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Backyard Study of *Prosopis juliflora* (Garanwaa) Infestation

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The Masala area of Hargeisa is on plateau with flat rocky surface dominated by sparse dwarf shrub with Acacia trees occasionally found in microhabitats with well-textured loamy soils. This is a year where all indigenous shrubs are dry and dull. This dullness however, is a common drought coping strategy of arid land plants where the top part even when not browsed by animals die off to reduce water loss and to allow regrowth after the drought spell. There are many morphological and physiological features that allow plants to live in arid conditions and all are geared towards minimizing water loss. There are annual plants that grow quickly, produce seeds and then die. There are perennial plants with deep and lateral surface roots that absorb water from large surface area and may store them in their tissues. There are those with small and narrow leaves with small stomata reducing evapotranspiration loss of water. There are plants with wax or other impediments that protect them from water loss. There are plants in which their tissues are more resistant to dehydration and desiccation.

The invasive species, *Prosopis juliflora* locally known as Garanwaa or the unknown plant, shares some of the above drought coping characteristics with other arid land plants.

It worth noting that it is the most conspicuous plant in the landscape of Masala now. It will not scape the casual observer that it is growing in all the municipal plots allocated for housing and one is obliged to ask why it is establishing and spreading in one of the least suitable sites for perennial plant growth.

I decided to make a backyard study of empty plots around my residence west of Ambassador hotel. The study included counting the number of plants per individual plots varying in size from 24X24 to 24X36 meter plots and then calculated the density of Garanwaa. Measurements were made of the crown diameter of mature plants and frequency counts were made in all the plots. Measurement of the roots and shoot length were made on four seedlings found in my flower plots, which apparently came as contaminants with animal manure used in my garden.

The following are some of the results:

Density measured averaged 148 plants per hectare ranging from 52 to 197 plants per hectare. This is a very high density of perennial shrubby trees in arid land ecosystems not to mention of the unfavorable rocky soil of Masala site.

Frequency distribution of the species is 100% as the rooted presence of the species was found in every plot, indicating how aggressive the plant is in spreading to all habitats. Observation was made that its crown diameter was overgrowing established perennial natives that used to grow while their roots will out compete local species choking them and eliminating them from their habitats.

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Average crown diameter of mature plants was 5.07 meters, ranging from approximately 2 to 7 meters giving the species large leaf area index and therefore, large photosynthetic surface to make carbohydrate reserve for fast growth and regrowth. Animals do not browse leaves of the plants and their green pods are not also eaten giving them a competitive advantage against indigenous species in which their photosynthetic leaves are repeatedly and continuously grazed by livestock.

Seedlings of the Granwa that apparently came in animal manure and established in my flower pots were removed and their roots and shoots were measured, these were very young seedlings, the root to shoot ratio was found to be very wide (photo1) ranging from 2:1 to 3.2:1. These were undifferentiated young tap roots indicating the ability of the plant to send deep roots to tap water for the above ground shoot that produce the leaves.



Photo 1. Root and shoot of Garanwaa seedlings

During this study, observation was made of plant growth forms, most of the plants had low stature of bushy nature giving considerable crown area. But quite a few plants were seen growing prostrate to the ground (photo 2) almost like tillering plants. It is not clear whether the relatively upright growing bushy forms and the prostrate plants are different phenotypes, ecotypes or all together different species of Prosopis.



Photo 2. Upright growing Garanwaa



Prostrate forms of Garanwaa

Most of the plants had green pods (Photo3). I made morning and afternoon observations of goats and donkeys struggling to eat dry and hard remains of local none identifiable shrubs but NOT eating any of the lush green leaves and pods of Garanwaa. It was also observed that some of the goats venture to go underneath the prickly thorns of Garanwaa to feed on dry local shrubs (photo 4) previously established but covered by the crown area of Garanwaa. It is also common to see goats eating paper and cardboards next to Garanwaa without touching the lush green plants of this invasive species.



Photo3. Fruits of Garanwaa March2016 Photo4. Goats searching dry shrubs under Garanwaa

Why Garanwaa in Masala?

There are two major reasons, the plots in the area have all half-meter foundations which trap rain water that collect in crevices and fissures between the rocks and tapped by the extensive surface roots characteristic of *Prosopis* sp and secondly the plots which are not built are open access to livestock and particularly goats which are plenty in the area. The only part that livestock feed on are mature, dry pods, which contain the seed. Seeds of legumes such *Acacia* and *Garanwa* have hard seed coats that do not readily germinate except if they are completely submerged under water for more than 24 hours to soften the seed coat and allow the embryo to germinate that is why you will find them in microhabitats with run -in water after rains. It can also germinate if the hard coat is scarified and it can also germinate with enzymatic treatment or acid treatment, this is the case in Hargeisa where livestock and particularly goats dominant in Masala treat the seeds with their rumen liquor and pass them with their feces ready to germinate.

It appears that there is no policy in land appropriation, as plots hoarded and not built are filling the landscape of Masala. Some of these plots were there for more than 20 years. They created conducive environment for the growth of *Garanwa*, and their open access to livestock is major contributor in the spread of this invasive and destructive species. Animals that feed on them can move to other areas including distant rangelands and then the aggressive *Garanwa* will eliminate valuable forage species already weakened by continuous overgrazing.

There is no worst enemy to the livelihood of pastoral and farming communities than this species.

Another observation made during this backyard study is, many of the empty plots are garbage dumps (photo5), not to mention that many are used as public toilets. This is a public health hazard, which need to be addressed by the concerned ministries (Interior, health and environment). Some of the plots retain water for weeks and are breeding grounds for mosquitos.



Photo 5. Masala plots used a garbage dumps

I arrived at Hargeisa airport and as my plane landed, I viewed the airport landscape from the window and Garwanwaa is seen growing all over the place and along the peripheries of the runway, which created microhabitat resulting from additional moisture from the runway runoff. All stages of growth were observed including newly established plants (Photo 6). This expensive and very valuable infrastructure can be easily destroyed from the turgor pressure of the roots when current small plants reach maturity and become dense stands.



Photo 6. Garanwa infestation in Hargeisa airport showing different growth stages

In my earlier reports of 2011 and 2014, I gave more detailed report of the pros and cons of the invasive species, *Prosopis juliflora* (Garanwaa) and its impact on water resources, agriculture, sandy beaches, natural biodiversity in rangelands and migration routes of wildlife.

This current study gives another dimension of the impact of unregulated land use on the spread of Garanwaa and the health hazards of empty plots allocated to people for building purposes.

Recommendation

If the Somaliland government wants to reduce resource based conflicts and particularly the land, its **priority should be land tenure policy**. There is aggressive land grab and it appears that **lack of land use policy is the major cause**.

Kilometers of common access rangelands are grabbed by private individuals, land appropriated to individuals for farming with permits are sold for building construction, municipal lands are hoarded by land prospectors and stay un built for many years and are currently having serious environmental impacts such as the spread of the invasive species of Garanwa and hazard to public health as they are used as garbage dump sites and are also mosquito breeding grounds.

This is not the responsibility of one ministry but is cross cutting issue for the Ministries of the Environment, agriculture, health, interior, municipality etc.

Control and eventual eradication of Garanwaa also requires national action.

This is also a multi sectoral involving ministry of environment, agriculture, planning, aviation, water, energy and interior