analysis of pictures on Tree Analyser



**Traits that can be estimated:**

- ✓ Tree height
- ✓ Crown height
- ✓ Crown width
- ✓ Crown volume
- ✓ Leaf area density
- ✓ Leaf area

## Results

### I) Branch measurements

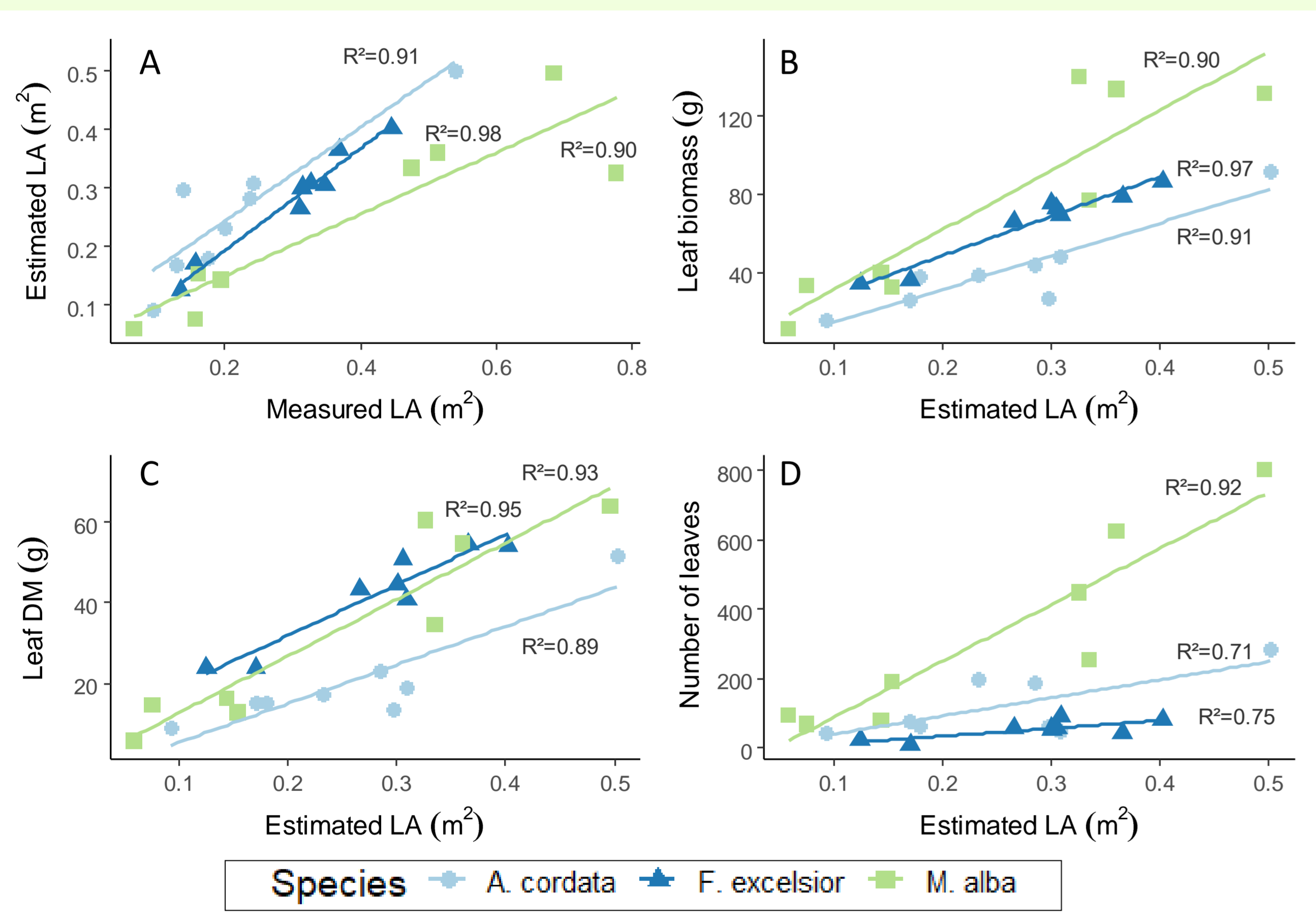


Figure 1 Relationship between estimated LA and measured LA (A), leaf biomass (B), Leaf dry matter (C) and the number of leaves (D)

### II) Tree measurements

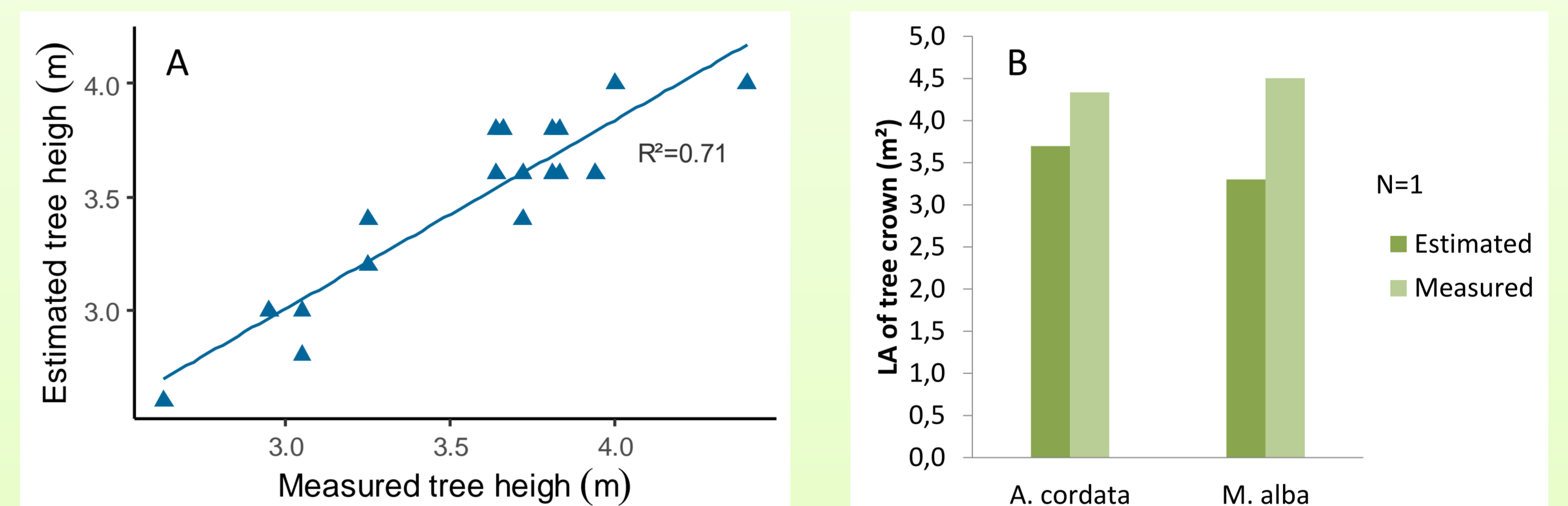


Figure 2. Comparison of measurements and estimations using TA of tree height (A) and LA (B).

Branches: reliable estimates obtained between estimated LA and measured LA, leaf fresh biomass and DM and the number of leaves

Trees: reliable estimates of total height

LA was estimated with an error rate of 14,7% for *A. cordata* and 26,7% for *M. alba*

## Conclusion

- ✓ The method allows fast and non-destructive monitoring of leaf area of trees grown in an agroforestry system. Taking into account the potential to improve accuracy of measurements TA is a promising tool to study the browsing of fodder trees by ruminants.

### References

- Guide d'utilisation: Phattaralerphong and Sinoquet (2005)  
Phattaralerphong et al., (2006) *Tree Physiology* 26, 1123–1136  
Phattaralerphong and Sinoquet (2005) *Tree Physiology* 25, 1229–1242