



## Community based eradication strategy and response tactics of the IAS *Prosopis juliflora* early infested nursery site in babile worked, Erer bada Kebele Eastern Hararghe, Ethiopia: Case Study

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### Abstract

*Prosopis juliflora* is one of the worst weeds that threaten native biodiversity of rangeland, forest ecosystem and nursery sites across Ethiopia. This study is therefore, designed to assess the impact and evaluate community based eradication strategy and response tactics of the IAS *Prosopis juliflora* early infested the nursery site in Babile woreda, Erer bada Kebele Eastern Hararghe, Ethiopia. Around 15 hectare *Prosopis juliflora* early infested area was taken as experimental land Erer Bada kebele. The cover abundance and distribution of *Prosopis juliflora* was estimated by laying 3 imaginary transect line to guess the amount of human power needed during controlling intervention. Diagnosing the real problem, realistic appraisal of the situation, understanding the overall problem, exploring potential technologies, setting plan of action, execution of the planned action and follow up were used as a strategy to eradicate the early infested rangeland. Accordingly, Mechanical removal specifically uprooting using localized tool called “Mencha” followed by Rehabilitation and restoration of the nursery site using forage grasses, shrubs and trees were designed as a response tactics. A total of 150 voluntary trained farmers were involved for 3.5 hours to eradicate the sampled *Prosopis juliflora*. The result revealed that successive mass participatory approach using mechanical uprooting by localized tools followed by rehabilitation; restoration and repeated follow up alleviate the effect of early *Prosopis juliflora* on native biodiversity. In conclusion, mechanical intervention (uprooting, grafting the floral and leaf part before fruiting, destruction of seeds and area enclosure until restoration and rehabilitation suppress the reproduction of *Prosopis juliflora* early infestation.

**Keywords:** nursery site restoration, response tactics, uprooting, prosopis

### 1. Introduction

The deliberate or accidental introduction of non-indigenous species to new habitats has become an increasingly important aspect of global environmental change (Sharifi *et al*, 1983) [9]. Invasion of habitats by exotic species is a global phenomenon with ecological, economic and social consequences (Wittenberg R., 2004) [12]. It is considered as the second most widespread threat to global biodiversity next to habitat destruction (Woldeamelak B. 2005) [13]. of natural ecosystems worldwide (Hayson and Murphy, 2003; [3] IUCN/SSC/ISSG, 2004; [4]. Sala *et al*, 2005; CBD, 2005 [2]. Sharma and Raghubanshi, 2009 as stated in (Solomon Chanie and Adane Asefa, 2015). Once an invasive species becomes firmly established, its control often becomes difficult and eradication is usually impossible (Primental.*et al*, 2000) [7]. In Ethiopia, there are about 22 invasive alien species (McGinley, 2007) [5]. Among these invasive alien species Mesquites (*Prosopis juliflora*), parthenium weed (*Parthenium hysterophorus*), water hyacinth (*Eichhornia crassipes*), *Lantana camara*, and *Acacia* species are causing major problems in the country. The invasive woody plant, *P. juliflora*, is an evergreen tree native to North and South America (Pasicznik *et al*, 2003) [6]. It is the most aggressive weed that cause great devastation to subtropical grasslands and was thought to have been introduced to Ethiopia during the establishment of irrigation water development project at Middle Awash as wind break, shade and shelter (Abiyot Berhanu and Getachew Tesfaye, 2006) [1]. This species is now commonly found in Afar

National Regional State (ANRS) and spreading to Oromia, Amhara, Somali, and Diradawa regions. Nowadays it is repeatedly reported to be one of the invasive and problematic trees in the Afar region as well as in the country. It is observed that the species has been increasing in density as well as area coverage from year to year even from month to month. Currently, this noxious tree heavily infests most agricultural as well as nursery site in the oromia region Babile woerda. The most common indigenous methods used around the Babille for the control of *Prosopis juliflora* are hand pulling, slashing/chopping of the stems and in some cases burning. In Ethiopia, there is no practical strategy, tactics and methods designed to control *Prosopis juliflora*. This study is designed therefore, to evaluate the effectiveness and limitation of community based eradication strategy and response tactics of the IAS *Prosopis juliflora* early infested nursery site using localized adopted method (Uprooting with Mencha with substantial removal of the root system) in Babille woreda Erer bada Kebele, Eastern Hararghe, Oromia Region, Ethiopia.

### 2. Methodology of the Eradication Campaign

#### 2.1 Site Selection and human power

According to the Survey report of (Harar Biodiversity center, 2015) Babille woreda particularly erer bada kebele Nursery site is the most priority Districts where the infestation of *prosopis juliflora* is high. Babille is a woerda in Eastern Ethiopia named after one of the 12 major clans of Oromo people and Erer bada is one of the kebele that the infested

nursery site was found, it is located in Eastern Harerghe Zone of Oromia Region, 42 km East of Harar. A participatory Rural Appraisal following (Victor *et al*, 2007) [11], were conducted from May 5 to 25, 2016 on the early infested experimental nursery site. Accordingly, at erer bada kebele, 15 Hectare of *prosopis juliflora* early infested nursery site was taken as an experimental site. To determine the required amount of human power in the eradication campaign, three imaginary line transect were laid to guess the cover abundance of *prosopis juliflora*. 5 representatives 20m by 20 m sample plot from the four directions and one center plot were taken. Based on the count result of each plot the average cover abundance of *prosopis* except other three were determined. Based on the abundance of *prosopis* 150 local people for 3.5 hour campaign were determined.



**Plate 1:** During Site observation with the local community (Photo by Yeneayehu Fenetahun, 2016)

## 2.2 Stakeholder Identification and Consultation

Multi-stakeholders were identified with consulting the Woreda Administration, Kebele Administration, Woreda and Kebele Agricultural offices. Based on the information share between the governmental sectors at Woreda and Kebele level, 150 local peoples were selected voluntarily. Following selection a mini consultation meeting was conducted. The consent of all these parties will be understood through awareness creation meetings.



**Plate 2:** Stakeholder Consultation; (Photo by Yeneayehu Fenetahun, 2016)

## 2.3 Awareness Creation Session

A total 150 local peoples were involved during the mini workshop session. The local people were discussed on the

indigenous method they already used. During the stakeholder awareness session the local people described as the most usable method in controlling the spread of *prosopis* is Chopping of the stem. However, the local people evaluate their previous trial as have had no or little effect in controlling the spread of *prosopis* infestation due to their inherent limitation absence of an integrated control strategy.



**Plate 3:** Mini awareness session at the site with the local people; (Photo by Yeneayehu Fenetahun, 2016)

## 2.4 Campaign Design (designed strategy)

A scientific approach for tackling Invasive alien species should be implemented. According to (Tese faye A., 2016) [10], the major component of weed management are Thorough understanding of the overall objectives/strategies of weed management, Step-by-step procedure for dealing with an individual weed problem and Realistic appraisal of the limitations and potentials of individual available technologies. The overall weed management strategy programs are prevention, Control and Eradication. Eradication is the main program selected for this experiment since the selected site is early infested nursery site; it is feasible strategy in which total elimination of plants and their parts. The eradication campaign is Mechanical removal specifically uprooting using localized tool called “Mencha” followed by Rehabilitation and restoration of site using other indigenous trees were designed as a response tactics. A total of 150 voluntary trained farmers were involved for 3.5 hours to eradicate the sampled *prosopis juliflora*.

## 2.5 Available technologies and tools

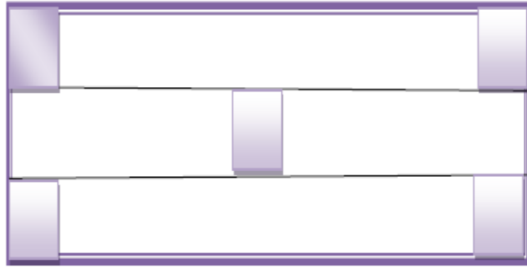
The tactics to eliminate *prosopis juliflora* determine the technology and tools. Locally adopted technology called Uprooting using localized tools Mencha were used as available technology. In addition chopping tools were used so as to substantial removal of the root system.

## 3. Result and Discussion

### 3.1 Estimation of *prosopis juliflora* Cover abundance

Out of the total number of 5 quadrates, on average 5 individual stand of *prosopis juliflora* were registered. A total of 500 quadrates can be measured from 400m by 500m = 200,000m<sup>2</sup>. The total stand cover abundance is approximately 2500 individual stand of *prosopis juliflora*. Each individual involving in the campaign eradicates 20 individual stand of *prosopis juliflora* within 3.5 hours. The result revealed that

successive mass participatory approach using mechanical uprooting by localized tools followed by rehabilitation; restoration and repeated follow up alleviate the effect of early infested *prosopis juliflora* on native biodiversity.



**Plate 4:** The 5 quadrants that used to estimate the abundance of *prosopis juliflora* (Self model)

### 3.2 Major task accomplished

In our research the following basic task would be accomplished. General awareness creation about Invasive alien spice were given to the local community of erer bada kebele and other stakeholders ,total of 15 hectare nursery site were cleared from *prosopis juliflor* and replace by other indigenous plants ,the continues follow up strategy were identified, the major information gap of the community about the concept and negative impact of this invasive alien spices were identified and solved, The dilemma on the benefit and adverse impact of *Prosopis juliflora* can be solved by enhancing the benefits and implementing proper management options. The clearing area would start its normal nursery function for different local fruit and forest spices and distributed to the local community and school after eradication was don



**Plate 5:** During eradication of prosopis from the nusery site (Photo By Yeneayehu Fenetahun, 2016)



**Plate 6:** Aftre eradication perpartaion of nursery site (Photo By Yeneayehu Fenetahun,2016)



**Plate 7:** The local friut and forest spices aat the nusery site (Photo By Yeneayehu Fenetahun, 2016)

### 4. Conclusion

Eventhough the area was infested with is the very short period of time due to its capcity to spread with in short time by invaideing other native spices it is alerady dominated and covered the whole area of the nuresry site and chnaged to non usebale site. Studies from around the world indicate that through appropriate short, medium and long terminterventions the adverse effects of *P. juliflora* can be reversed. That means, promoting its utilization in a planned and regulated way through adoption of appropriate and sustainable management practices is beneficial. From the persont study mechanical intervention like uprooting, grafting the floral and leaf part before fruiting, destruction of seeds and area enclosure until restoration and rehabilitation suppress the reproduction of *prosopis juliflora* early infestation. Sharing practical findings and lessons to higher learning Institution may create an insight for further experimental study.

### 6. Recommendations

Based on the results obtained from the study and field observations, the following recommendations are forwarded.

1. Complete eradication of *prosopis juliflora* is virtually impossible at the invading state of management options but it is possible to reduce further spreading. Controlling at early infestation stage is the best solution at present.
2. Organizing the local people to utilize the plant effectively so as to control further invasions and to diversify source of income of the local people.

3. Randomized cutting immediately above the ground should be stopped.
4. Hand clearing and uprooting of the plants from farm lands, grazing lands, around the villages, and from forest lands should be carried out individually or in group.
5. Burning of the stands of *P. juliflora* should be banded because burning encourages resprouting of new seedlings from the damaged stems and removes all valuable native plants from the ground and encourage wind and soil erosion. Moreover, it also releases Co<sub>2</sub> and other undesired gases that contribute for global warming.
6. Researches on breeding of *Prosopis* species should be encouraged to replace the thorny *P. juliflora* with thorn less varieties of high economic value.
7. *Prosopis juliflora* is found in many parts of the country. Therefore, further studies are highly recommended to know the overall social and environmental impact of the plant and its rate of expansion.

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#### Competing interests

The authors declare that they have no competing interests.

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