

Adaptation of the Acacia trees seeds (Senegal and mellifera) for germination in Bisha region- Saudi Arabia

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Abstract

The study conducted in Bisha Province Saudi Arabia about the adaptation of the acacia trees seeds germination, the main goal is of the study to evaluate the seeds germination of type of acacia trees in Bisha area, which its result with on germination seeds due to loss soil maturation elements. The important recommendation, the germination of acacia plants only by seedling in Bisha area.

Keywords: Acacia; Senegal; Mellifera; Gum Arabic; Seeds

1 Introduction

The genus *Acacia* belongs to the family Mimosaceae. There are some 1350 species of *Acacia* found throughout the world and close to 1000 of these are to be found in Australia. Commonly known as Wattle, *Acacia* is the largest genus of vascular plants in Australia. Australia's national floral emblem is *Acacia pycnantha*, the Golden Wattle. Wattle Day is celebrated on the 1st of September each year.

Within Australia *Acacia* occupies vast areas of the continent and is to be found in a wide range of differing habitats from coastal to sub-alpine regions and from high rainfall to arid inland areas. They are particularly prevalent in the arid and semi-arid and the dry sub-tropical regions of the country.

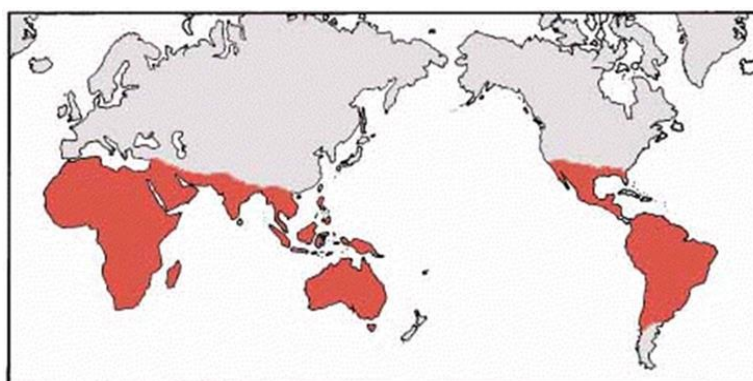


Figure 1 Acacia is to be found in Australia, Africa, and Madagascar, throughout the Asia - Pacific region and in the Americas.

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1.1 Flowers

Individual flowers are arranged in inflorescences that may be either globular heads or cylindrical spikes. Each inflorescence may comprise from as few as 3 individual flowers (e.g. *Acacia lunate*) to as many as 130 or more (e.g. *Acacia anceps*). *Acacia* species flower throughout the year although the bulk of species flower during spring and summer and a lesser number flower during autumn and winter.



Figure 2 Acacia inflorescence types - globular (left) and cylindrical (right)

Flowers can vary in color through cream, pale yellow to gold. One species, *Acacia purpureapetala*, has purple flowers whilst a form of *Acacia leprosa* has red flowers. The flowers of many species are delicately perfumed.



Figure 3 Globular inflorescences (*Acacia cultriformis*)

Gum Arabic (GA) is a natural exudate from *Acacia* trees of the Sahelian region of Africa, and contains branched polysaccharides and proteinaceous materials. Three major fractions of GA are arabinogalactan-protein complex (AGP), arabinogalactan (AG) and glycoprotein (GP). The AGP fraction has a molecular mass of several millions Daltons and contains about 10% proteins, which is regarded as an active component for emulsification.

It is readily soluble in water and insoluble in Ethanol. The physicochemical characteristic of the Gum Arabic samples from Central Rift Valley of Ethiopia -color, odor, moisture content, ash content, pH, specific rotation, nitrogen content, tannin content and mineral contents -are in good agreement and even has a better result with qualities reported from major producer and exporter countries such as Sudan and fitted well to international standards in all aspects. *Acacia Senegal* (L.) Wild. (Hashab) is a tree species of great importance in the economy of the Sudan. It yields Gum Arabic of which the country exports over 80% of the world's demand. *A. Senegal* has a wide distribution from the 200 mm isohyet on the sandy soils of Western Sudan to over 800 mm of annual rainfall in Central Sudan (M. Obeid and A. Serif El Din 1970).

1.2 Functions and Applications

Gum Arabic, a complex mixture of polysaccharides and glycoproteins, is used primarily in the food industry as a stabilizer. It is edible and has E number E414. Gum Arabic is a key ingredient in traditional lithography and is used in printing, paint production, glue, cosmetics and various industrial applications, including viscosity control in inks and in

textile industries, although less expensive materials compete with it for many of these roles. While Gum Arabic is now produced mostly throughout the African Sahel, it is still harvested and used in the Middle East. For example, Arab populations use the natural gum to make a chilled, sweetened, and flavored gelato-like dessert.

Acacia mellifera is a dense thorny shrub native to many semi-arid regions in Africa and western Asia. It can be widespread in dry bushland, thornveld and wooded grassland, mainly on clay rich or calcium rich soils. However, it is also an aggressive colonizer and forms impenetrable thickets, increasingly so on badly managed pasture lands. It is one of the main species involved in what is commonly referred to as 'bush encroachment', especially in southern Africa, becoming an invasive species within its native range, where it greatly increases its density, linked in part to overgrazing and the reduction or removal of the use of fire in the landscapes. In parts of Namibia,

South Africa and Botswana, for example, millions of hectares are now dominated by *A. mellifera* and the problem is increasing. In Ethiopia and East Africa, it also encroaches on rangeland but is not noted as invasive. Although it does have some value as a browse and for bee forage, the curved thorns make this a particularly undesirable species, with significant impacts reducing the availability of pasture for livestock and corresponding land value and, once established, it has proved to be very difficult to remove.

- Taxonomic Tree
- Domain: Eukaryota
- Kingdom: Plantae
- Phylum: Spermatophyta
- Subphylum: Angiospermae
- Class: Dicotyledonae
- Order: Fabales
- Family: Fabaceae
- Subfamily: Mimosoideae
- Genus: *Acacia*
- Species: *Acacia mellifera*

Acacia mellifera is considered by most sources as native to a broad area in Africa, from South Africa to Egypt, including dry areas in most countries in southern and eastern Africa, the Horn of Africa and in neighboring Saudi Arabia and Yemen in the Arabian Peninsula. In southern Africa, *A. mellifera* occurs in bushveld and semi-desert areas, arid savannah, dry woodland and bush, often on deep sandy or gravelly soils where it often grows in circular groups forming impenetrable thickets in overgrazed areas.

1.3 Physiology and Phenology

In southern Africa, *A. mellifera* flowers usually appear in August or September before the tree comes into leaf, and a second flowering has been observed in March following heavy rains. The main fruiting period is between January and April. Seed ripens quickly and, after heavy rainfall, can germinate in great profusion. However, early growth may be slow and seedling establishment and growth of *A. mellifera*

mellifera subsp. dentine's were found to be influenced by different soils and sub-habitats in semi-arid savannahs in South Africa. Many *Acacia* species in East Africa, including *A. mellifera*, evolved in both a high fire and herbivory landscape, and *Acacia* trees can allocate resources to fire defense by developing thicker bark, or to herbivory defense by developing spines. The trend towards bush encroachment may be due to the reduction or absence of intense fires which is facilitating the expansion of thin-barked species such as *A. mellifera*.

1.4 Research problem

Adaptation of the acacia trees seeds (*Senegal* and *mellifera*) for germination in Bisha region- Saudi Arabia.

1.5 Research Objective

- The aim of the study was to evaluate the adaptation of acacia trees seeds (*Senegal* and *mellifera*) to germination in Bisha area – Saudi Arabia and Learn about different growing conditions.
- Knowing the seeds growth rate in *Acacia Senegal* and *mellifera* trees.
- To compare the physicochemical characteristics of the gum Arabic *Senegal* and *mellifera* in the Sudan and other Countries.
- To know the different applications of acacia trees products and use of industries.

Research Methodology

The methodology of the research uses experimental approach, in labotary and assume the results.

2 Materials and working methods

2.1 Plant material and germination conditions

The species under study were obtained *Acacia* (*Senegal* & *mellifera*) from Sudan public, April 2022, before starting the experiment, the seed's outer dormancy phase was broken, using mechanical scraping (The germination process was carried out under laboratory conditions, Faculty of Sciences – Bisha University – Saudi Arabia). The soil used may be three types of soil. First (80% sand and 20% clay and nitration elements. Second 100% clay. Third humors consist all the elements which it necessary for acacia plants) to assumed good soil type for germination. These seedlings were not planted singly in pots 2-liter plastic for a period of 2 weeks. After completion all factors of the germination process, the seeds were not grown in modular containers, in order to obtain a sufficient number of seedlings.

Experimentation begins at the beginning of June 2022 (Adaptation of the *Acacia* trees seeds (*Senegal* and *mellifera*) for germination in Bisha region- Saudi Arabia). The experiment was conducted under external climatic conditions in the Faculty of Science.

3 Results and discussion

Acacia plant did not planted by seeds in Bisha area Province Saudi Arabia, because their soil its less of necessary elements for plants growth, added to the soil structure with rocks not suitable for *Acacia sp* plants growth.

Recommendations

- Added to the studies of Acacia plants in this field.
 - the germination of Acacia plants only by seedling 3.Acacia seeds not growing in Bisha area soil
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4 Conclusion

It was the aim of this study to evaluate the adaptation of acacia trees seeds (*Senegal* and *mellifera*) to germination in Bisha area – Saudi Arabia and Learn about different growing conditions.

- Acacia plant did not planted by seeds in Bisha area.
- Bisha area soil its lack in Nutrients that necessary for plants.

I recommend growing acacia trees using seedlings only.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflict of interesting.

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