**Effects of Different Management Techniques on Growth and Productivity of Rhamnus prunoides**

**Introduction**

Rhamnus prinoides, commonly known as Gesho in Amharic, is a widespread plant species found across various African countries. It is native to Ethiopia and other nations in East and Southern Africa. This versatile plant thrives in a range of altitudes, from medium to high elevations, and is typically found on the margins of evergreen forests (Amare, 2018; Emrie & Fikadu, 2024; Nagari & Abebaw, 2013). The plant is well-adapted to the moist and wet agro-climatic zones, including the Kolla (lowlands), Woina Dega (mid-highlands), and Dega (highlands) zones (Nagari & Abebaw, 2013).

Rhamnus prinoides is highly valued in Ethiopian culture and agriculture. Gesho is cultivated on the homestead of each farmer in the Western Amhara region of Ethiopia. The leaves, twigs, and stems of Gesho has indispensable social value ingredients in traditional beverages named ‘Tella and Tej’ (Bekele, 2007; Campbell et al., 2019; Teshome, 2023) as well as for cash generation for farmers in rural and urban holdings. Gesho, aside from its culinary use, has been traditionally used to treat various ailments like arthritis, back pain, flu, indigestion, pneumonia, fatigue, and more. (Alemu et al., 2007; Njoroge & Bussmann, 2006). Its medicinal properties are well-recognized in local remedies. Traditionally, a mixture of ground R. prinoides leaves and butter has been used as an ointment to treat atopic dermatitis, with the leaves providing anti-inflammatory benefits and the butter acting as a soothing emollient (Teklehaymanot & Giday, 2007). This plant can be harvested more than three times annually if properly harvesting only leaves and two times harvesting the stem from the bottom of the tree and well managed by cultivation, weeding; hoeing, mulching and watering during the dry season that help to generate cash crop for growers by sailing the leaves and stems used to traditional beverages. Furthermore, RP also cultivated to effectively control soil erosion and serve as a natural barrier against wind when planted as a hedge. It can also be strategically placed around fish ponds to offer protection while providing shade for the fish. Additionally, the plant can be used as an ornamental feature, enhancing the aesthetic appeal of landscapes (Amabye, 2016).

The demand for RP has been steadily increasing, driven by the rising popularity of local beverages and other applications. At the same time, RP production has been on the rise, as it is increasingly being integrated into natural resource management efforts implemented across the country. However, its productivity remains low due to the lack of well-documented management practices for RP in the region. Therefore, the aim of this study is to evaluate various management techniques to enhance the growth performance and overall productivity of Rhamnus prunoides.

**Objectives**

* To evaluate the effects of different management techniques on the growth performance of Rhamnus prunoides
* To evaluate yield and overall productivity of Rhamnus prunoides

**Materials and Methods**

**Design**

The experiment will include five treatments arranged in a Randomized Complete Block Design (RCBD) with three replications. Seedlings will be planted 1 meter apart within rows, with 1.5 meters between plots. Blocks will be spaced 2 meters apart. Each plot will contain 16 seedlings, and yield and performance data will be collected from the central seedlings to minimize edge effects.

**Treatments**

* Light pruning with watering
* Heavy pruning with watering
* No pruning with watering
* No pruning without watering
* Local management practice( like using manure)

Note: Watering once in a week and light pruning mean harvesting only twigs, heavy pruning mean harvesting branches and no pruning mean harvesting only Rhamnus prunoides leaves.

**Data Collection**

**Growth Parameters**

* Plant height
* Stem diameter,
* Number of branches, and
* Canopy spread.

**Productivity Metrics:**

* Leaves yield
* Fruit yield

**Statistical Analysis**

The growth performance and yield data will be analyzed using Analysis of Variance (ANOVA) in R to assess the differences between the various management techniques. The results will be presented through graphical representations, and detailed tables will be provided to summarize the statistical findings.

**Location: Dahena**

**Initiators: Amaru S.**

**Status: New**

**Responsible person: FRD Experts**

**Budget source ARARI**

**Duration:4 years**

**Work plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activities** | **2025** | **2026** | **2027** | **2028** |
| Seed collection |  |  |  |  |
| Seedling preparation |  |  |  |  |
|  Experimental site selection and nursery preparation |  |  |  |  |
| Actual experiment  |  |  |  |  |
| Data collection |  |  |  |  |
| Full write up |  |  |  |  |

**Budget**

|  |  |  |
| --- | --- | --- |
| Category | Amount in ETB | Remark |
| Site selection | 50,000 |  |
| Wedge for management activities | 40,000 |  |
| Perdiem for experts | 40,000 |  |
| Seed purchase | 2000 |  |
| Total | 132,000 |  |

**Reference**

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