

Human-woodland interactions during the Pre-Aksumite and Aksumite periods in northeastern Tigray, Ethiopia: insights from the wood charcoal analyses from Mezber and Ona Adi

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SM3 – Quantitative and qualitative curves. Gini-Lorenz index.

Two procedures were followed in relation to the effort curves in order to assess the qualitative and quantitative representation of the assemblage in relation to the original deposit (Duque 2004): the former was evaluated by plotting the total number of charcoal specimens analyzed against the floristic diversity found in the assemblage (taxonomic curve), while the latter was tested by plotting the relative frequencies of identified taxa against the number of analyzed charcoal fragments (quantitative curve). In both cases, the assemblages must draw a saturation curve in order to be considered representative (Asouti and Austin 2005); that is, they need to be represented as an exponential function where both the number of taxa and their relative frequencies rise sharply as the first charcoal specimens are examined and then stabilizes as more fragments are identified (Chabal et al. 1999).

The Gini-Lorenz index measures the ecological representativeness of the assemblage (Asouti and Austin 2005). This is achieved by calculating the ratio between the frequency of each taxa and the number of taxa in a given assemblage, hence giving a measure of how the rank and proportion of taxa are represented (Dotte-Sarout et al. 2015) –e.g. 20% of the taxa are represented in 80% of the fragments or plants present. The observation of the Gini-Lorenz index allows comparisons to ecological references, which have established proper representation of given vegetation formation at 20:80 in temperate regions and 25:75 in tropical regions (Chabal et al. 1999; Scheel-Ybert 2005). Out of these parameters the assemblage is to be considered not representative of the past ecological context. Instead, when the index shows a separation trend (e.g. 10:90), it is to be interpreted as a result of strategies of firewood selection by species, whereas approximation trends (e.g. 40:60) have been considered to represent imbalance in the vegetation formation (Chabal 1997; Duque 2004).

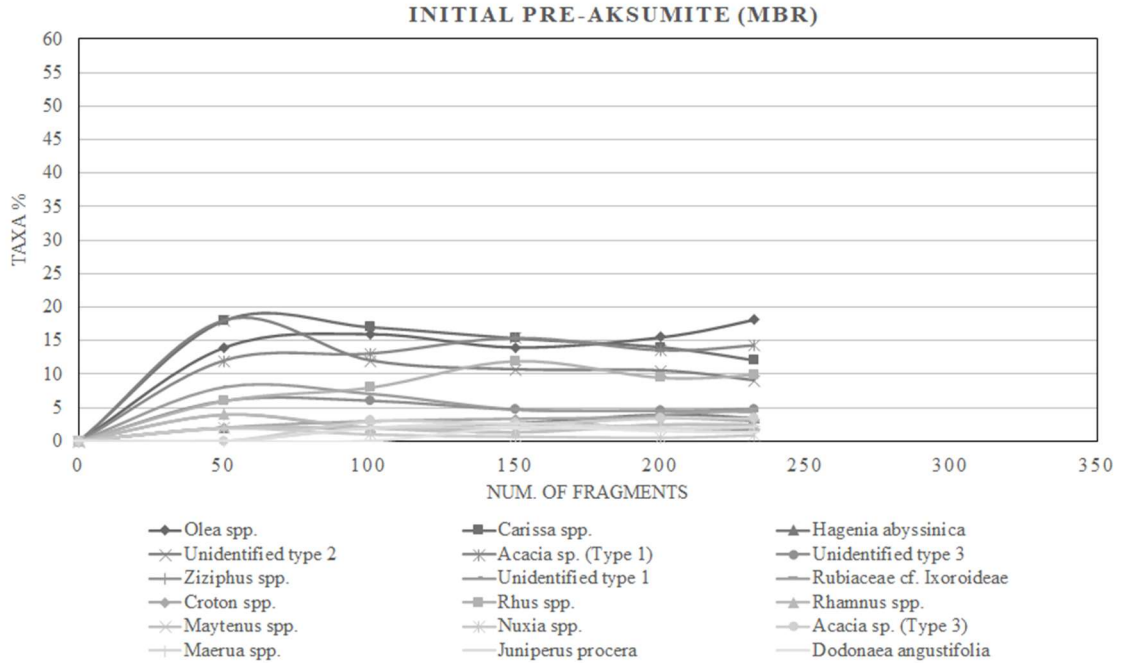


Fig. 1 Quantitative saturation curve from the Initial Pre-Aksumite phase at Mezber.

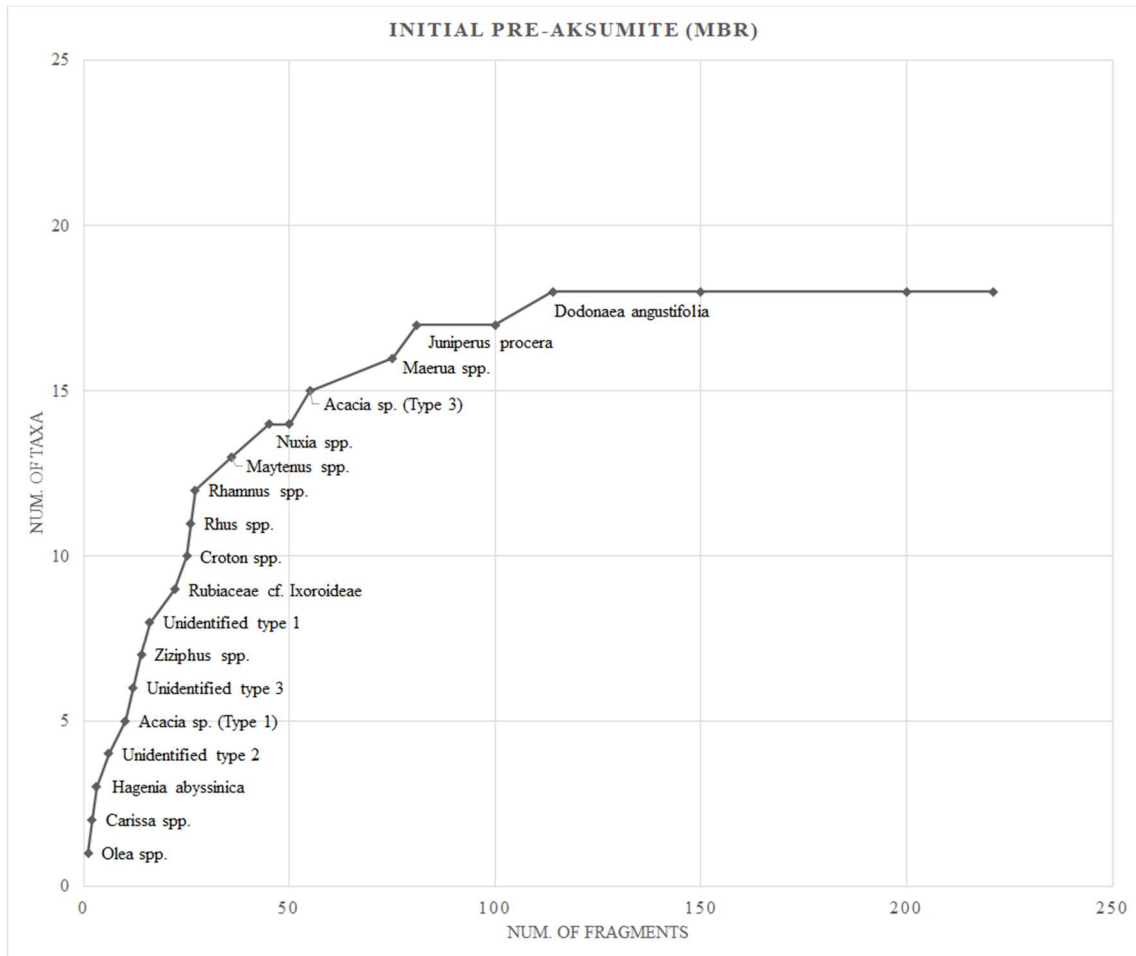


Fig. 2 Taxonomic saturation curve from the Initial Pre-Aksumite phase at Mezber.

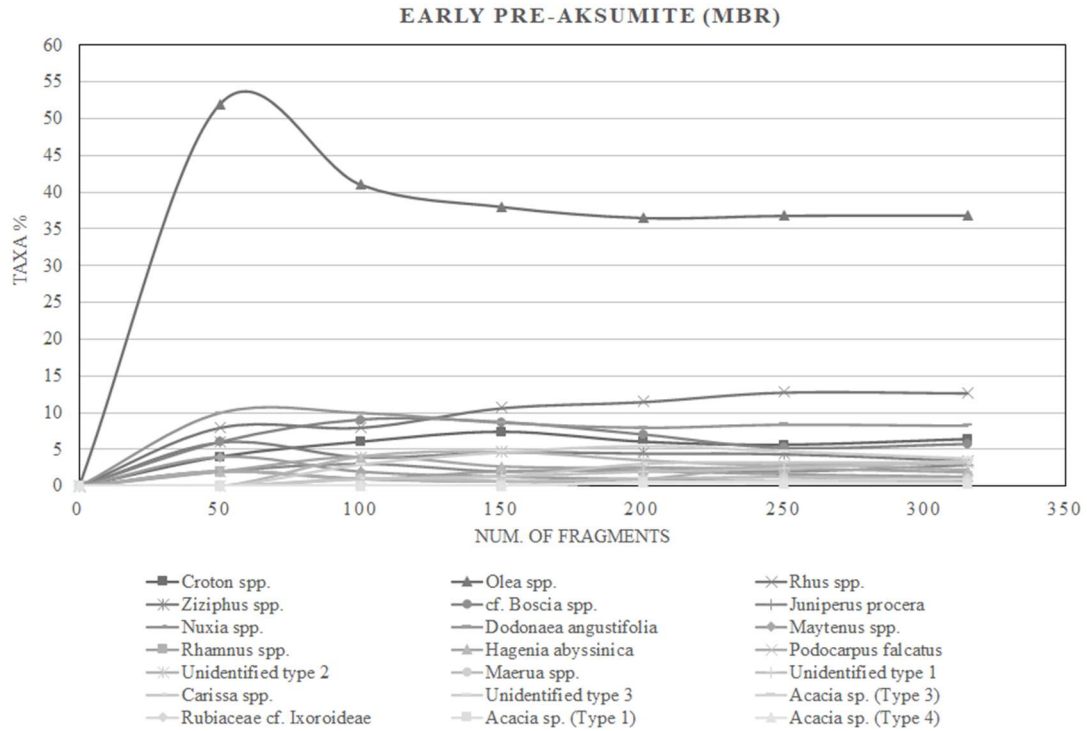


Fig. 3 Quantitative saturation curve from the Early Pre-Aksumite phase at Mezber.

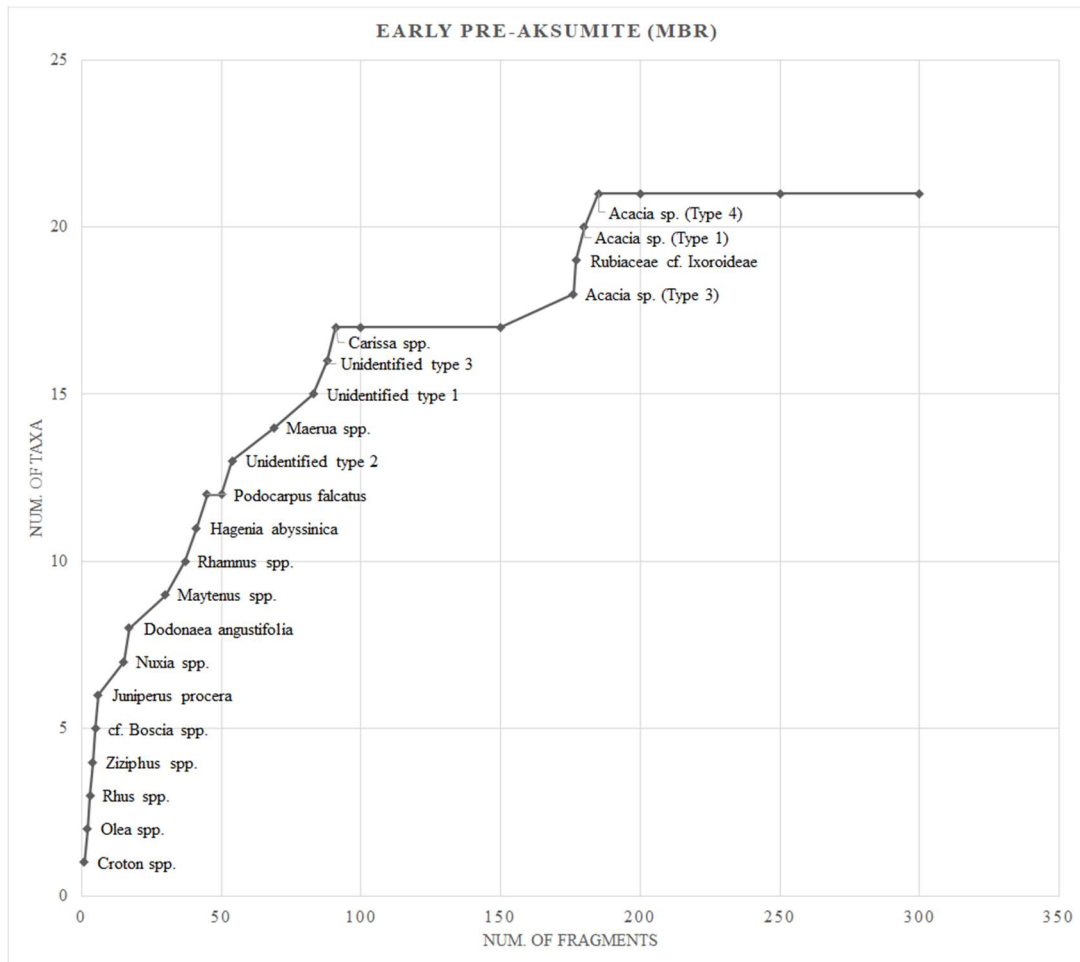


Fig. 4 Taxonomic saturation curve from the Early Pre-Aksumite phase at Mezber.

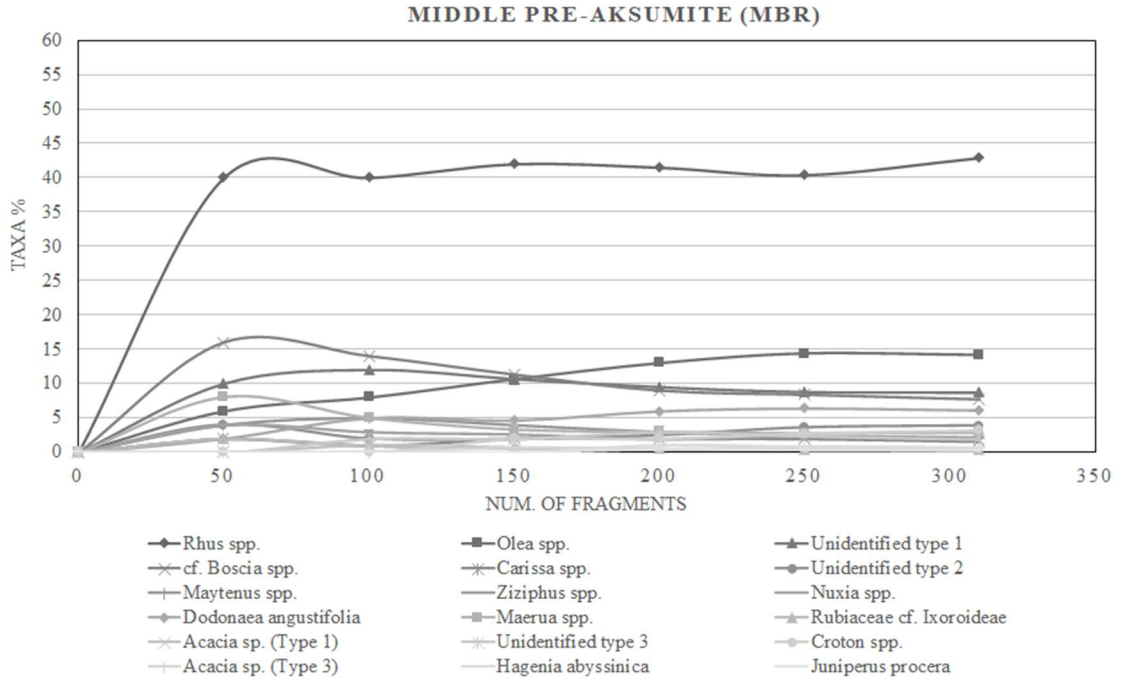


Fig. 5 Quantitative saturation curve from the Middle Pre-Aksumite phase at Mezber.

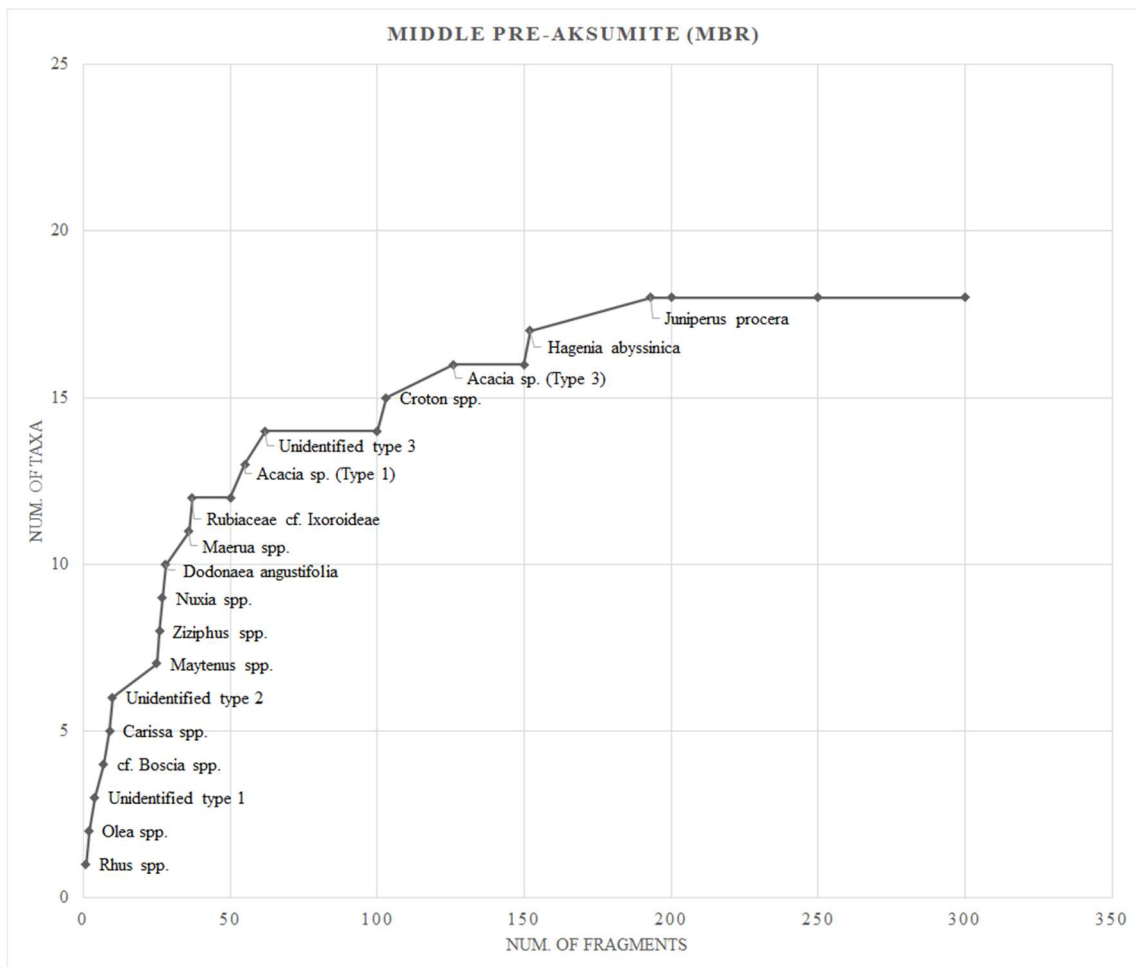


Fig. 6 Taxonomic saturation curve from the Middle Pre-Aksumite phase at Mezber.

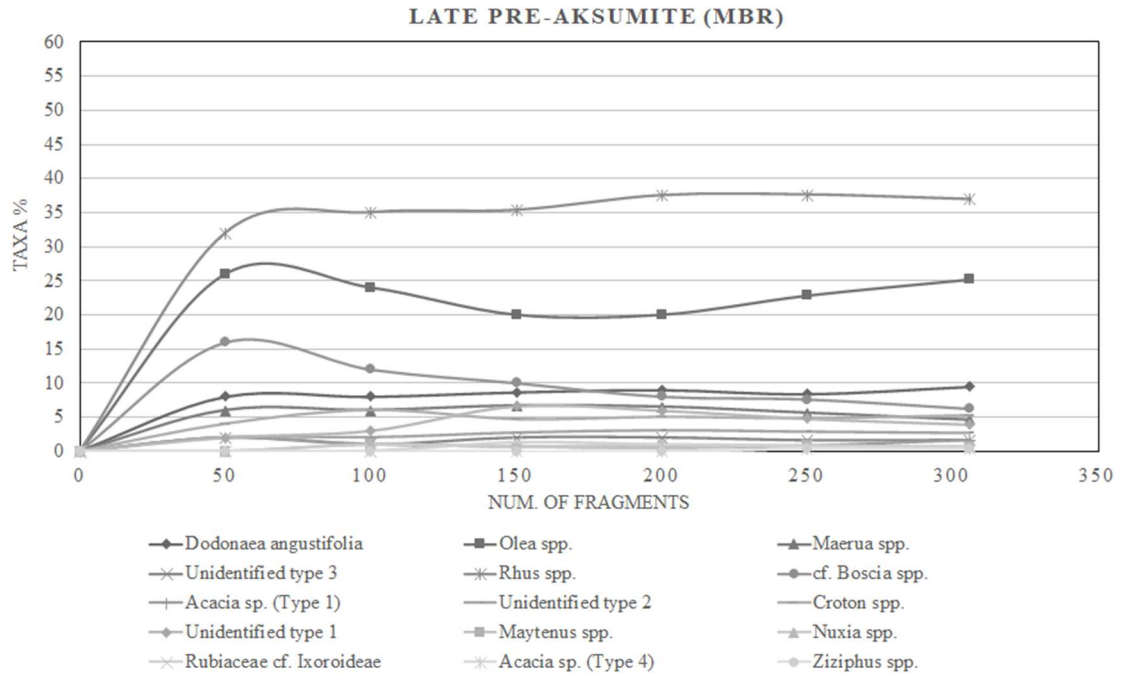


Fig. 7 Quantitative saturation curve from the Late Pre-Aksumite phase at Mezber.

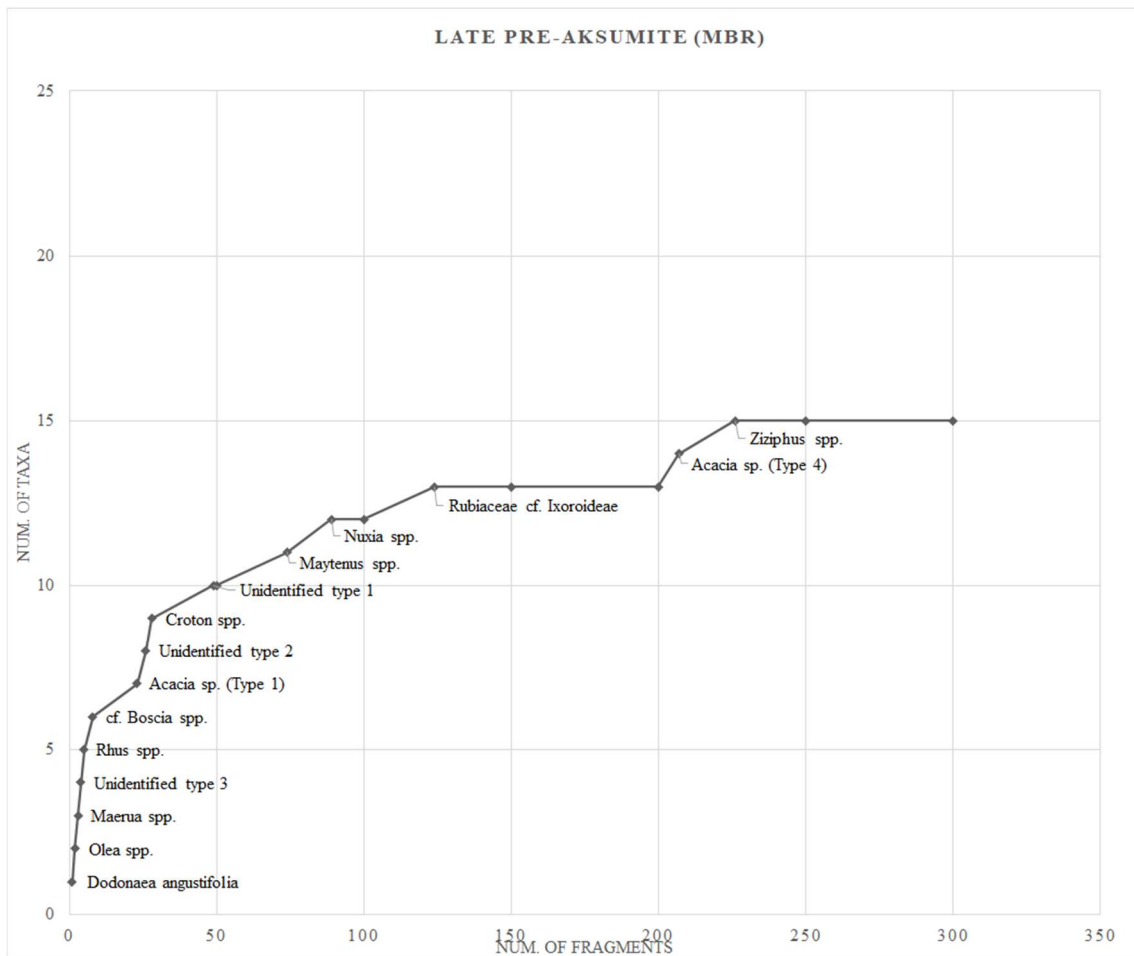


Fig. 8 Taxonomic saturation curve from the Late Pre-Aksumite phase at Mezber.

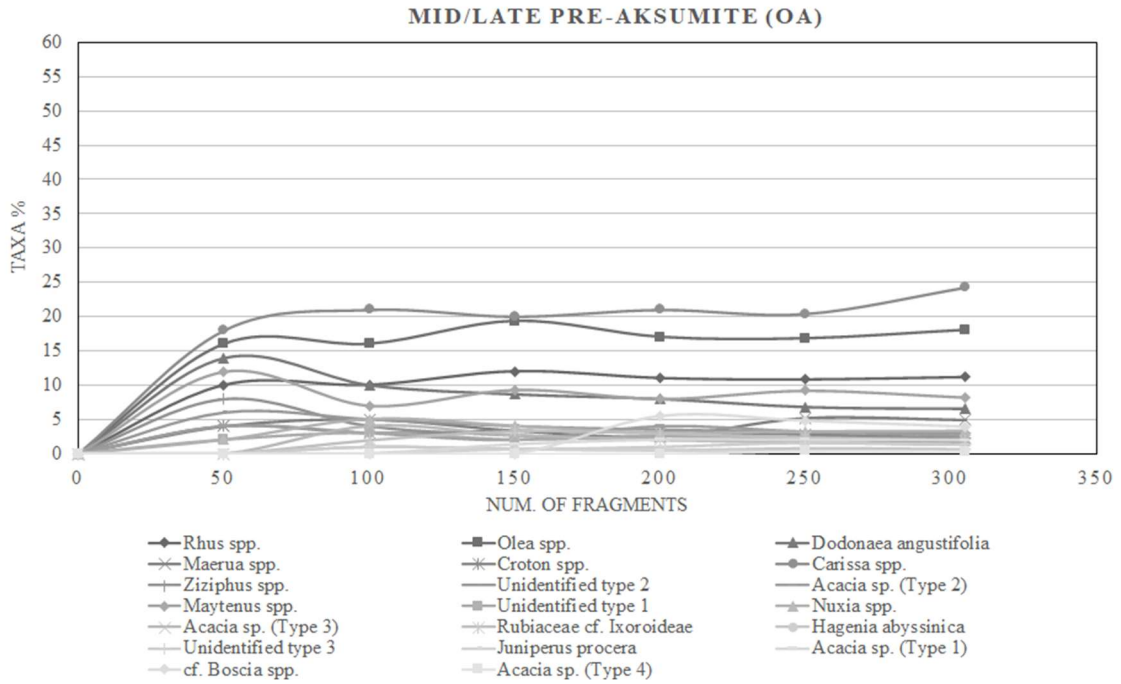


Fig. 9 Quantitative saturation curve from the Mid/Late Pre-Aksumite phase at Ona Adi.

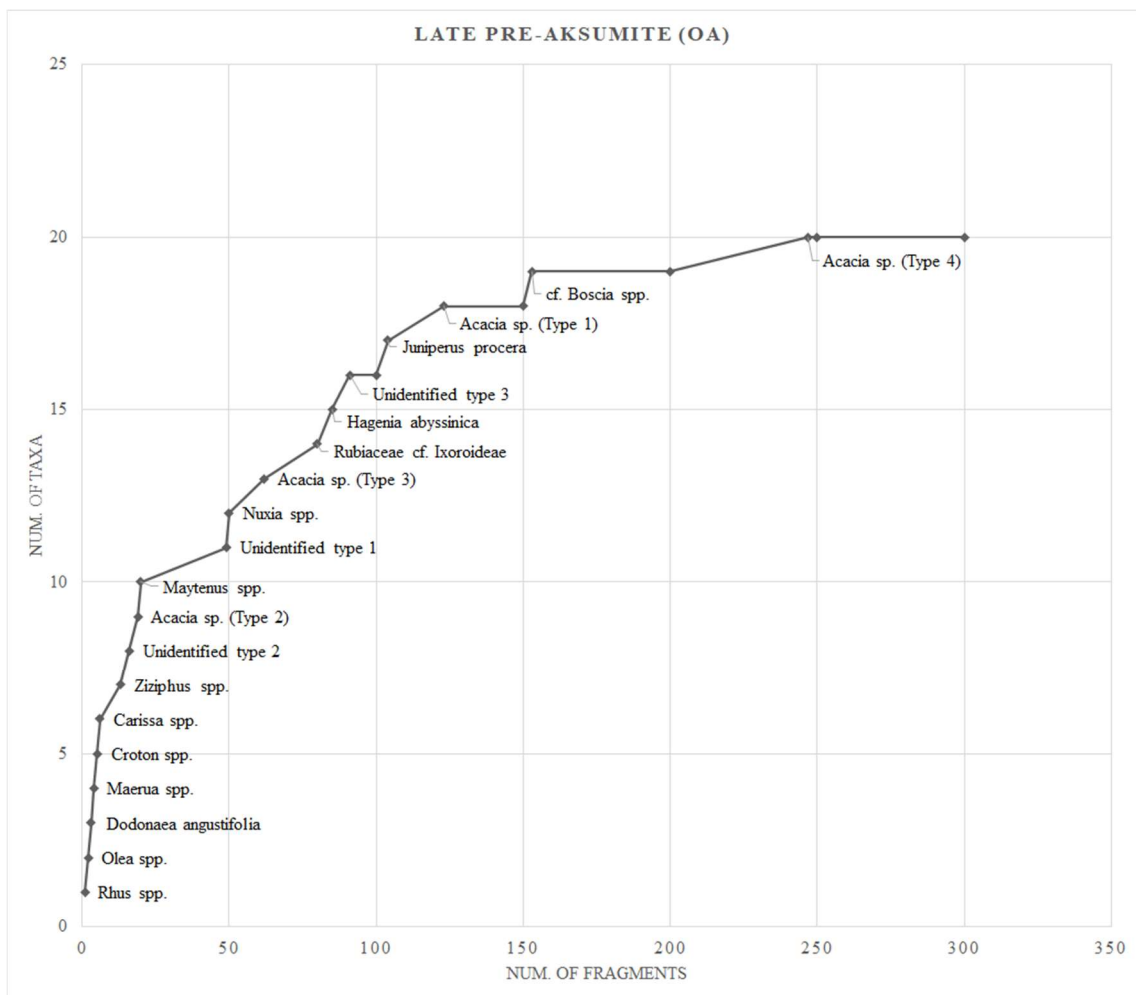


Fig. 10 Taxonomic saturation curve from the Mid/Late Pre-Aksumite phase at Ona Adi.

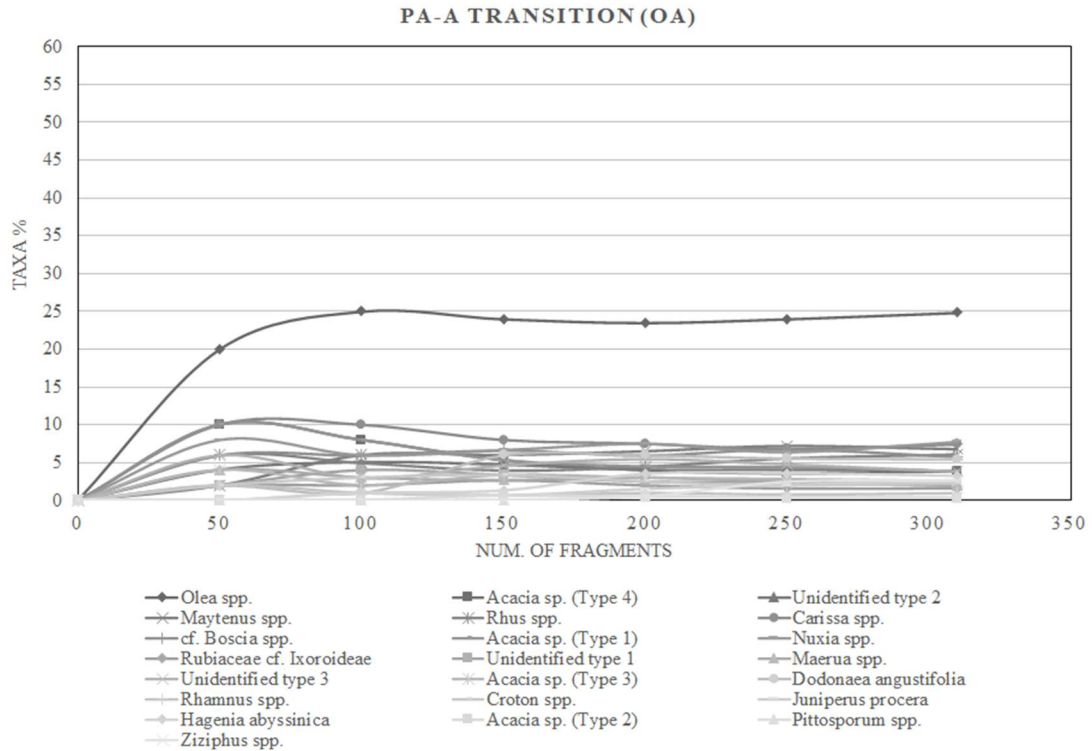


Fig. 11 Quantitative saturation curve from the PA-A Transition phase at Ona Adi.

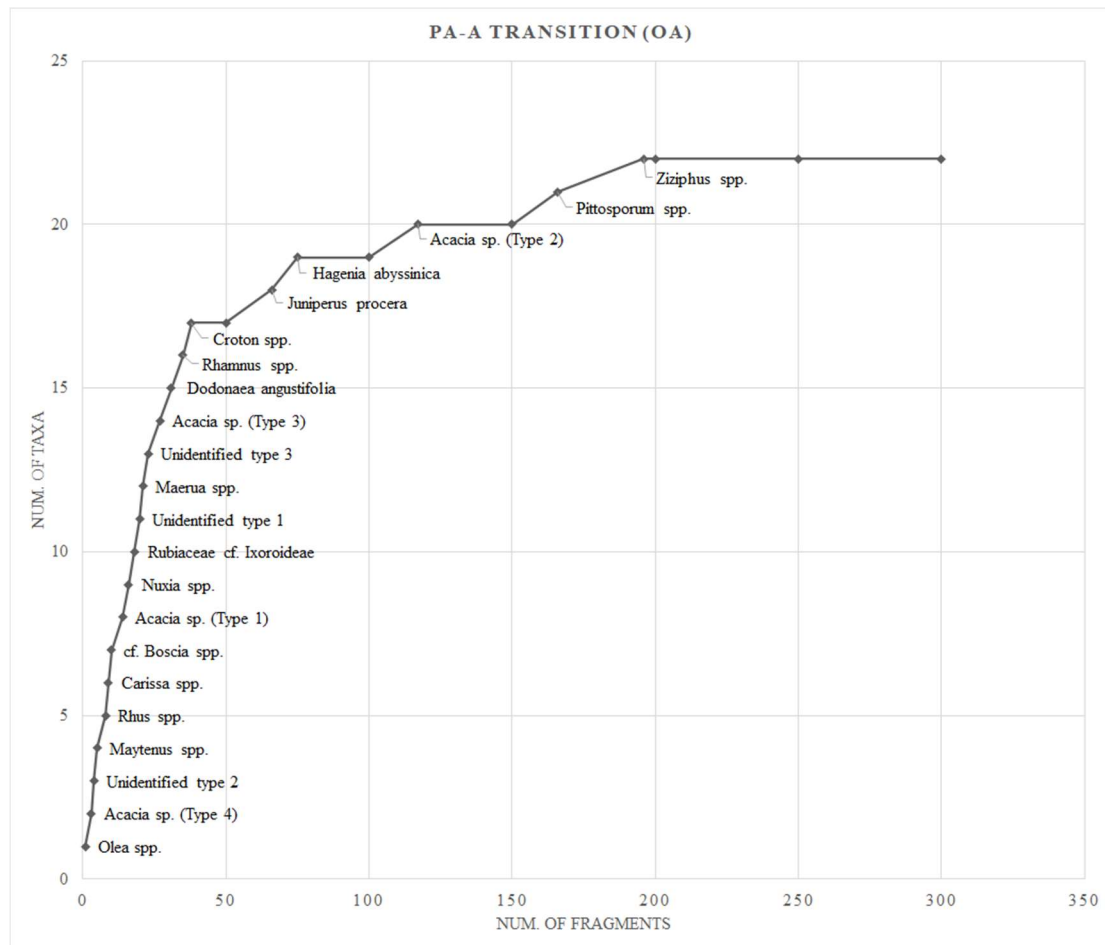


Fig. 12 Taxonomic saturation curve from the PA-A Transition phase at Ona Adi.

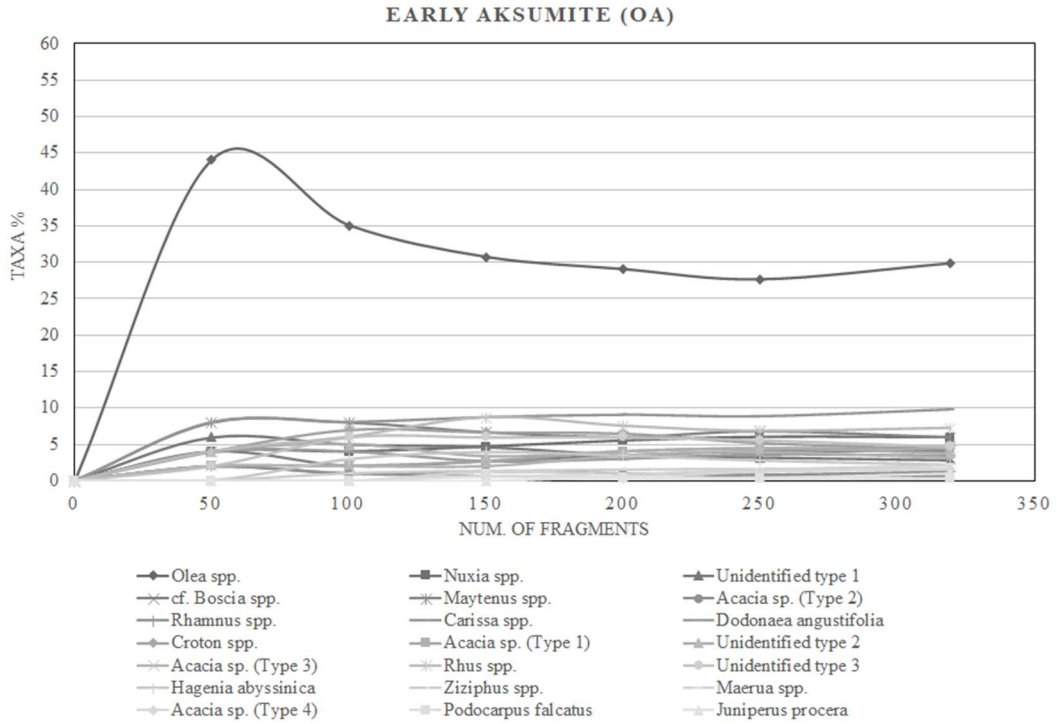


Fig. 13 Quantitative saturation curve from the Early Aksumite phase at Ona Adi.

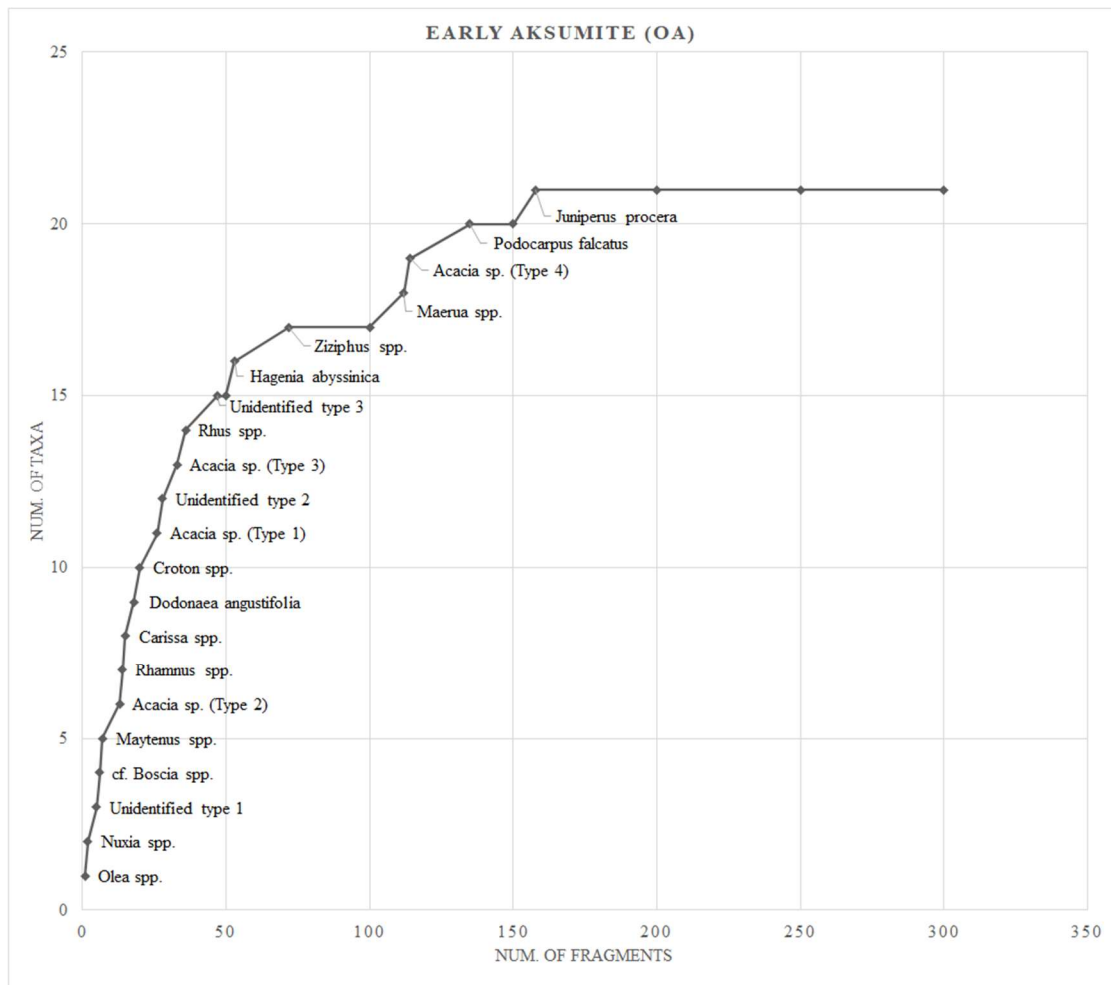


Fig. 14 Taxonomic saturation curve from the Early Aksumite phase at Ona Adi.

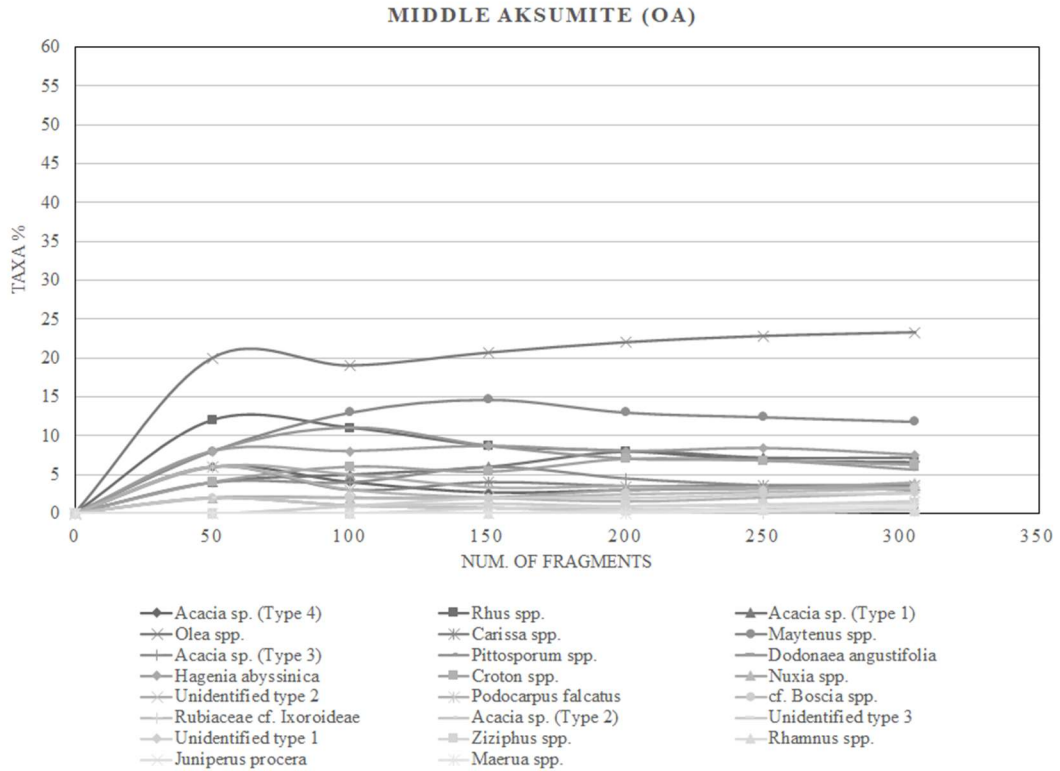


Fig. 15 Quantitative saturation curve from the Middle Aksumite phase at Ona Adi.

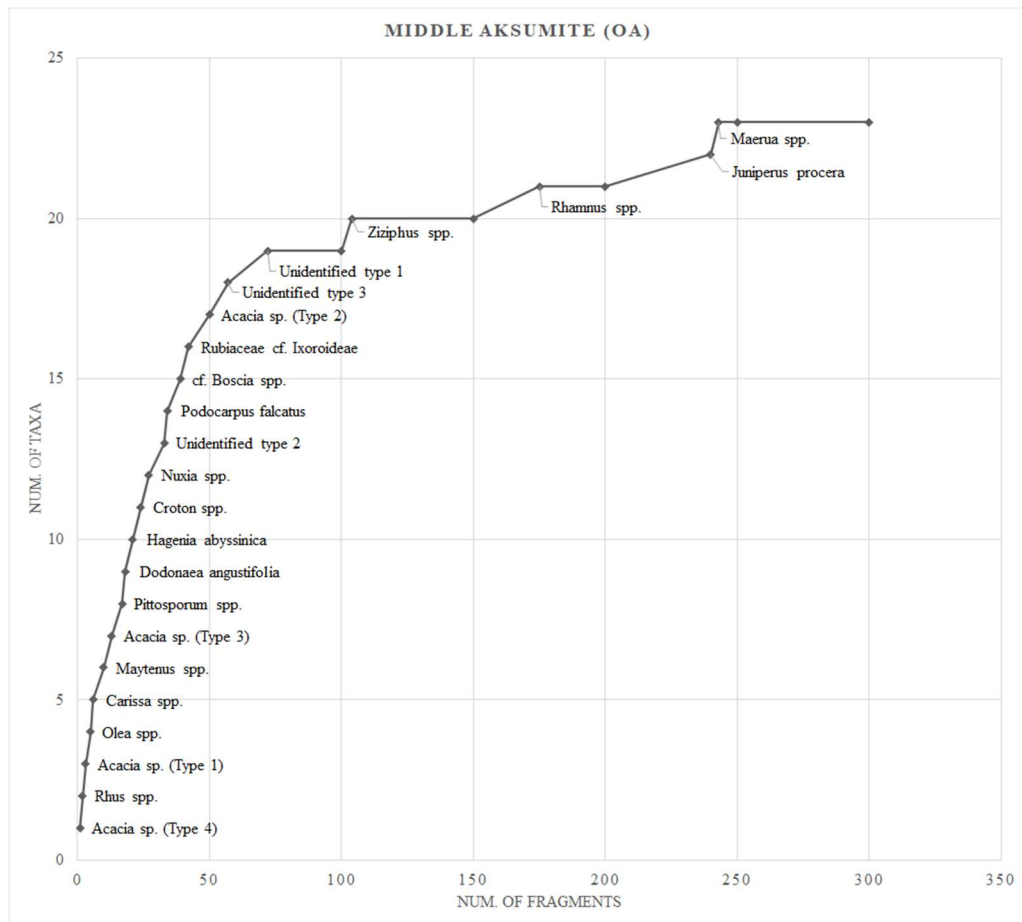


Fig. 16 Taxonomic saturation curve from the Middle Aksumite phase at Ona Adi.

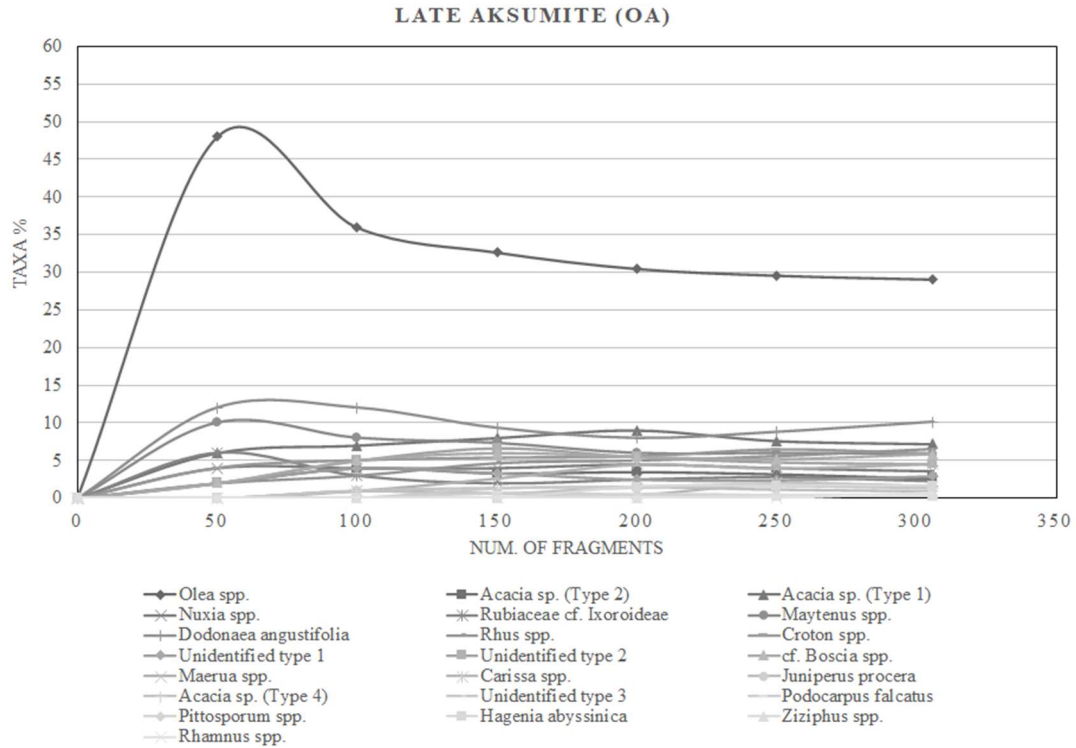


Fig. 17 Quantitative saturation curve from the Late Aksumite phase at Ona Adi.

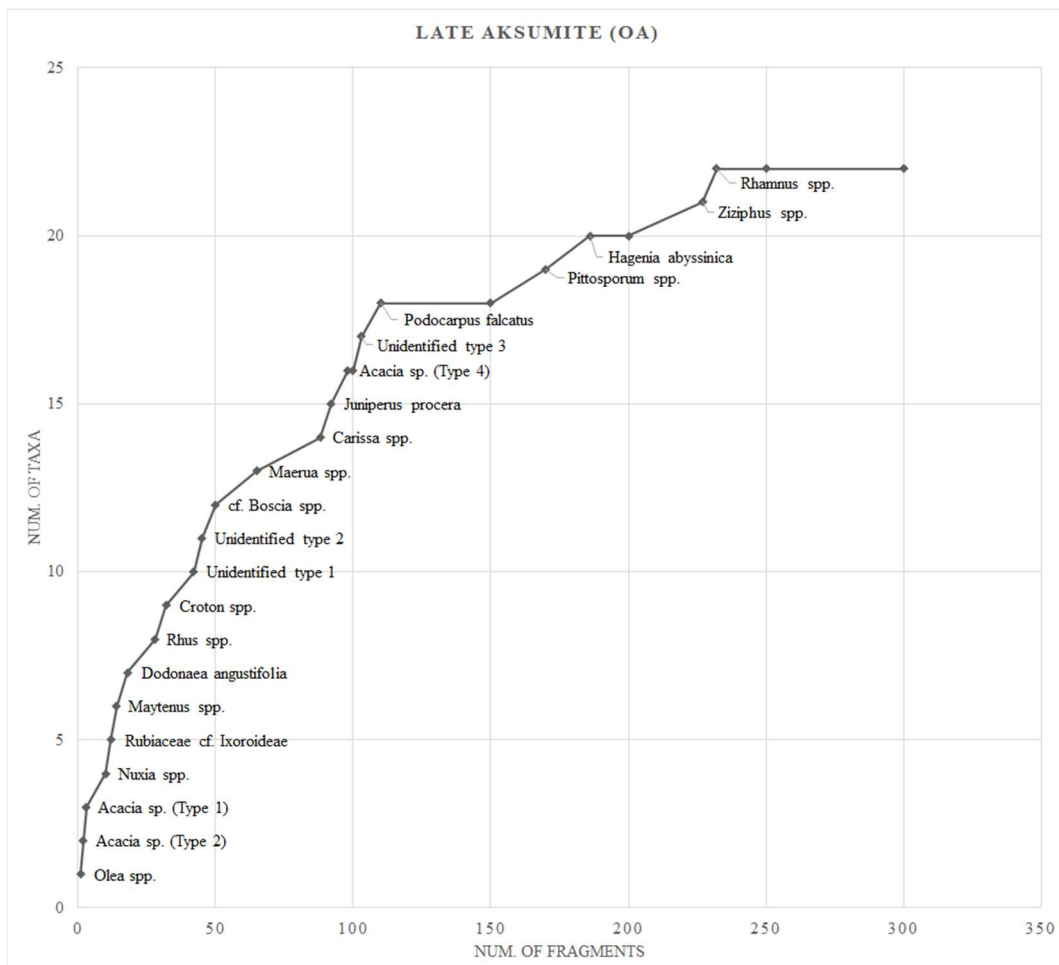


Fig. 18 Taxonomic saturation curve from the Late Aksumite phase at Ona Adi.

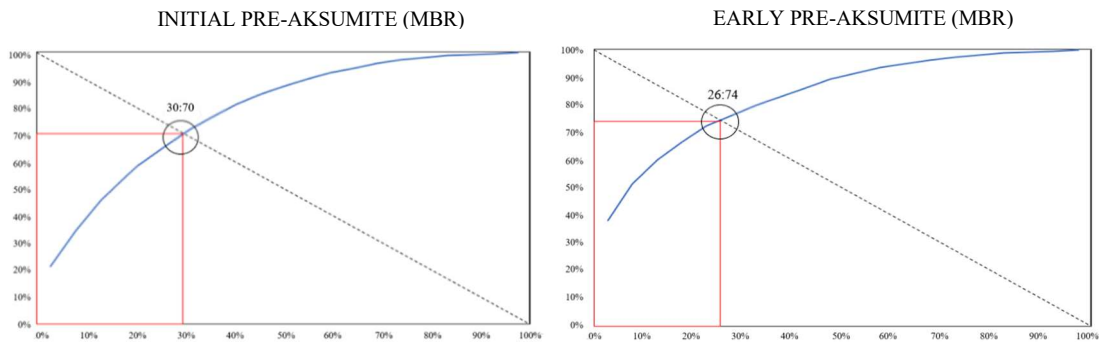


Fig. 19 Gini-Lorenz curves from Mezber Initial and Early Pre-Aksumite phases.

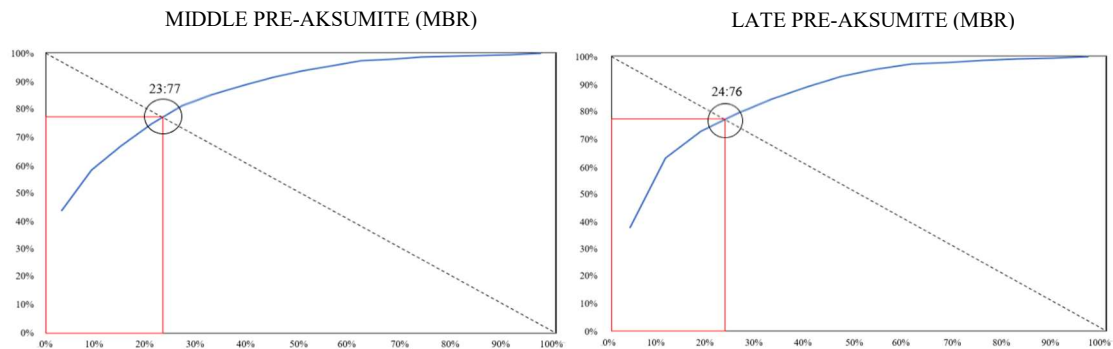


Fig. 20 Gini-Lorenz curves from Mezber Middle and Late Pre-Aksumite phases.

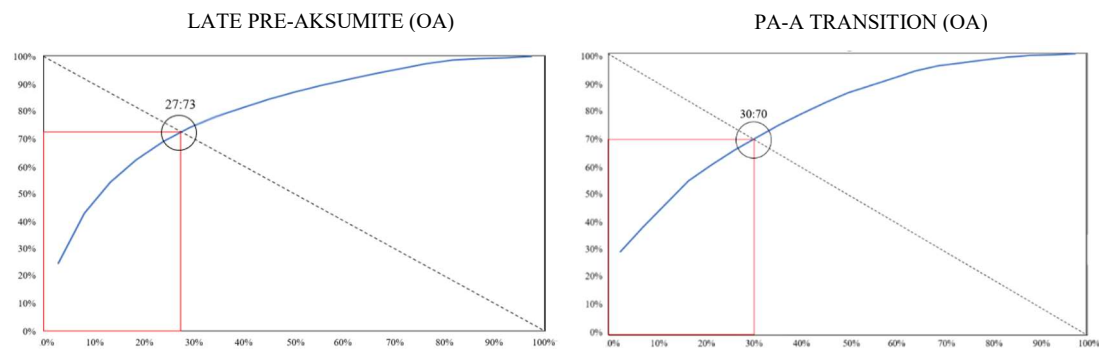


Fig. 21 Gini-Lorenz curves from Ona Adi Late Pre-Aksumite and PA-A Transition phases.

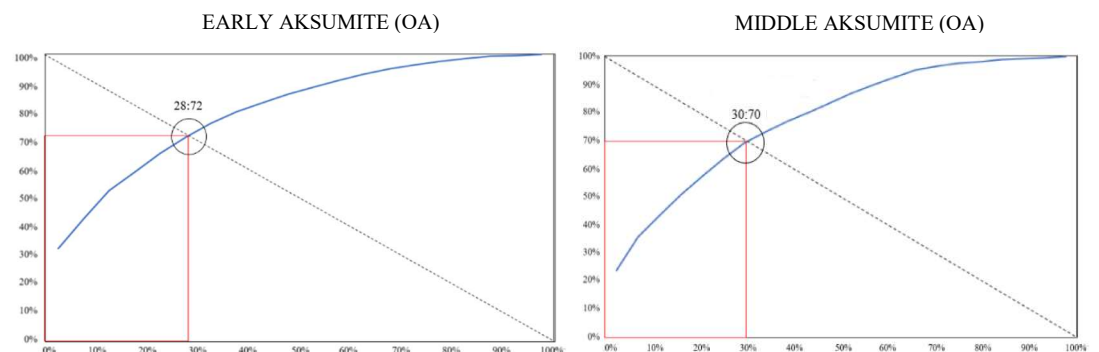


Fig. 22 Gini-Lorenz curves from Ona Adi Early and Middle Aksumite phases.

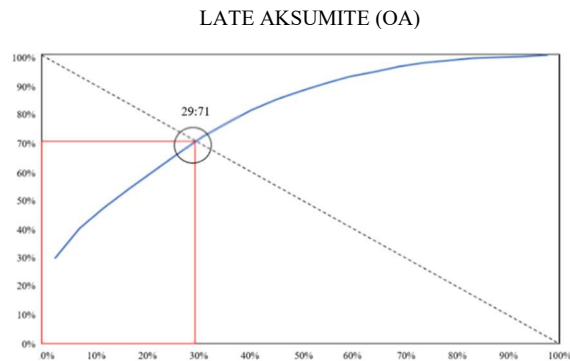


Fig. 23 Gini-Lorenz curve from the Late Aksumite phase at Ona Adi

Acknowledgments.

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