

# *Faidherbia albida* Biomass, Growth, Litter

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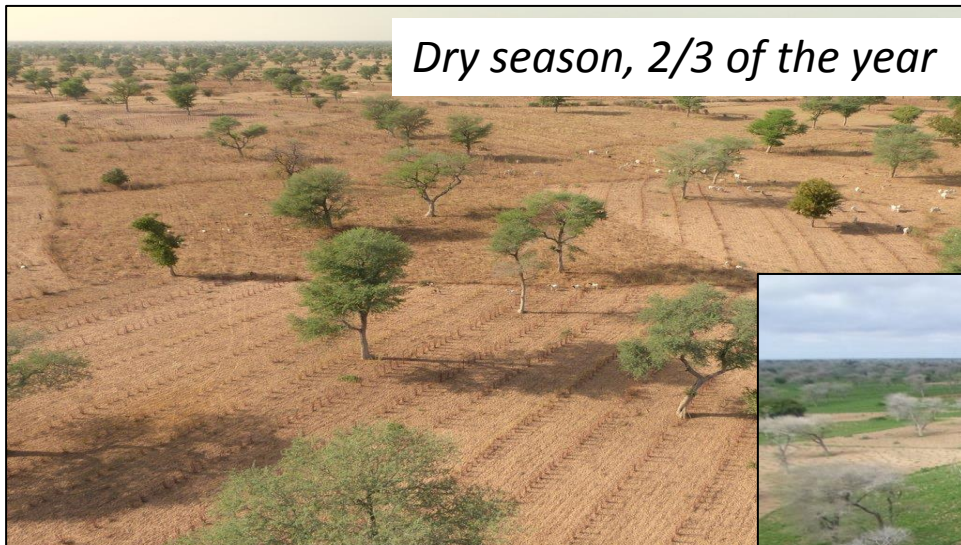
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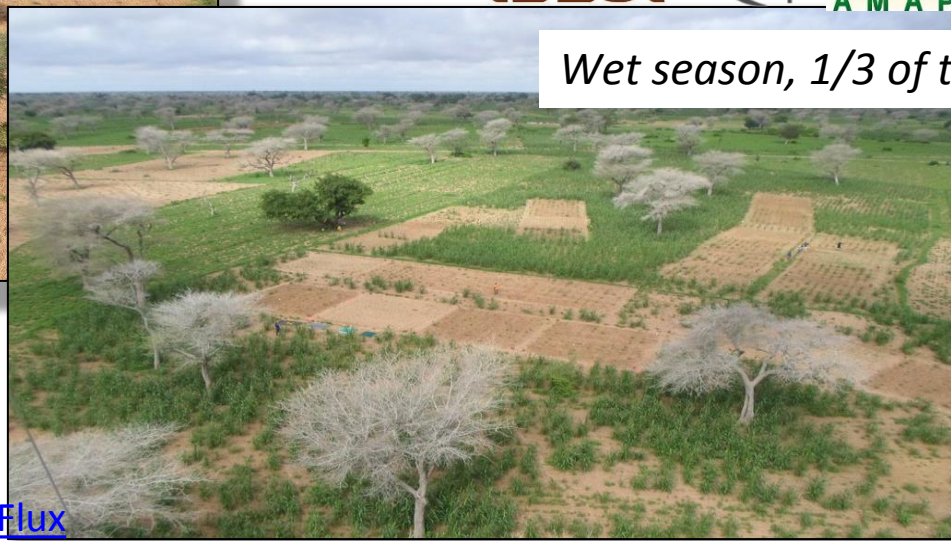
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“*Faidherbia-Flux*”: A long-term Collaborative Observatory on food security, GHG fluxes, ecosystem services, mitigation and adaptation in a semi-arid agro-silvo-pastoral ecosystem (groundnut basin in Niakhar/Sob, Senegal)

Dry season, 2/3 of the year



Wet season, 1/3 of the year



“*Faidherbia-Flux*” Web site :  
<https://lped.info/wikiObsSN/?Faidherbia-Flux>

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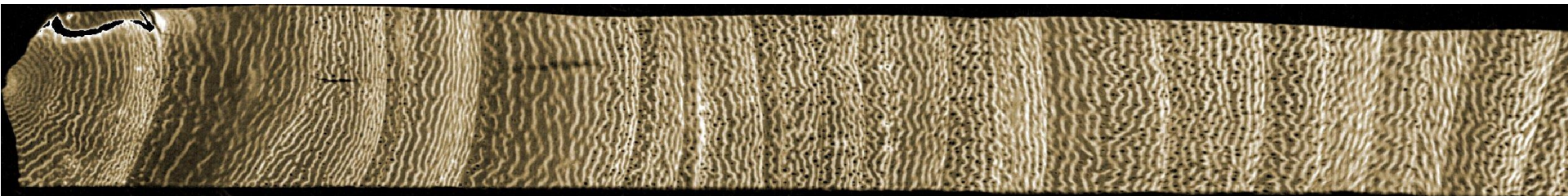
# *F. albida* growth monitoring: S. Diatta; C.O. Samb; R. Marchal; J. Gérard, D.

Dougba; J. Ruelle

- 10 discs sampled from recently fallen-dead *Faidherbia* trees

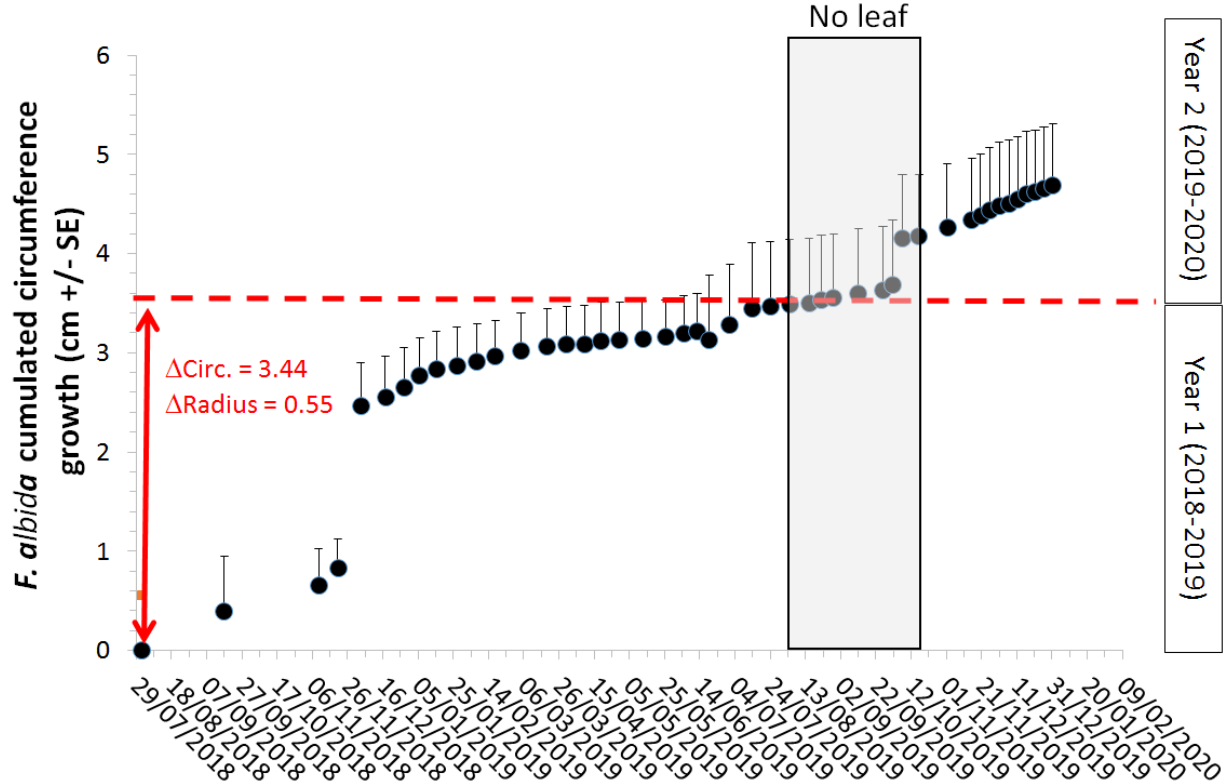


- Ring analysis in INRA-Nancy and CIRAD (BioWoob) [seydoudiatta1@yahoo.fr](mailto:seydoudiatta1@yahoo.fr)



# Method 1: monitoring 12 Fa. trees from the antenna footprint

- Method 1: 12 trees monitored in circumference at breast height during > 1 year, every 10 day (Faidherbia-Flux)

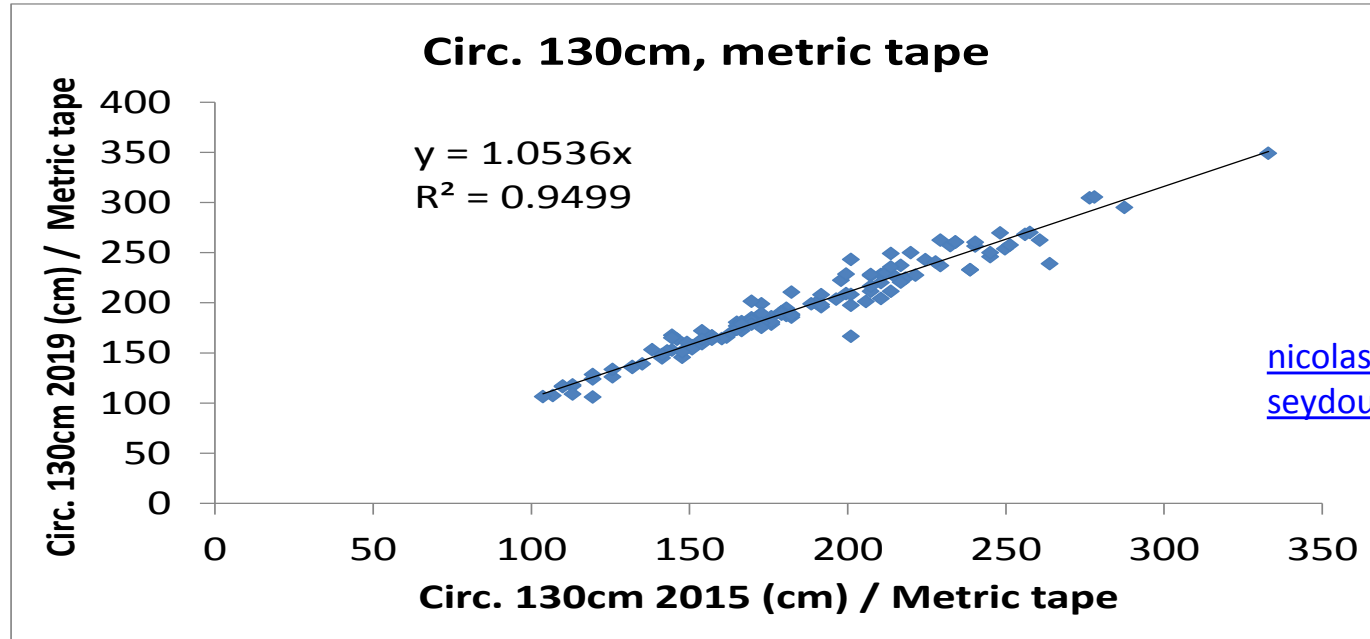


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We observed a radial increase by around 0.55 cm yr<sup>-1</sup>

## Method 2: Surveying 189 Fa. trees, in 2015 and in 2019

- Method 2: The same 189 trees from Sob measured for circumference at breast height in 2015 (N. Montes) and in 2019 (S. Diatta)



From the tight relationship, we argue that the same trees were actually surveyed.

We observed a circumference increase in 2019, by around 5%

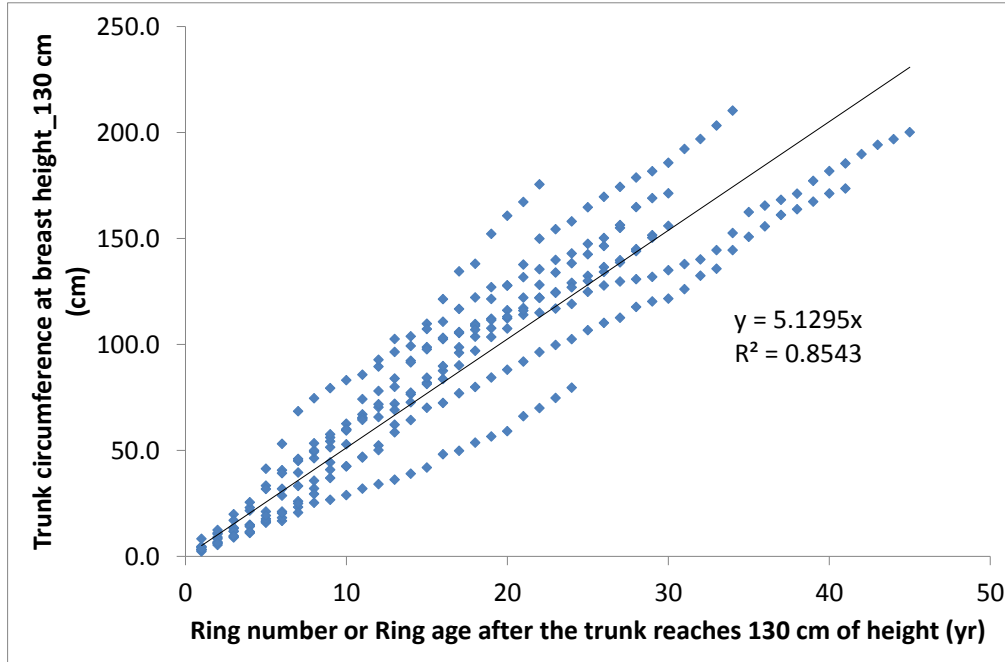
It is linear, so the radius increase does not seem to depend on the initial circumference

The average radial increase is  $0.42 \text{ cm yr}^{-1}$

# Method 3: Dendrochronology

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- **Method 3:** 10 discs sampled from 10 fallen-dead trees and analyzed for ring width and density



- The trajectory of circumference growth was reconstructed for every 10 trees
- All trajectories were quite consistent
- Circumference at breast height can be used to estimate the amount of rings (or Fa. tree age after the trunk has reached a height of 130cm)
- Ring radius growth declines from 0.88 (rings 0-9) to  $0.58 \text{ cm yr}^{-1}$  (rings 40-49)

# A synthesis on *F. albida* radial growth and ring #

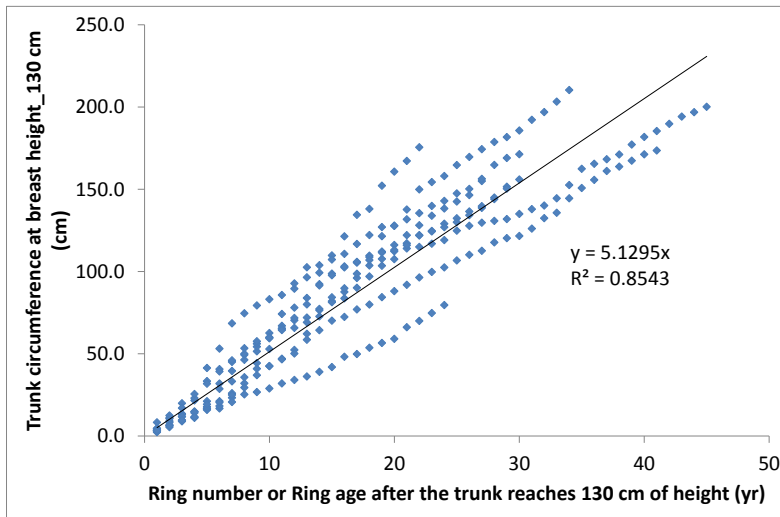
3 methods were compared to estimate annual ring growth

- **Method 1:** 12 trees monitored in circumference at breast height during > 1 year, every 10 day (Faidherbia-Flux) (G. Demarchi, S. Diatta)
- **Method 2:** 189 trees from Sob surveyed for circumference at breast height in 2015 (N. Montes) and in 2019 (N. Montes, S. Diatta)
- **Method 3:** 10 discs sampled from 10 fallen-dead trees and analyzed for ring width and density (D. Dougabka, J. Ruelle, S. Diatta, C.O. Samb)

#Method	Method	Cric. Breast height_Average (cm)	# of rings after the tree reached 130 cm of height	Annual ring growth (cm)
1	12 trees monitored in Faidherbia-Flux	158	31	0.55
2	189 trees surveyed in 2015 and in 2019	198	39	0.42
3	Dendrochrone 0-9 yr	26	5	0.88
3	Dendrochrone 10-19 yr	78	15	0.93
3	Dendrochrone 20-29 yr	130	25	0.71
3	Dendrochrone 30-39 yr	182	35	0.76
3	Dendrochrone 40-49yr	234	45	0.58

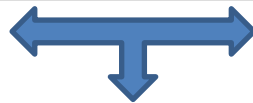
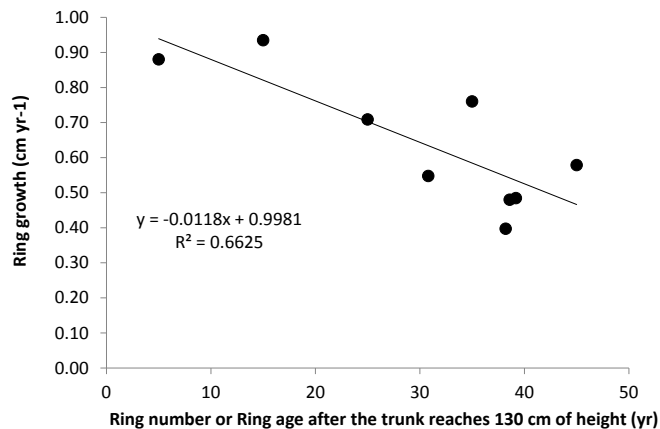
Convergence of results for annual ring growth

# A synthesis on *F. albida* DBH, Radial Growth and Ring #

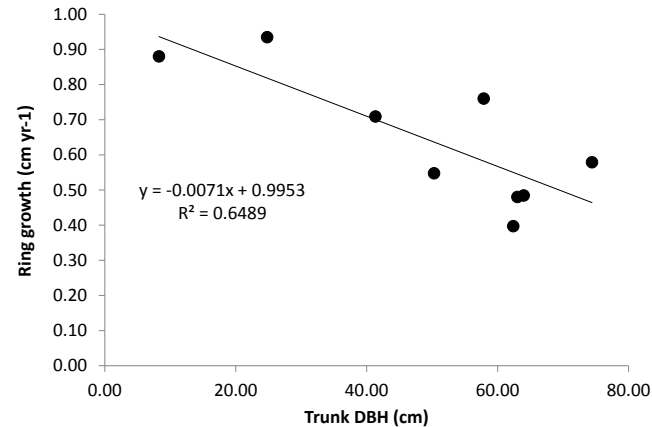


Circumf. is proportional to ring #

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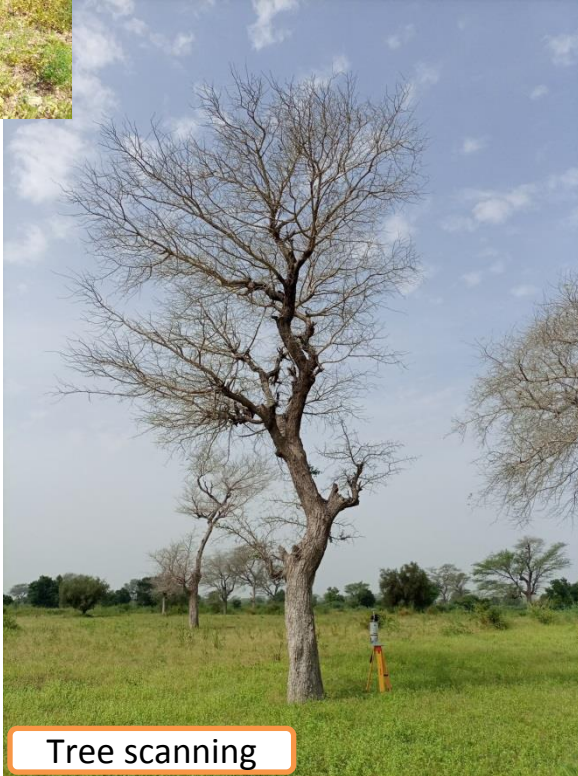
Ring growth and tree age (ring#) can be estimated from DBH





# Lidar, Photogrammetry and radial growth data collection

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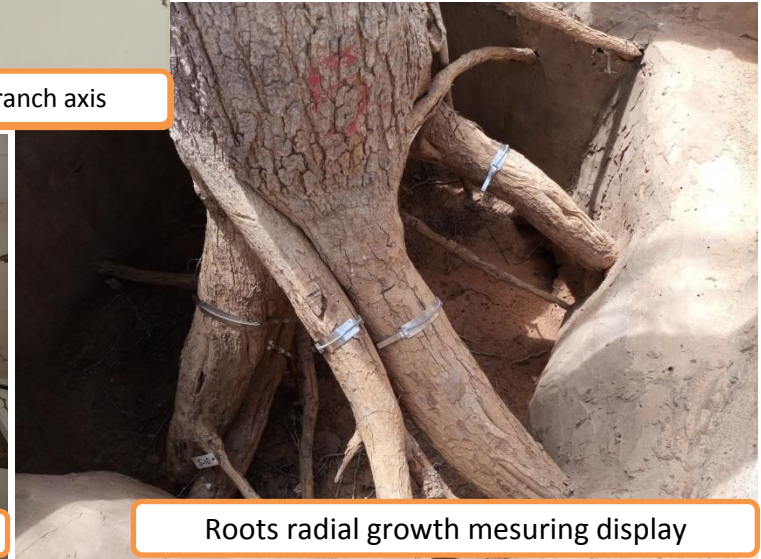
Tree scanning



Numbering of branch axis

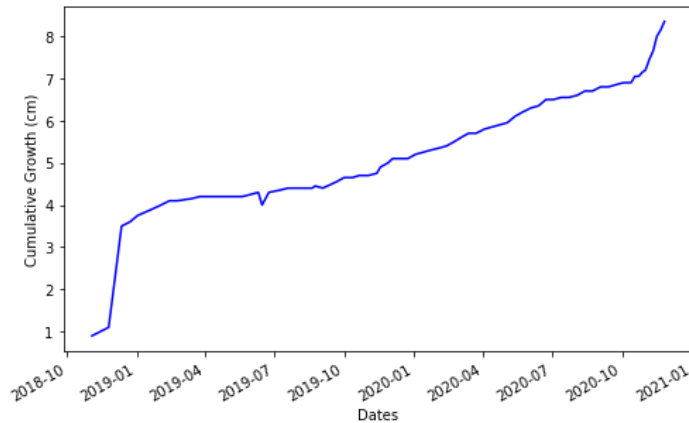
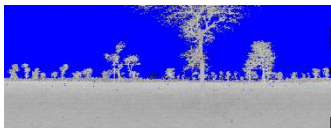


Branch MTG

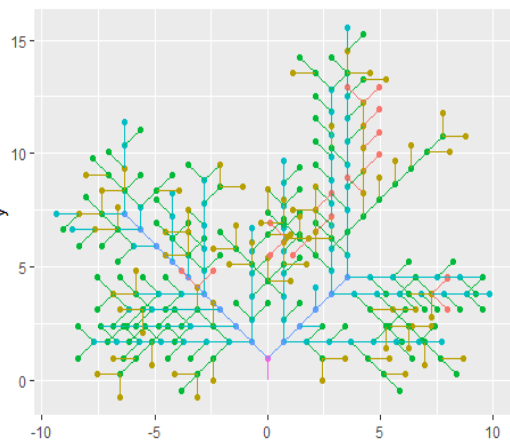
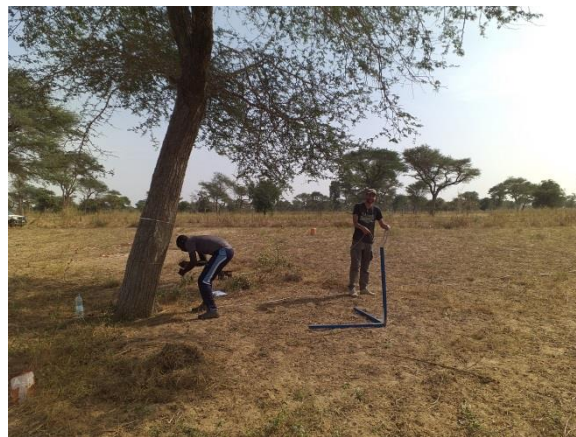


Roots radial growth measuring display

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*Faidherbia* trunk growth (2018-2021)



MTG exemple

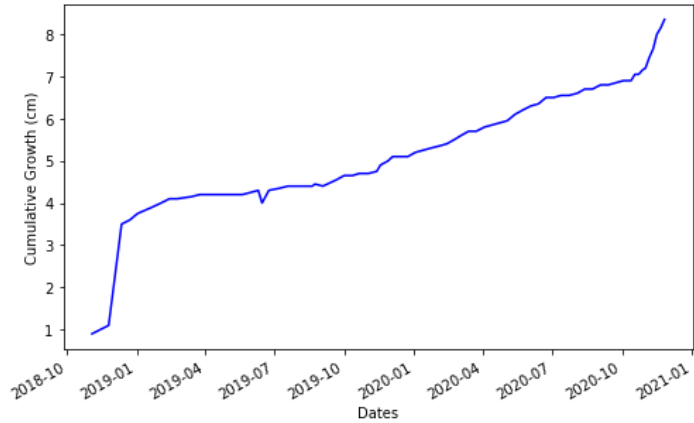
Lidar Tree point cloud

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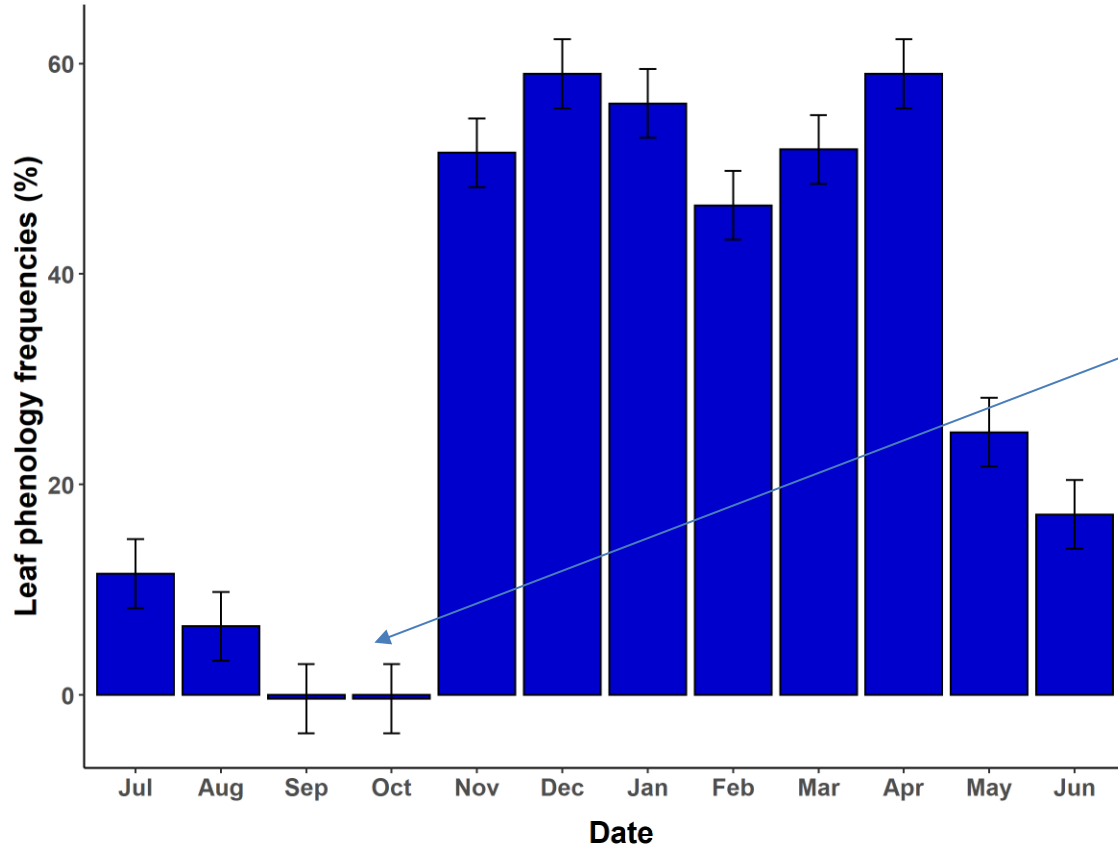


*Faidherbia* trunk growth (2018-2021)



Photogrammetry by drone

## Leaf phenology

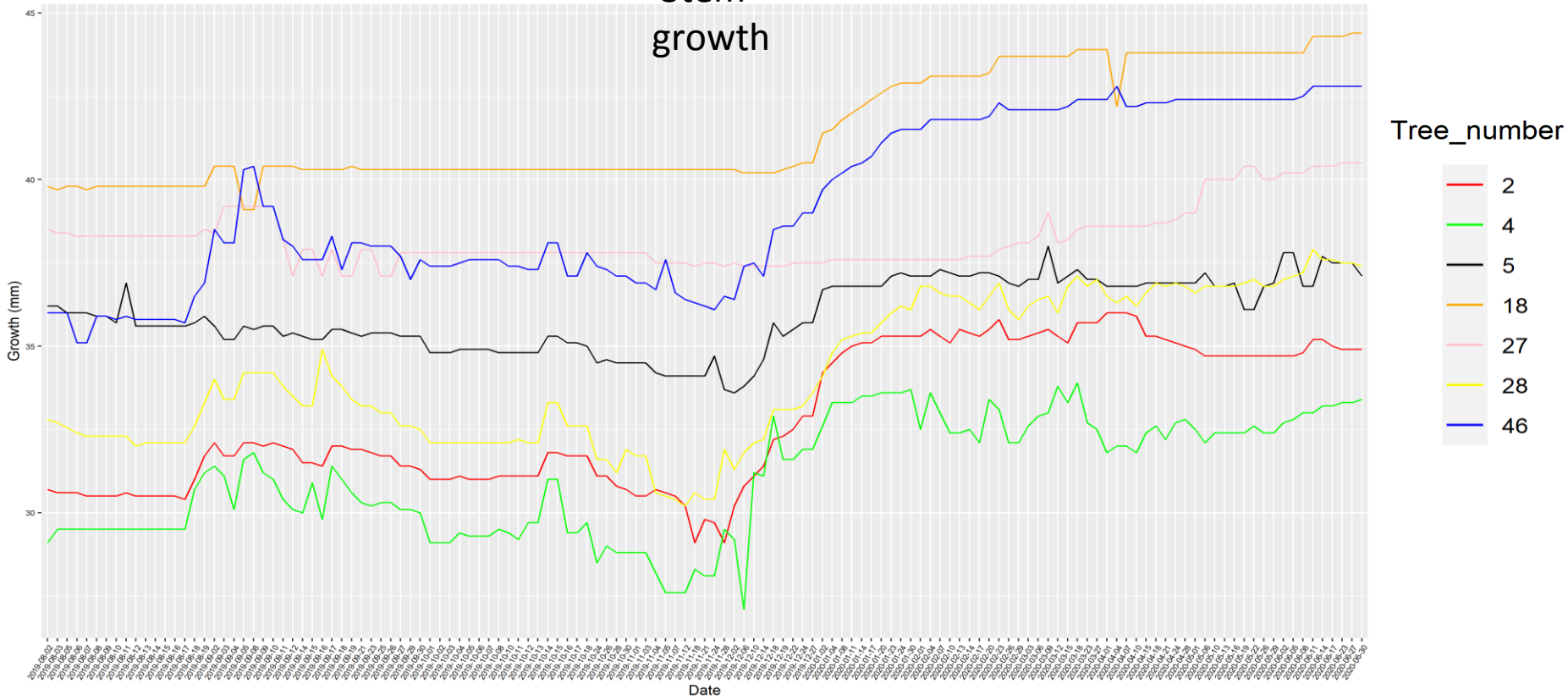


**Fig. 1:** Seasonal variation of leaf phenology from July 2019 to June 2020

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# Dendrometer of the stem

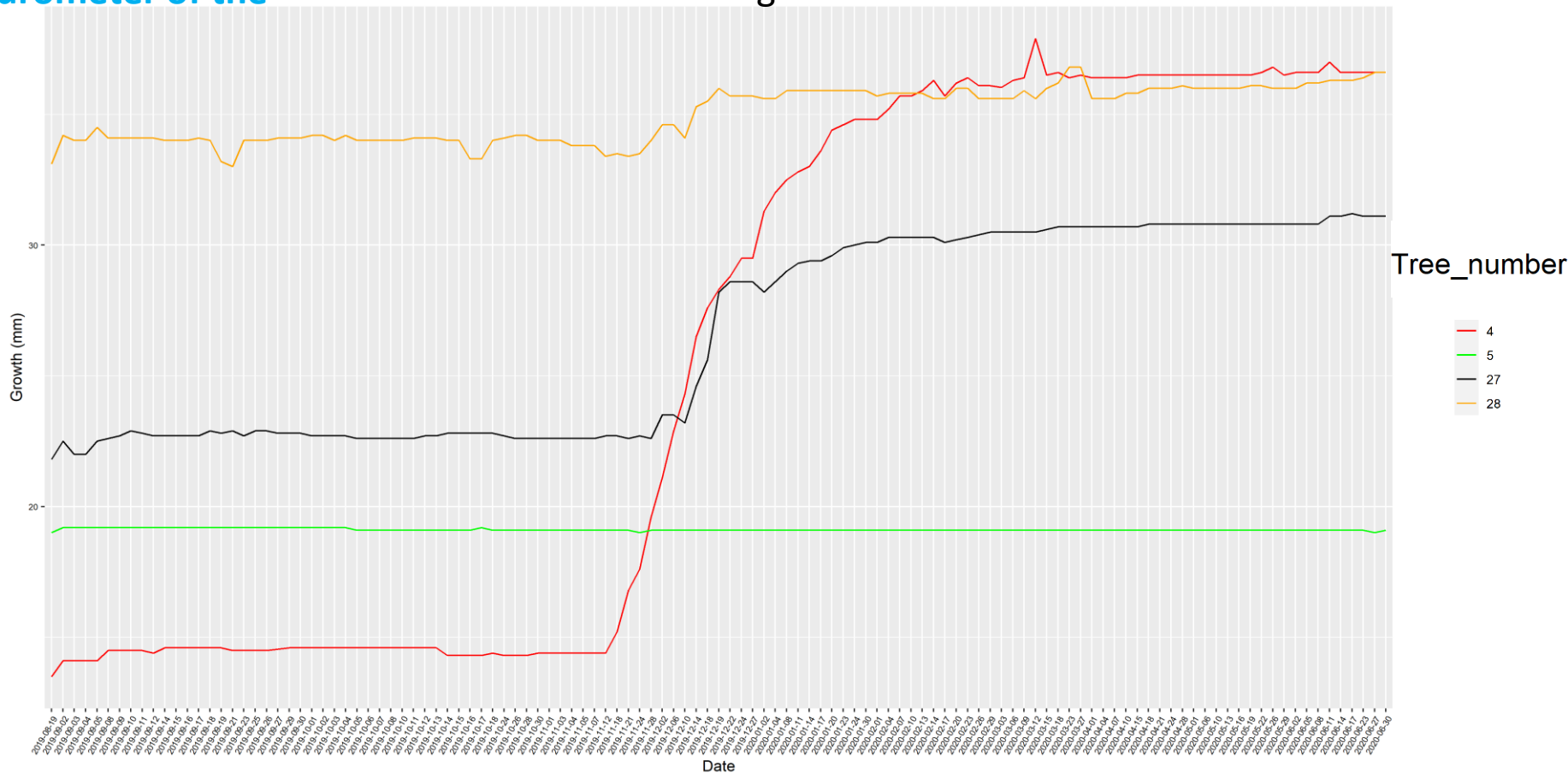
Stem growth



Growth varied among the trees **Fig. 4:** Variation stem growth from August 2019 to June 2020

# Dendrometer of the root

## Root growth



**Fig. 5:** Variation root growth from August 2019

to June 2020

[fag@ign.ku.dk](mailto:fag@ign.ku.dk) (Fatou Gning)

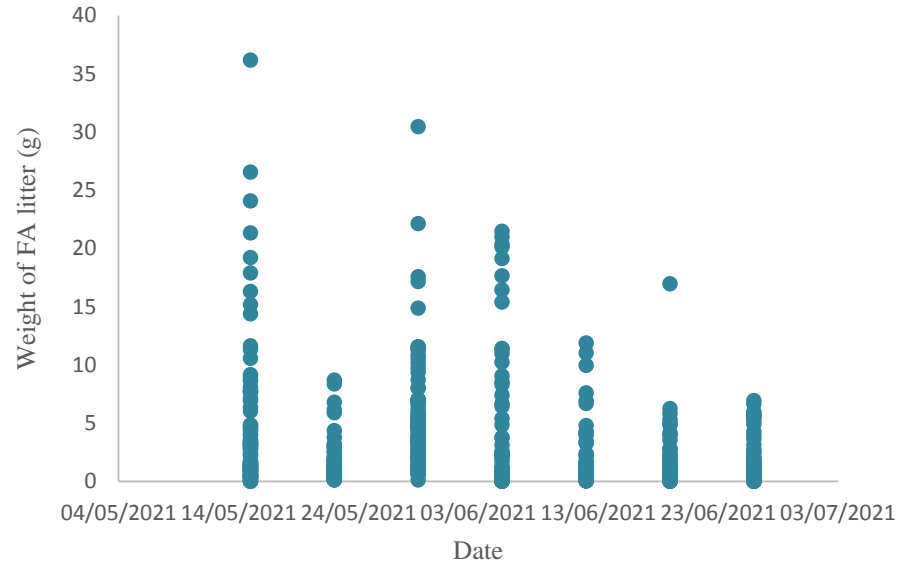
Roots increased from 2019-2020 but varied within individual trees

# Quantifying litterfall and distribution over a *Faidherbia albida* parkland in Senegal

## □ Collection of *Faidherbia Albida* litter



Overview of the 100 collectors installed over the parkland



Amount of AF litter over one yers period time  
(in progress)

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## Articles

## Communications

## Academic Reports

- Diatta, S., 2021. Estimation du stock et du stockage annuel de carbone dans la biomasse aérienne de *Faidherbia albida* (Del.) A chev du parc agroforestier de Sob (Observatoire de Niakhar, Sénégal) : approches par inventaires et dendrochronologie. Senegal, Master en Foresterie et Environnement pour une gestion durable des ressources naturelles. Université de Thiès-ENSA, Thiès, Senegal., soutenu le 06 janvier 2021. 45pp + Annexes. Mention Bien.

## Shared databases

[Faidherbia-Flux Collaboratif\Database](https://baobab.sedoo.fr/)  
<https://baobab.sedoo.fr/>