

Three ways to fight invasive prosopis juliflora tree in Eastern Africa all proved very effective, new study shows

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Grassland growing following removal of prosopis juliflora in the experiment in Tanzania. Credit: Rene Eschen

A team of scientists led by CABI have conducted a new study which

shows that three ways to fight the invasive *Prosopis juliflora* tree in Ethiopia, Kenya and Tanzania all proved very effective in almost all cases.

The three-year research, published in the journal *CABI Agriculture and Bioscience*, revealed that cut stump and basal bark herbicide application and manual uprooting were highly effective, killing the trees in between 85% and 100% of cases.

In addition, three incremental restoration interventions were tested as part of the study, which took place in Ethiopia's Afar National Regional State, Kenya's Baringo County and Tanzania's Moshi District, that included divots, divots and mulching, divots and mulching and grass seed sowing.

The scientists found that the two treatments that involved the complete removal of the aboveground biomass (manual removal and cut stump) yielded a more productive and more diverse vegetation than the treatment that killed the trees standing (basal bark).

Prosopis juliflora is considered one of the world's most threatening non-native tree species. Though it was introduced to Eastern Africa in the 1970s to provide wood and fodder and reduce erosion on degraded land, it has since spread rapidly with a range of severe impacts.

These include loss of grazing land, loss of access to water, declining biodiversity, reduced human health, increased human-wildlife and human-human conflicts.

In Ethiopia's Afar region, *Prosopis* invaded 1.2 million hectares of land since its introduction in 1990. A [previous study](#) by Shiferaw et al, for instance, provided evidence that the alien tree—which has invaded both the floodplains of the Awash River and the surrounding dryland

habitats—uses excessive amounts of water by consuming approximately 3.1–3.3 billion m³/yr of water throughout the year in the Afar Region.

Dr. Rene Eschen, lead author of the study and Senior Scientist, Ecosystems Management, based at CABI's center in Switzerland, said that compared to the effect of prosopis removal, the effect of restoration interventions on vegetation composition was small, suggesting that most species re-established from the soil seed bank.

"The results show that it is possible to restore land previously invaded by prosopis. Despite the different rates of vegetation establishment and variation in species composition, the restoration interventions resulted in vegetation that in some cases contained a substantial fraction of perennial grasses," he said. "The method chosen to control prosopis depends on the availability of resources, including herbicides, and the need to remove rootstocks if the intention is to plant crops."

The scientists argue that their research demonstrates how combined prosopis management and restoration interventions can result in grassland vegetation within a few years, therefore, reversing some of the impacts of prosopis and providing livelihood support.

They stress that the results further show that the cost—including time investment—and subsequent vegetation development differ among the method employed for killing prosopis trees.

The researchers also add that the choice for one method over another depends on a combination of available resources, sizes of the target trees, available manpower and the intended land use following prosopis management.

Dr. John Richard Mbwambo, of the Tanzanian Forestry Research Institute, added, "Most of the restoration practices did not have

significant impact on the species re-establishment and further studies are needed to determine whether the initial investment in prosopis treatment is offset by [economic benefits](#) provided by grassland established following removal of prosopis.

"Yet, these results indicate that significant livelihood benefits may be obtained as a result of the increased availability of fodder."

CABI have been assessing water use of prosopis and its impacts on catchment water budget and rural livelihoods in the dry Afar Region of Ethiopia, since 2015 as part of a long-term collaboration in the framework of the CABI-led Woody Weeds project.

A subsequent Swiss-Kenyan Woody Weeds + project was launched in 2019 to support a National Prosopis Strategy (NPS) for Kenya which is aimed at the sustainable management of the invasive weed prosopis juliflora.

The Woody Weeds + project will support implementation of the NPS jointly with relevant stakeholders, in a target area stretching from West to East along the southern edge of Kenya's northern rangelands, targeting areas in Baringo, Isiolo and Tana River counties.

More information: René Eschen et al, Experimental prosopis management practices and grassland restoration in three Eastern African countries, *CABI Agriculture and Bioscience* (2023). [DOI: 10.1186/s43170-023-00163-5](https://doi.org/10.1186/s43170-023-00163-5)

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