



(@C.Fassinou)

Impact of tree on the growth of the herbaceous layer of Sahelian savannah. A UAV based approach.

1- Context

Sahel: region south of Sahara (150 mm to 600 mm of rain per year).

Natural vegetation: feed source of livestock.

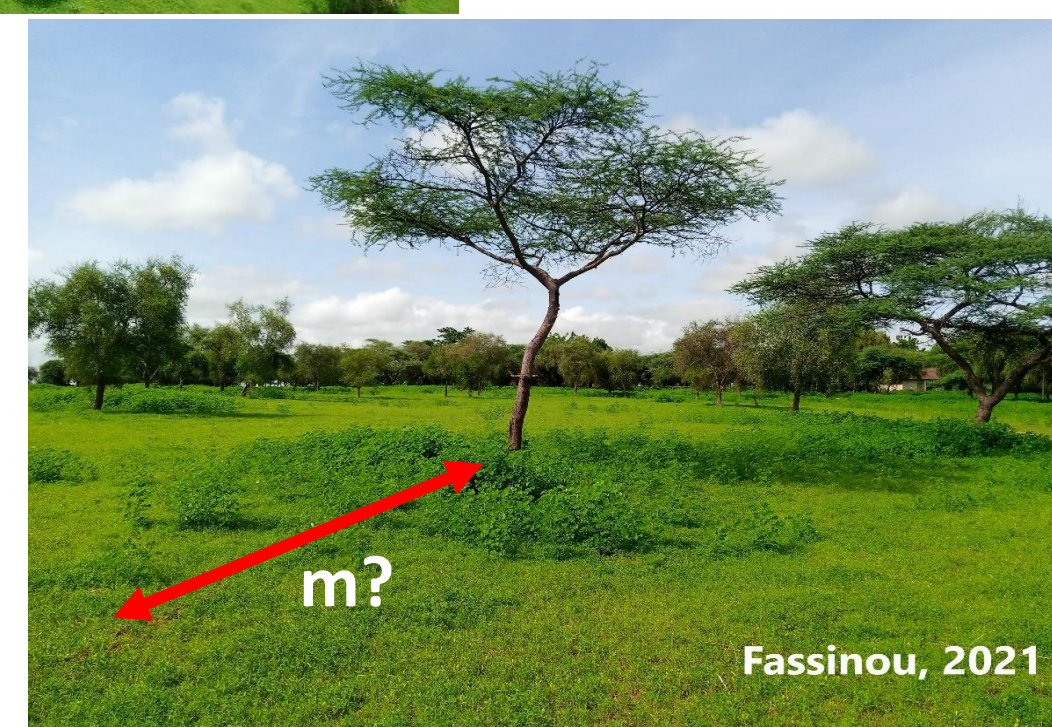
Natural vegetation: annual herbs species and scattered trees.

Tree has a positive impact on the development of the herbaceous layer. (Akpo et al., 2003)

Distance of trees impact on the herbaceous layer unknown.



Taugourdeau, 2018



Fassinou, 2021

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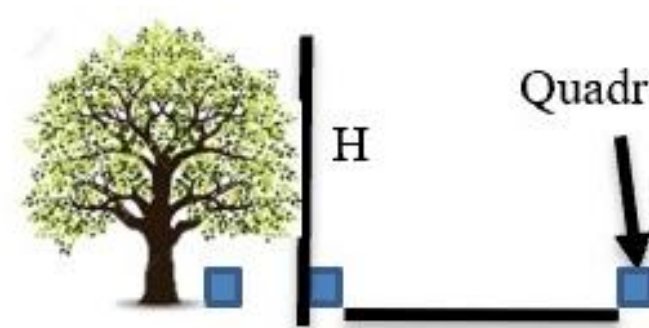
Question: How far do trees influence the herbaceous layer of Sahelian ecosystem?

2- Material and methods

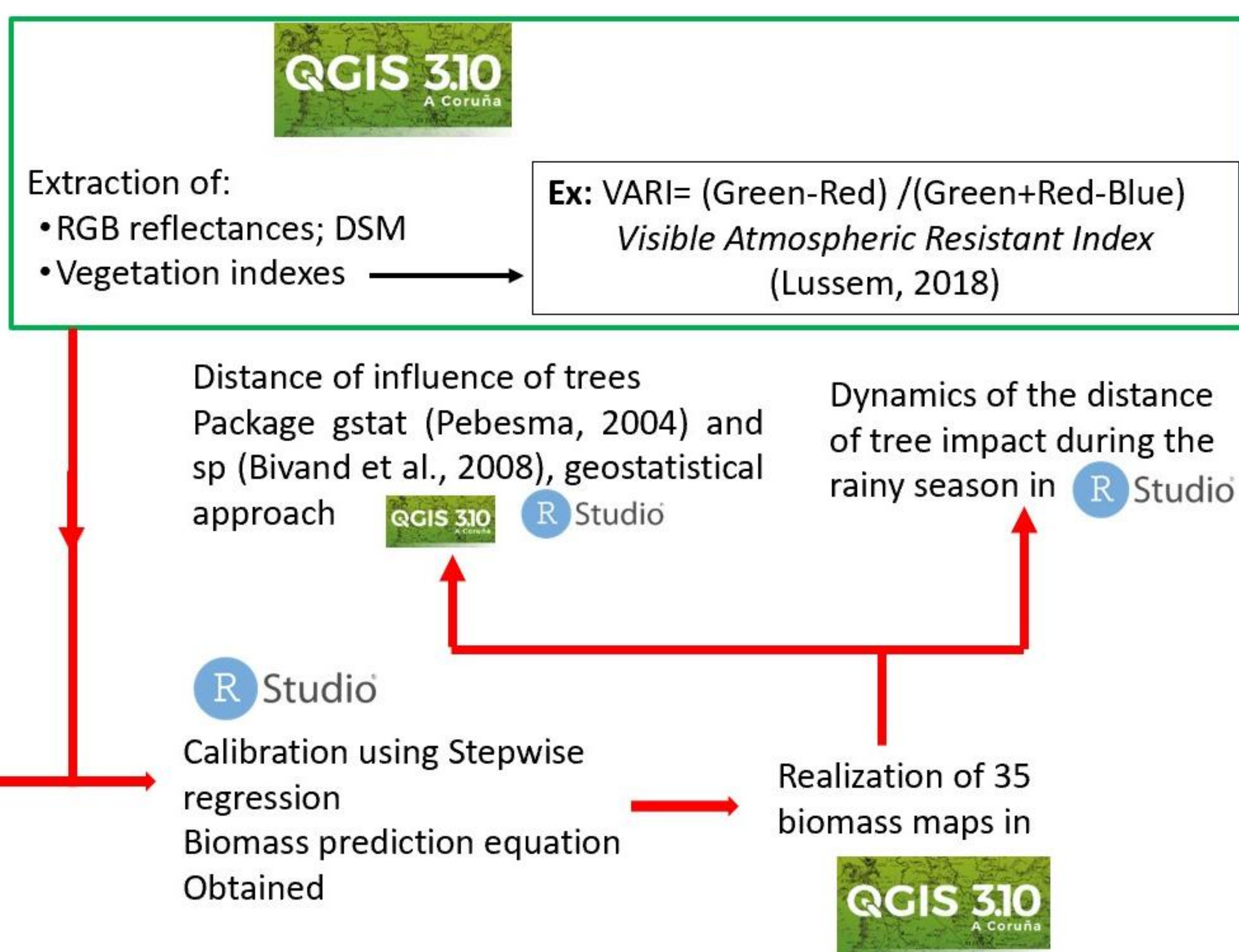
- A drone flight and biomass harvest every 2 days on 1ha plot in the Dahra ISRA station (15°21' N 15°26' W).



Geospatial image collected by ANAFI drone and 3D maps are produced in



Fresh and dry biomass measured in 3 quadrats of 1 m² around trees



3- Results and discussion

- Predictive equation for biomass variation: $-0.0054(\text{Red}) + 0.0047(\text{Green}) + 0.0032(\text{Blue}) + 0.78(\text{NDBRI}) - 0.29$
- Model of biomass prediction significant: P-value = $3.95e-13$, R-square = 0.64 (Figure1)

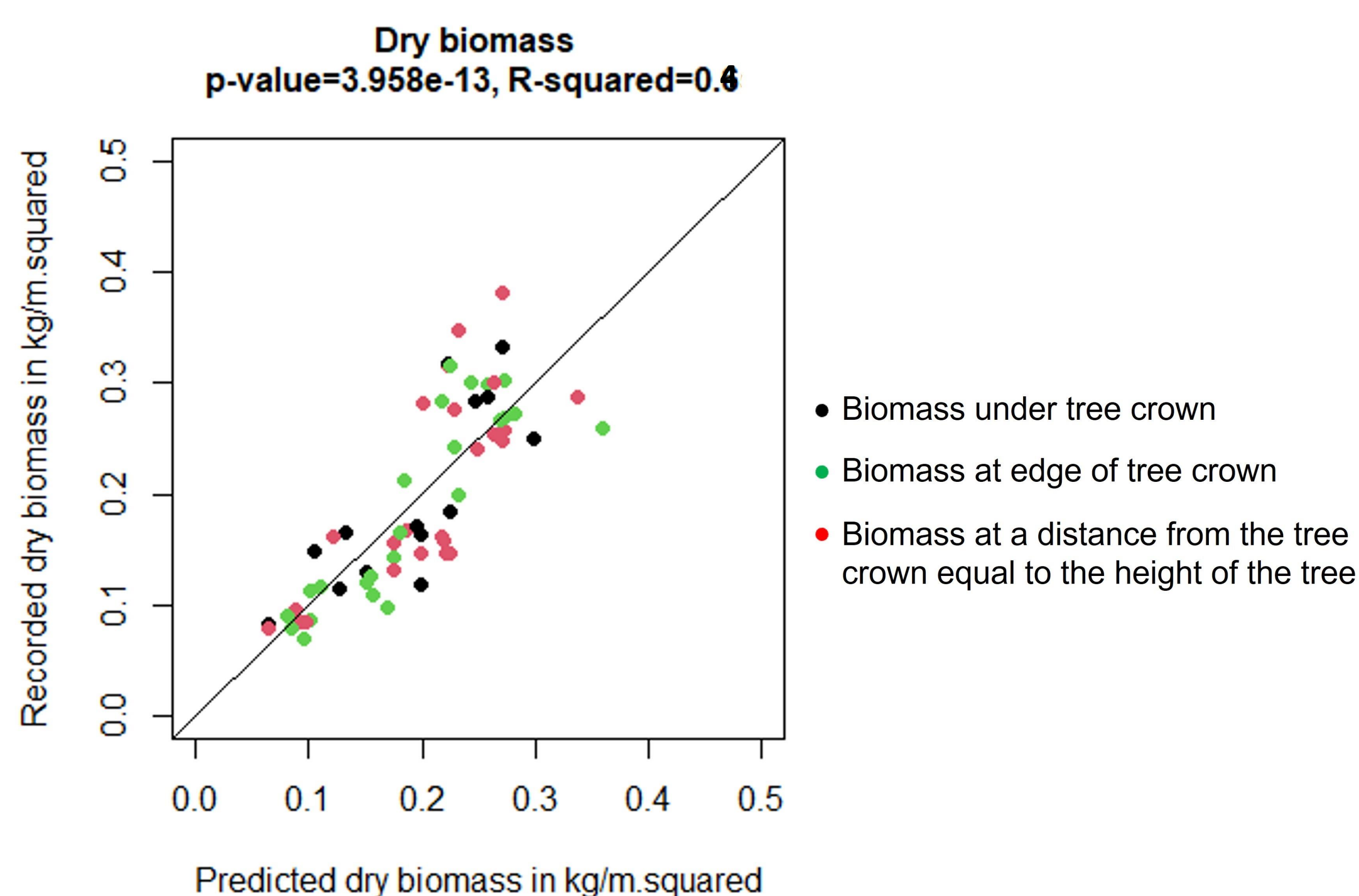


Figure 1 : Stepwise regression on the dry biomass.

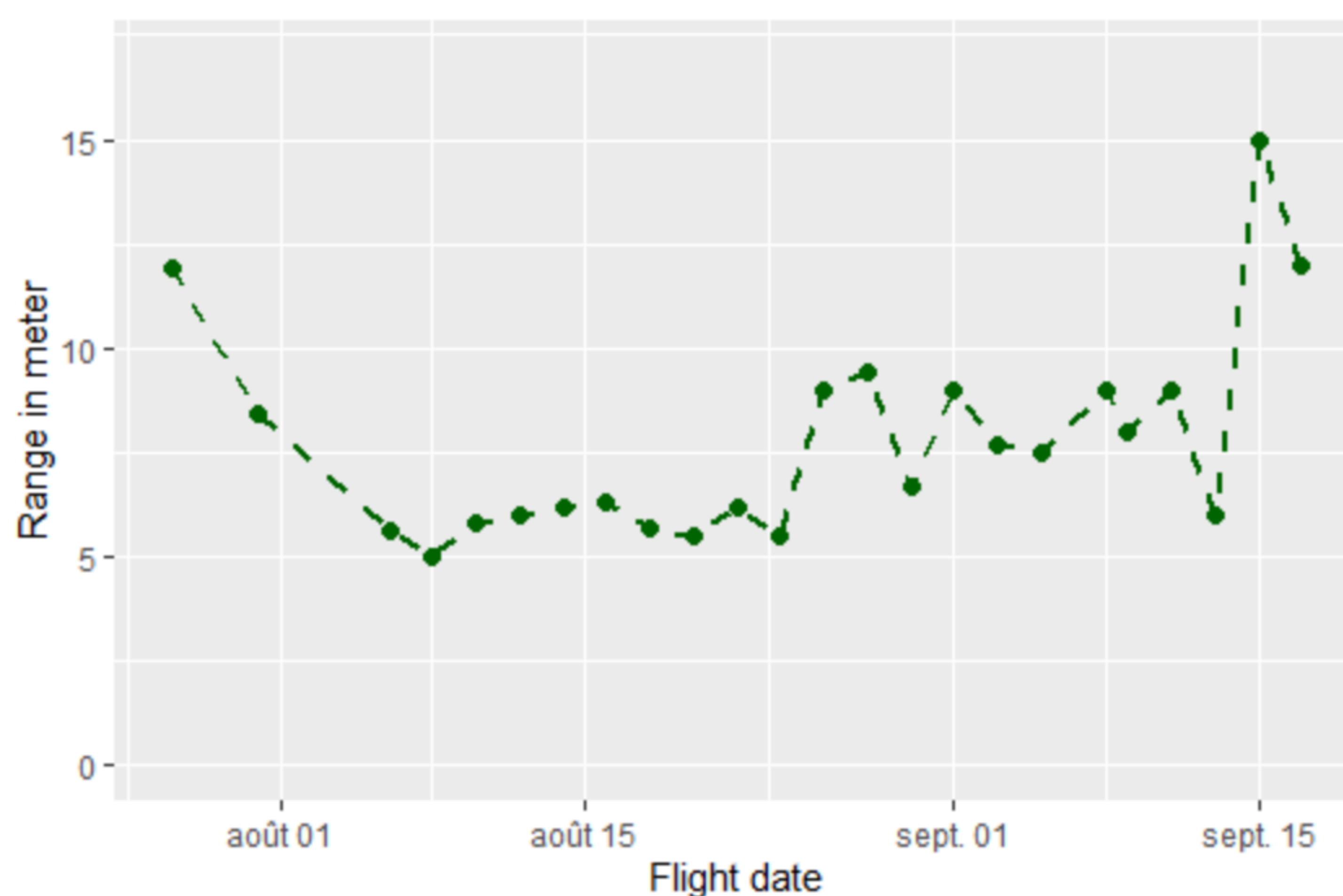


Figure 2: Variation in tree influence distance (Range) from the crown edge on the plot over the season.

- Trees have impact on the growth of the herbaceous layer outside the canopy (Figure2). (Roupsard et al., 2020)
- Study incorporates a temporal dimension of the tree impact (Figure2).
- The distance of trees impact varies between 5 to 15 meters from the tree crown (Figure2).
- This shows that trees impact is due to the fertility effect of tree.
- Trees provide litter and root residues that help maintain soil organic matter levels and improve fertility (Young, 1995).