Assessment of spatial distribution and population health of baobab (*Adansonia digitata* L.) in Kilifi and Kitui Counties, Kenya

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1. Introduction/Background

Baobab (*Adansonia digitata* L.) is a noteworthy fruit tree species (Fig. 1a) with multiple uses found in drylands of sub-Saharan Africa. It is mainly harvested for its nutritious fruits (Fig. 1b) by local communities for home consumption and sale. The naturally dry fruit pulp with a pleasant sweet-sour taste is rich in vitamin C and calcium

Challenges: Increase of international demand for baobab pulp as a 'superfood' may threaten the resource base of the species. Fruits are only harvested from wild trees and little information is found in Kenya on distribution, population health and utilisation level of baobab (Gebauer et al. 2016)

Objective of the study ➔ To assess the abundance, distribution and population health of baobab in Kilifi and Kitui Counties, Kenya

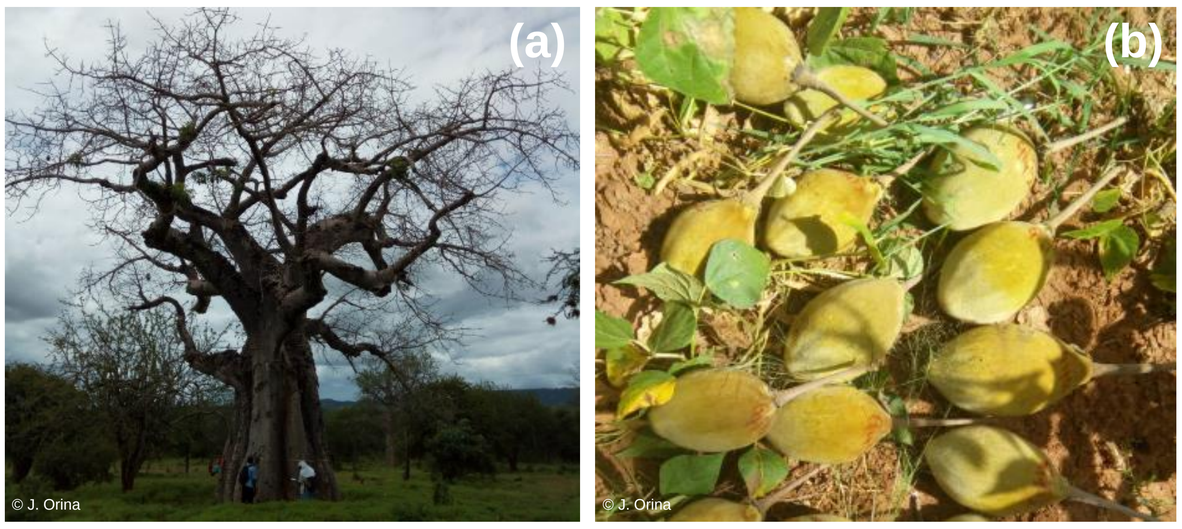


Fig. 1: Baobab tree and mature fruits in Kitui County, Kenya; (a) large tree being surveyed by the research team, (b) baobab fruits collected for the project

2. Methodology

- Study is part of the larger Baofood project (www. baofood.de)
- Regions selected in areas with different agro-ecological zones (AEZs) (Fig. 2)
  - Kilifi County: along Mavueni – Mariakani road (C107) and
  - Kitui County: along Kitui – Kibwezi road (B9)
- Quadrats measuring 0.5 x 3 km randomly selected in the two study regions, → 11 in Kilifi and 16 in Kitui (Fig. 2b and c)
- All baobab trees within the 27 quadrats were documented; coordinates, height and stem diameter at breast height (DBH) recorded
- Densities of small (DBH<1m) and large (DBH≥1m) trees calculated per region
- Size class distribution curves developed following Condit et al. (1998) to assess population health (i.e. sufficient rejuvenation is present)
- Mann-Whitney U-tests used to detect differences between the two regions

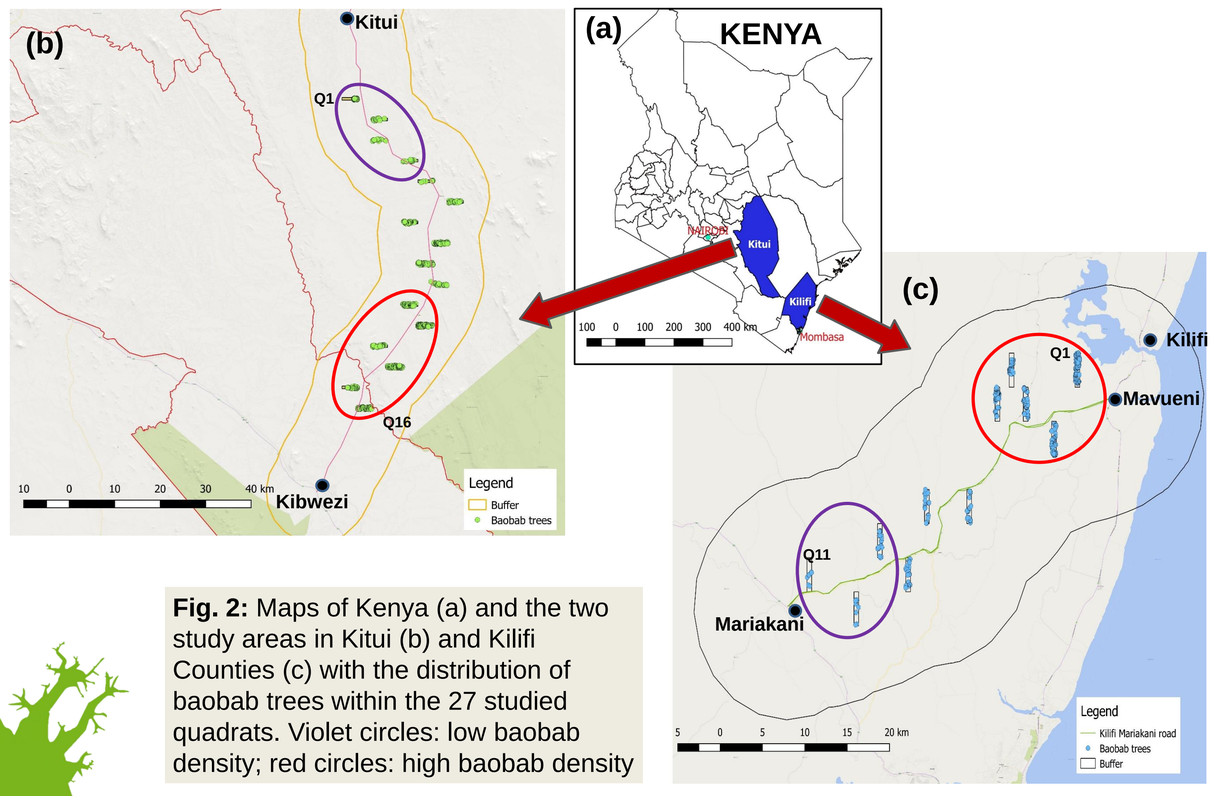


Fig. 2: Maps of Kenya (a) and the two study areas in Kitui (b) and Kilifi Counties (c) with the distribution of baobab trees within the 27 studied quadrats. Violet circles: low baobab density; red circles: high baobab density

3. Results and Discussion

3.1 Abundance and distribution of baobab

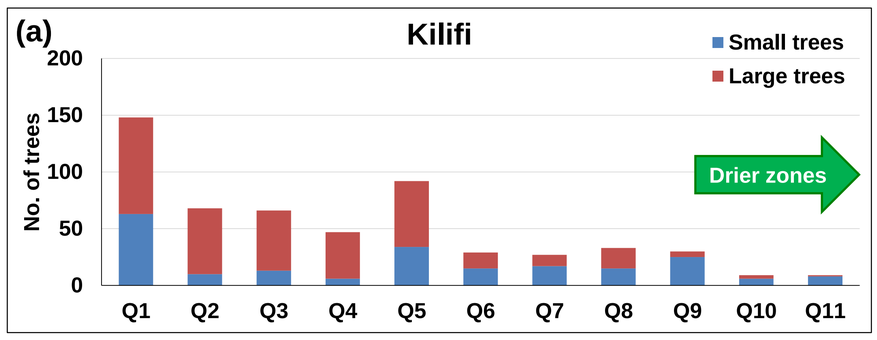
- Tree density and proportion of small trees (DBH<1m) was rather high in both regions with no significant differences between the regions (Table 1)
- Significantly higher density of large trees (DBH≥1m) in the drier AEZs than the wetter ones (median 0.3 trees/ha versus 0.1; p=0.028)

Table 1: Total and median baobab abundance and population characteristics (ranges in brackets) of 27 surveyed quadrats in the two study areas ('small trees' = DBH<1m)

County	Area covered	Total no. of trees	Tree no. per quadrat	Proportion of small trees	Density (trees/ha)	Median DBH per quadrat
Kilifi (11 quadrats)	**1650 ha**	**558**	**33.0[a]** (9-148)	**46%[a]** (13-89%)	**0.2[a]** (0.1-1.0)	**1.4[a]** (0.6-1.8)
Kitui (16 quadrats)	**2400 ha**	**1184**	**58.5[a]** (20-156)	**40%[a]** (6-94%)	**0.4[a]** (0.1-1.0)	**1.4[a]** (0.4-2.4)

Similar letters within one column indicate no significant differences between the respective medians according to U-test

- High variability of total tree numbers and small/large trees per quadrat in both regions (Fig. 3a and b) → distribution of baobab is very patchy



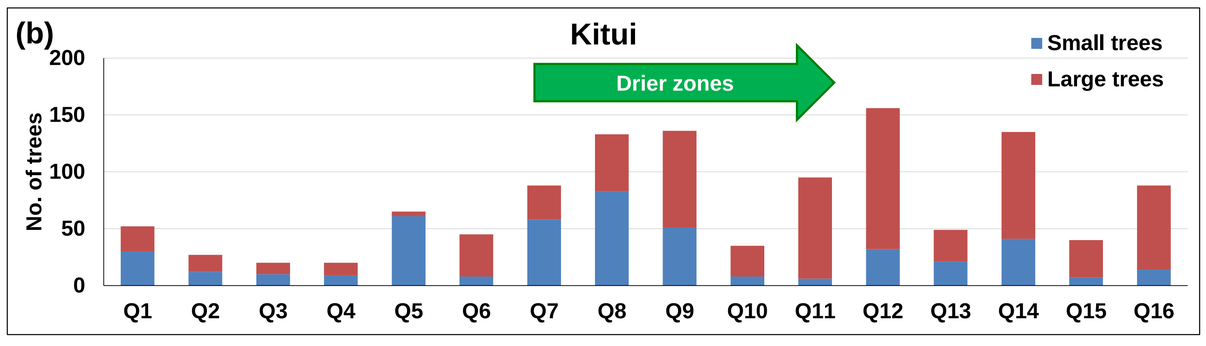


Fig. 3: Number of small (DBH<1m) and large (DBH≥1m) baobabs in the 11 surveyed quadrats (Q) with 558 trees in Kilifi County (a) and in the 16 quadrats with 1184 trees in Kitui County (b)

3.2 Population health

- Both regions showed rejuvenating populations by the reverse J-shaped size class distribution (Fig. 4) with relatively high proportions (~38%) of young trees (DBH<1m) in the two study regions
- A much lower proportion of young tree and therefore a lack of rejuvenation was reported in other studies, e.g. in Malawi ~ 5% only (Cuni Sanchez, 2011)

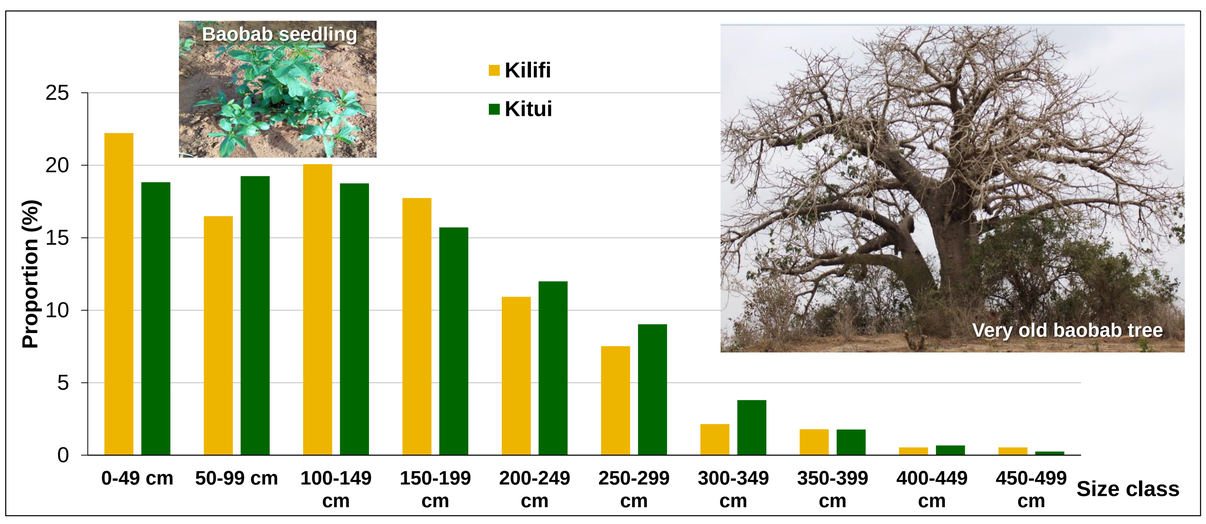


Fig. 4: Baobab DBH size class distribution separately for the research regions in Kilifi County (558 recorded trees in 11 quadrats) and Kitui County (1184 recorded trees in 16 quadrats)

4. Conclusions

- Both study regions show patchy occurrences of baobab and regenerating populations with higher proportions of old trees in drier areas
- Our results can be used for developing a more sustainable approach in the utilization and conservation of baobab in Kenya

References

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