CONSERVATION AND SUSTAINABLE

UTILIZATION OF ACACIA IN ELBA P.A . IN EGYPT

Socio-economic assessment and economic valuation of ELBA Protected Area 's acacia

Final Report
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Introduction and acknowledgements

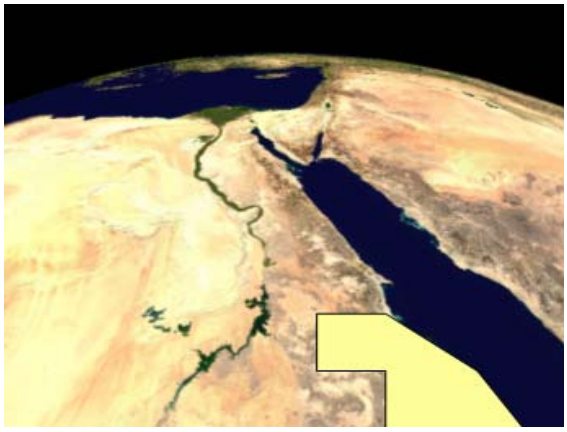
The need for this report

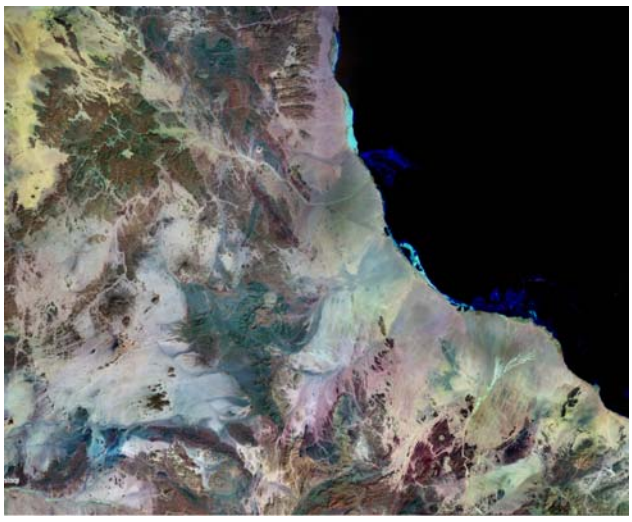
This study is an attempt to better understand the role played by Acacia species in the rural economy of elba protected area as a part of eastern desert and the drier regions of Africa,. Acacia species are widely distributed through the arid and semi arid regions of Africa, often the dominant tree and in some areas forming monospecific communities .although in Arabia through Iraq and Iran eastwards to Pakistan and India and in the last year in Egypt particularly elba region species of Prosopis may replace Acacia both ecologically and economically

Much of the information presented has been gleaned from the website Libraries of the Food and Agriculture Organization, Special acknowledgement is given for invaluable support provided by usama ghazaly elba P.A 's ranger

3. Description of the area

The present studies were conducted in the Nubian desert of Egypt in the south east part of eastern desert of Egypt , area located between latitude between 22 to 23, 30 degree and longitude between 34 ,30 to 37 degree (Fig. 1) which is characterised as a 'hyperarid environment ' with an aridity index of less than 0.05. Data from the nearest meteorological stations in shalateen show the annual mean temperature is 27.5(C. A mean minimum temperature (C has been recorded for the month of January. A mean maximum temperature of 41.8(C has been recorded for the month of July. However it can often reach above 45ºC especially in August .The data from the shalateen Meteorological Station showed (50%) , lowest in May and June (20%).





The annual rainfall in this area rarely exceeds 5 mm and is highly variable in both time and space. Precipitation comes in discontinuous cloudbursts, varying from one to 15 days in a year and many years may pass without any rain but in gabel elba region Precipitation reach to about 400 mm in year under effect of moist oases phenomenon ,elba P.A region suffer long from drought effect for about 7 year without rainfall , but the last 2 years there is a few seasonally rainfall only in month of November . Since the rainfall is very local and there are so few measuring stations, the rain events could not be accurately detected. According to our observations, during the last decade rainfall was recorded in the Area area in the winter of 2001, November 2002 , November 2003 only in south part ,november 2004 (only in north part), but in November 1996 which caused strong

torrents in the surrounding wadis. The autumn rain events indicate that the South Eastern Desert is in a transitional zone where the pattern of precipitation gradually changes from predominantly winter rains in the north (Mediterranean type of climate) to predominantly summer rains in the south (Tropical climate).

1.1 Acacia in world and elba region

There are c. 1250 species of Acacia, of which 134 species (represented by 170 taxa) are native of Africa, with 20 species (26 taxa) extending into Asia and 6 species (7 taxa) native to East Asia (Ross, 1979; Hassan and Styles, 1990; Lock, 1989, 1991). Faidherbia albida (formerly known as Acacia albida) is also included here since its role in the rural economy is so similar to that of the Acacia that its omission by what are relatively minor taxonomic distinctions does not appear to be justified; never-the-less it is still treated throughout this document as Faidherbia albida

Some 160 Acacia species are native of Africa , in the drier regions of which 78 (97 taxa) are reported to be utilized for fuel, timber, forage, gum, tannins, fibre, medicine, food, handicrafts, domestic utensils, environmental protection, soil fertility, shade and shelter, game refuge, amenity and ornamental plantings, and agroforestry
In elba protectorate there is 9 species of acacia , distribuated through most of habitat in protectorate from salt marshes to the peak of elba mountain , in the same time there is a new guest in the area which is prosopis juliflora as invasive species , species of Prosopis may replace Acacia both ecologically and economically.for that we included it in our study

physiological problems associated with their introduction in the Sahel. Most species are important sources of browse, fuel and pole timber; some are important commercial sources of gum and tannin. Many are utilized by the rural populations in local medicines, for fibre, domestic utensils and handicrafts. Nitrogen-fixing, their potential for use in agroforestry, apart from a few species, has been neglected. Some can be effectively utilized for shade, shelter, live fences, soil stabilization as well as street trees and ornamentals

There are problems in the management of Acacia communities, many of which have already been subjected to anthropogenic pressures. It is difficult enough to manage for sustainable development for timber, fuel and non-wood products for the rural communities; the demands by urban communities for fuelwood certainly cannot be met from forest resources within the arid and semi-arid regions. In severely decertified areas there is very little hope of improvement. Protection of local communities in the higher rainfall areas through sound

management is recommended in order to form a base from which it is possible to attempt reclamation of the decertified regions

Acacia Distribution in elba P.A

There is 9 acacia species in elba P.A , Acacia in gabel elba grow and distribute in most habitat of Elba region along desert from salt marshes to mountain habitats . acacia tortilis as a common species of acacia distribute through most of habitat but the other species is restricted to a specific habitat as acacia nubica which grow only in a costal plain habitat in area

Acacia tortilis

Acacia raddiana

Acacia ehrenbergiana

Acacia nubica

Acacia mellifera

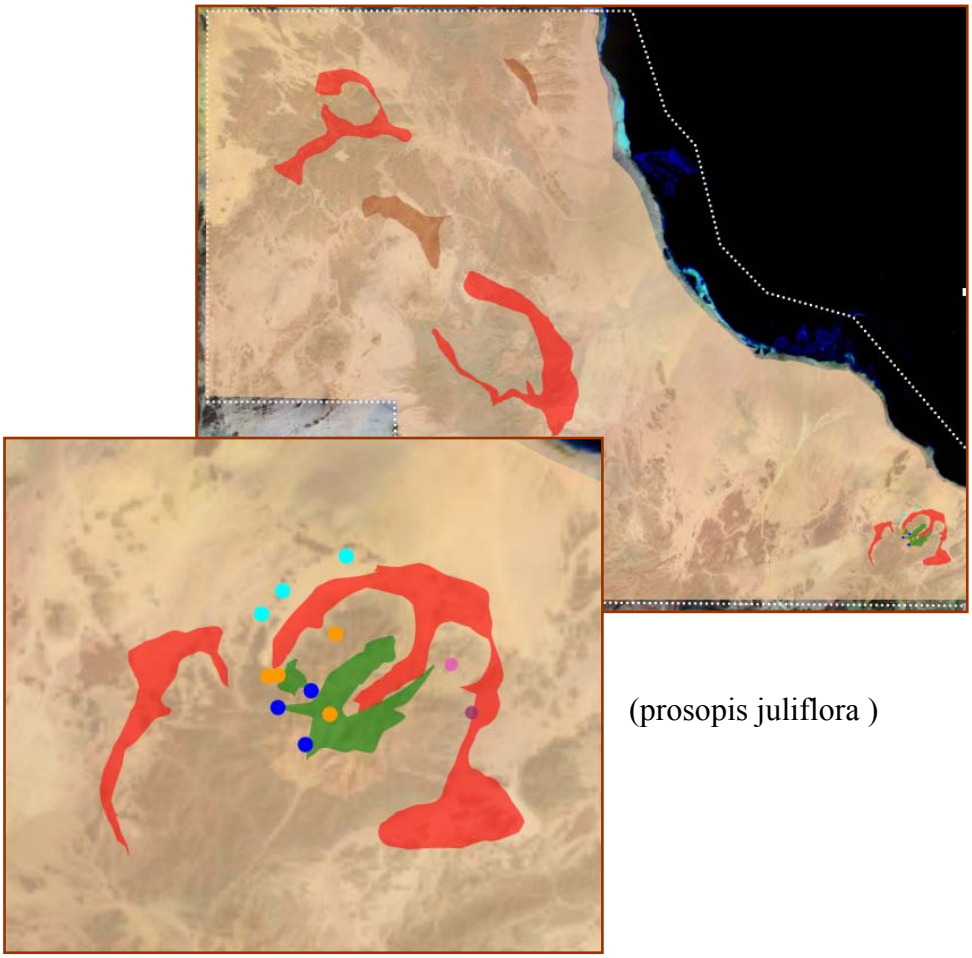
Acacia asak

Acacia latea

Acacia etbiaca

Acacia albida

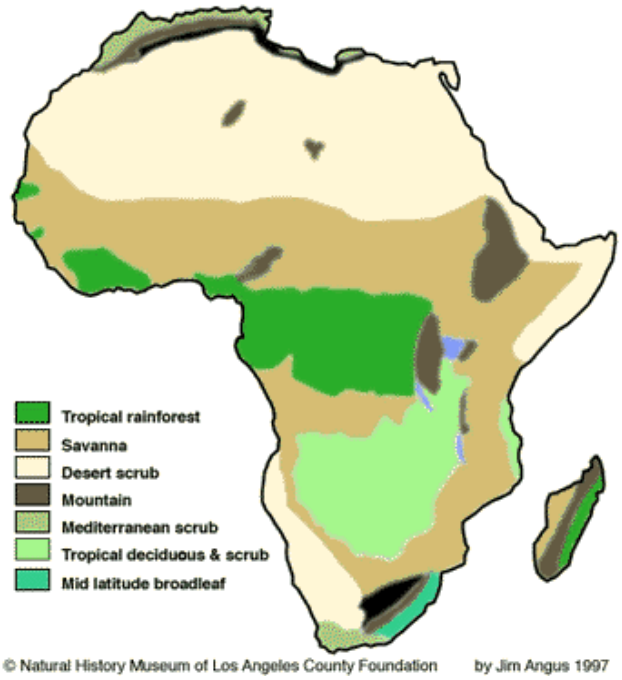
Acacia juliflora



(prosopis juliflora)

h1.2 The ecosystems

Approximately 55 per cent of the land surface of Africa is arid or semi-arid (Jahnke, 1982, cited by Seif el Din, 1991) and is illustrated in Annex B. These areas are characterized by annual rainfalls of less than 100 mm to c. 600 mm in a short season of 2-4 months .



The semi-arid ecosystems of tropical Africa are, with few exceptions, either thorn scrub or thorn savanna, with Acacia as the dominant species, either forming pure stands, e.g. Acacia mellifera thorn scrub, A. seyal thorn savanna, Acacia albida riparian woodland (now more correctly known as Faidherbia albida riparian woodland), etc. These ecosystems are important rangelands for the livestock industry, especially in those areas where A. tortilis is widespread.

Grasses and herbs alone cannot support a livestock industry in the semi-arid regions; browse, especially from Acacia species, plays an essential part. The dietary requirements of herbivores requires an intake of 20-25% browse, of which some 5% is consumed during the rainy season when herbage is relatively plentiful and 30% in the long dry season. Consequently the loss of these Acacia and other browse species would mean that herbivores would no longer be able to live through the dry season without costly and currently uneconomic food supplements

Part two: The uses of Acacia in the rural economy

2.1 Wood products
2.2 Non-wood products
2.3 Services

2.1 Wood products

2.1.1 Fuel

It is generally accepted that the current use of trees for fuel nationally is exceeding incremental growth. The standing volume obtainable from some of the best 20 year-old Acacia woodlands is only 8.5 m^3 ha (Vink, 1989), equivalent to about 0.42m^3/ha of mean annual increment.

Wilson (1983) obtained annual values per capita of 0.50-0.62 m^3 of fuelwood for urban use in Niono, Mali, and cites 0.62 m^3 in northern Ethiopia and 0.63 m^3 in northern Nigeria.. Other authors give values ranging from the annual fuelwood requirements in the Sahel of one

person for cooking of 0.7 m^3 (Maydell, 1987) up to 1.5 m^3 (Montalembert and Clement, 1983) and, in Tanzania for Dar es Salaam, 2.1 m^3 (Hines and Eckman, 1993). For the higher ranges it is uncertain whether fuel consumption is for domestic use only or includes bakeries, brewing, brick kilns, potteries, blacksmiths, etc. Since the degree of drying and efficiency as a fuel also affects fuelwood consumption, any conclusions based on the above figures would be inconclusive apart from obvious deduction that fuelwood consumption is exceeding supply and must inevitably affect other forms of tree usage too

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The present trend of a 2-3% annual population increase and its concomitant increase in demands for more fuel and land for food have placed an impossible strain on existing forest resources, especially in the drier regions.. Similar economies must surely be practiced throughout Africa, where an exponential population explosion creates a demand that excedes natural regeneration of the fuel source. However, more efficient stoves could reduce fuel consumption considerably and thereby substantially reduce some of the pressure on the existing fuel resources.

Whereas it is suggested that the use of fuel by the rural population, which relies heavily on dead wood, may be more or less in balance with regrowth, the urban population places an unbearable strain upon fuelwood tree resources. Land cleared for cultivation, especially in poorly-planned development schemes, also represent a future loss of potential fuelwood supplies (M.A. Trossero, verbal information, 1993). This is well illustrated by the changes in the source of fuelwood for Khartoum, Sudan.

The once abundant natural stands along the Nile of A. nilotica subspp. nilotica and tomentosa were formerly important sources of fuel for the Nile steamers and the railways as well as timber for boat building and railway sleepers (Muriel, 1901); they were even used to pay taxes (Schweinfurth, 1893). Plantations of these species are now minor sources of fuel for Khartoum.

2.1.1.1 Firewood

The desirable criteria for firewood species are (Riley and Brokensha, 1988; Hines and Eckman, 1993):

1. Rapid growth, high volume production, ability to coppice or sprout readily when cut. an requiring minimum management.

2. Wood dense with a low moisture content, relatively easy to cut, easy to handle, with few or no thorns, splitting easily and readily transportable; wood collected during the rainy season should not absorb moisture

3. Slow burning with high calorific value, producing very little smoke without objectionable nor toxic fumes and neither spits nor sparks.

These are criteria that are found in many Acacia species;

The preferred Sahelian species in Burkino Faso and Niger are, because of their high calorific value, freedom from smoke and sparks, Acacia ehrenbergian, A. tortilis subsp. raddiana and A. nilotica subspp. adstringens, nilotica and tomentosa, while the wood of A. macrostachya and A. erythrocalyx is not highly regarded and are little used (Guinko, 1991). By their occurrence in large pure stands, offering easy harvesting and processing conditions, Acacia seyal formations have played a special role in the supply of charcoal to growing cities in Sudano-Sahelian Africa such as Dakar, N'Djamena as well as for many other cities in the Sudan where mechanized farming and the needs for fuel have contributed to the depletion of extensive areas of pure Acacia seyal stands.

2.1.1.2 Charcoal

Charcoal, whether by desire or availability, is often the preferred or only fuel used in urban areas. Its manufacture can be a lucrative industry but inefficient practices can often result in a conversion efficiency that can be as low as 15% so that it is consequently a wasteful process.

The desirable criteria for charcoal are similar to those for fuelwood but requiring large, uniform stands producing wood of suitable dimensions and a high specific gravity (0.7-0.9) for efficiency and ease of manufacture. The characteristics of the finished product are: moisture <7%, ash <3 %, fixed carbon >75 % and apparent density >0.3 g/cc (FAO, 1962).

2.1.2 Timber

. According to Hines and Eckman (1993) the desirable criteria for construction and pole timber are:

1. Rapid growing, with straight stems of uniform size and small branches, naturally pruning and rapidly self-healing..

2. Possess good physical, mechanical, seasoning, preserving, and processing properties and insect, fungus and rot resistant.

For domestic use and handicrafts, such as platters, spoons, shuttles, mortars, tool handles, musical instruments, carvings, bows, arrows, etc. shape, strength, density, ability to peel, work or carve easily, freedom from splinters and, for such items as spoons and bowls, low permeability to liquids, are additional requirements.

2.2 Non-wood products

2.2.1 Forage

The desirable criteria for forage are, according to Hines and Eckman (1993):

1. Provision of palatable, non-toxic, nutritious foliage and fruit.
2. Ability to withstand browsing, lopping, pruning and coppicing
3. Quick growing, especially during the early stages of growth.

Forage refers to all browse and herbaceous food that is available to livestock and game animals; fodder, which is often wrongly applied to forage, refers to dried, cured plant material of crops such as maize and sorghum, including the grain. Browse refers to the tender twigs and leafy shoots of woody plants (Ibrahim, 1975) and is extended by Skerman et al (1988) to include their fruit.

The Acacia trees provide a valuable browse for both game and livestock as well as being a valuable source of highly nutritious pods which can be stored as a dry season supplement for livestock (Table 2.2.1). Depending on the species, a flush of growth is often available at the end of the dry season before the grasses have begun to grow following the first rains (See Annex B for approximate analyses of Acacia browse, etc.). The woody vegetation thus provides a high quality food source at the critical period in late pregnancy of most undulates. It must be emphasized that this first flush of growth, which represents the major seasonal above-ground increase in biomass, is not growth per se but the relocation of stored food resources from the previous growing season. Growth begins after the flush, with the current season's production of photosynthates.

Because of their low presence, the indigenous

Acacia play a very minor role in the browse regime of North Africa and the Near East, never-the-less they are of considerable local importance where species do occur (see sections 3.5 and 3.6). In the arid, semi-arid and sub-humid zones of subSaharan Africa, woody species are an important source of fodder as well as exerting an influence on the seasonality and productivity of the grass cover growing beneath their canopy.

2.2.1.1 Forage Utilization

The degree to which browse is utilized by herbivores is species dependent. However, the recurrent droughts in subSaharan Africa have amply shown that the use of browse of any given soecies is also very dependent on the circumstances and overall availability of usable biomass. Cattle, sheep, equines, wildebeest, most antelopes, gazelles, white rhino and hippo are mainly grazers, but during the dry season balance their diet by browsing. Other species, such as goats, camels, eland, impala, kudu, elephant, giraffe, black rhino and a number of antelope are mainly browsers and can thrive satisfactorily on a purely browse diet (Le Houérou, 1983c).

The daily diet of herbivores, both wild and domestic, is selected almost entirely from the indigenous vegetation. As Dougall et al., (1964) have pointed out, it is important to know what plants are eaten by the different animals throughout the year, and what nutrients such plants might be expected to provide. For example, an elephant in the Tsavo East National Park Park, Kenya, during a single day in May (dry season), selected food from 64 species represent by 28 families, only 10 species of which were grasses (Dougall and Sheldrake, 1964), although what the choice would be for other months of the year is unrecorded.

The wealth of indigenous vegetation as a source of food for wildlife and domestic animals is enormous and it is essential that its preservation, regeneration and productivity should be assured for the future survival of the fauna. See Table 2.2.1 for the livestock and wild herbivores utilizing browse; the list is not exhaustive; see also section 2.3.4 for further discussion on herbivore survival and browse.

The structure of the herbivore community in a wildlife area can be quite complex but under pastoral conditions there is a direct ratio between cattle and goats and the effect of herbivory on the vegetation. Matching the herbivore community to the vegetation structure is essential if a stable system is to be achieved (Walker, 1983). Pollarding is widely used in some areas to keep the browse accessible.

The spines on many Acacia species can act as a self-regulating defense against excessive browsing; longer thorns can develop on, for example, branches of A. drepanolobium that are regularly browsed by goats than those out of reach of the herbivores (Young, 1987). However, thorns do not prevent giraffe browsing, for example, A. tortilis, in the Serengetti Plains but act by slowing down their feeding until a critical level is reached where it becomes too time consuming to seek the shoots between the spines and the animal moves on (Pellew, 1984). When the thorns are removed, increased browsing was observed among the free-ranging giraffe (Milewski et al., 1991).

2.2.1.2 Nutritional Value

The available proximate analyses for the various Acacia species are given in Annex C. The majority of analyses are based on a single sample and, as Walker (1983) has pointed out, such data can be misleading since the variation within a species sampled from different locations can be quite wide, at least for southern Africa and can be far greater than between species within a community. There is no reason to suspect the contrary throughout the

continent. In general, the protein content for Acacia browse is high but, from the little information available, only half of the dry matter is digestible. Especially noteworthy is the high calcium content of the bark of A. tortilis subsp. spirocarpa (5.68%) and A. xanthophloea (4.07%).

Cyanogenic glucosides have been reported by Steyn and Rimington (1935) in the pods of A. erioloba, A. hebeclada subsp. hebeclada, A: lasiopetala, A. tortilis subsp. heteracantha and A. robusta. However, the authors conclude that there is no danger provided the pods are ingested slowly, i.e. in small quantities by livestock that are not excessively hungry.

Tannins are present in most vascular plants and in a number of Acacia species they occur in sufficient concentrations for use in tanning leather (section 2.2.3). Tannins also act as an anti-nutritional factor due to their ability to precipitate proteins from an aqueous solution: In tree leaves tannins are present in both neutral detergent fibre (NDF) and acid detergent fibre (ADF) in significant amounts and are tightly bound to the cell wall and cell protein and appear to be involved in decreasing digestibility. Two groups are recognized, condensed tannins and hydrolysable tannins. While the former are more effective in reducing digestibility, the latter can cause various toxic manifestations due to their hydrolyzing activity in the rumen. They have, therefore, an important influence on the digestibility of browse. Dietary condensed tannins (2-3%) may even assist rumen digestion by forming a protein-tannin complex, thereby reducing wasteful protein degradation. Condensed tannins are known to be present in A. nilotica pods and have been shown to lower growth rate in sheep due to their ability to reduce nitrogen and NDF digestibility; a similar effect is also produced by the hydrolysable tannins in A. sieberiana pods (Kumar, 1992).

2.2.2 Gum

The polysaccharide exudate produced by a number of Acacia species (Table 2.2.2) are used for a number of domestic purposes, including adhesives, a constituent of ink, in crafts, as a cosmetic, in confectionery and as a food. The Hottentots of southern Africa are able to survive on gum for days, while the Moors harvesting gum in the North African desert are reputed to survive on a daily ration of 170 g (Grieve, 1931). Fagg and Stewart (1994) cite the example of the gum from A. gerrardii being in eaten in Oman, and Story (1958) of the Bushmen of the Kalahari eating gums from A. mellifera subsp. A. erioloba, A. erubescens, A. fleckii and A. tortilis subsp. heteracantha.

Gums are also widely used in traditional medicine since Pharaonic times as a soothing and softening agent, being taken internally for coughs, diarrhea, dysentery, haemorrhage, and as well as being used externally to cover inflamed areas.

Acacia gum from A. senegal and some 18 other species was, until the recent tightening of the specifications, a major item of commerce. The gums from this group of species, which include A. seyal (gum talha from West and East Africa), A. xanthophloea (from East Africa) and A. karroo (from southern Africa) are traded on the international markets, but only gum arable, from A. senegal, is now permitted for the food trade, the remainder being for industrial use only. However, acacia gum 'from A. senegal and other African species' is still official in the British Pharmacopoeia (1993) for use as a bulk-forming laxative and pharmaceutical aid. Similarly, while the US specification for the use of acacia gums in the food trade limits use to that from A. senegal (gum arable), the pharmaceutical specification also permits the use of gum talha from A. seyal; the rational being that only small amounts are used per patient and under medical supervision.

Gum arabic was traditionally defined as 'the gummy exudate from Acacia senegal or its related species', embracing a number of species that are not even remotely related taxonomically, despite the fact that the Test Article, evaluated as toxicologically safe as a food additive, refers solely to that from A. senegal. The increasing international pressure towards tighter trade specifications and labelling regulations, identity and purity has led to the Revised Specification (WHO, 1990a, b; FAO, 1990) where gum arabic is defined as originating from A. senegal or closely related species, with a specific optical rotation range of -26° to -34° and a Kjeldahl nitrogen content of 0.27-0.39%. This has limited the designation of gum arabic to members of the subgenus Aculeiferum which, in addition to A. senegal, includes A. laeta, A. mellifera, A. polyacantha subsp. campylacantha, although gum is not available commercially from any of these closely related species. The gums containing tannins and with a positive optical rotation from species such as A. seyal, A. xanthophloea, A. karroo and A. nilotica are now excluded for use in food and consequently attract a lower price (Anderson, 1993); the presence of tannin in these gums is also considered carcenogenic.

Exudates from species other than A. senegal, occur as small tears and dribblets; their collection is consequently extremely time-consuming. This, together with the low price, currently at $US 1000 per tonne, compared to $US 5000 per tonne for gum arable, is likely to kill the export trade in acacia gums but is unlikely to have any serious effect on internal use as an edible comodity, adhesive and ingedient of traditional medicines.

Gum arabic is used in the food industry to fix flavours and as an emulsifier, to prevent the crystalization of sugar in confectionery products, as a stabilizer in frozen dairy products; its viscosity and adhesive properties find use in bakery products, and as a foam stabilizer and clouding agent in beer. In the pharmaceutical industry gum arabic is used as a stabilizer for emulsions, binder and coating for tablets, and as an ingredient in cough drops and syrups. In cosmetics it finds use as an adhesive for facial masks and powders, and to give a smooth feel to lotions.

Industrially, gum arabic is applied as an adhesive, as a protective colloid and safeguarding agent for inks, sensitizer for lithographic plates, coatings for special papers, sizing agent to give body to certain fabrics, and anti-corrosive coating for metals; it is also used in the manufacture of matches and ceramic pottery (Cossalter, 1991).

Gum arabic is a major export crop of the Sudan and, through the Gum Arabic Company, which has a statutory monopoly of the gum arabic trade from the Sudan, effectively controls about 85% of the World Market, with the West African countries Senegal, Mauritania, Mali, Chad, Niger and Nigeria supplying much of the remainder (Anderson, 1993). In the past, the rural population of the Sudan "gum belt" practiced a tree fallow rotation system with A. senegal, forming practically pure stands during the fallow period, thereby increasing soil fertility and reducing soil erosion while, at the same time, providing a dry-season source of income from the gum harvest. With increasing human and livestock populations and pressure on the cultivatable and grazing lands, the length of the tree fallow was decreased or, in some instances, eliminated. The carrying capacity of the range land also decreased, resulting in the necessity to fell the young trees for forage. The poor prices paid to the farmers for their gum has also encouraged the cutting of trees for firewood and charcoal for an albeit short-term source of income.

Despite its advantages of low cost and superior performance over possible substitutes, in the past gum arabic has suffered from variations in quality due to the varying composition of

each batch and also from the uncertainty of maintaining a regular supply, especially since the loss of so many of the trees in the Sahelian droughts of 1973-74 and 1982-83. As a result there has been a steady decrease in demand over the past 15-20 years. Gum arabic sales peaked at around 1970 at approximately 70000 t, of which about 70% went into confectionery products. The high prices and world shortage as a result of the 1973-74 drought resulted in some major users seeking alternative modified starches. Annual sales fell to about 40,000 t during 1978-82. The following disastrous drought created a further world shortage and loss of markets, with annual sales reduced to about 20000-24000 t. World consumption of hydrocolloids by the food industry is fairly stable but, due to the fluctuations in the supply of gum arabic and the increasing availability of modified celluloses and fermentation products such as xanthin and gellan, major users are certainly beginning to pay serious attention to any cheaper alternatives to gum arable. Furthermore, gum importers and users consider that the Sudan, with its almost monopolistic control of the market, as bad for trade confidence. The spreading of sources of supply to give the Sudan control of only 50% of the market would lessen the risk of a major crop failure and improve confidence (Anderson, 1993).

A great deal of wasted effort has gone into the selection for higher gum yields. Elite trees have been identified and their seed sown; a somewhat pointless exercise with insect-pollinated trees. Furthermore, even the yields of elite trees are susceptible to unpredicatable fluctuations in yield. The chemo-physiology of gum production has not been thoroughly investigated and until it is known how and why gum is produced the proper selection and management for higher yields is not scientifically possible.

2.2.3 Tannins

The Acacia species whose bark or pods have been recorded as sources of tannin for taning leather are shown in Table 2.2.3, although it is suspected that many other Acacia species could also be used. The tannins are mainly used in the local tanning industries; very little is exported. Although more efficient solvents are available, for economic reasons it is the water-soluble tannins that are used in the commercial and local tanning industries. As already briefly discussed in section 2.2.1.2, there are two groups of tannins, condensed and hydrolysable tannins present in plants, and their chemistry affects their tanning properties. However, there appears to be no information available regarding the percentages of condensed and hydrolysable tannins present although, according to Siegler et al. (1986), most Acacia tannins are of the condensed type.

The exploitation of tannins from Acacia species is effected in many locations; in Senegal, Mauritania and Mali, the pods of Acacia nilotica subsp. nilotica are intensively used under the name 'Nep Nep'; also in the Sudan as 'sunt grains'. Sunt grains, which were formerly exported from the Sudan, are obtained mainly from the crushed pods of A. nilotica subsp. nilotica or subsp. tomentosa, after first removing the seeds; most of the pod cases are then removed by sifting. The residue contains 50-60% tannin, which gives a soft, plump, very light coloured leather. However, contamination of the pods with iron and mineral matter causes undesirable spotting of the leather (Howes, 1953). There is considerable confusion in the literature regarding the tannin content of A. nilotica because authors fail to mention the subspecies involved; the writer suspects that there could be considerable variation in the tannin content between the subspecies and possibly between individuals within populations. Even Howes (1953), who admits to the existence of subspecies (as varieties of A. arabica), failed to identify the source of sunt grains, although his description of the pods and the vernacular name indicate subsp. nilotica or tomentosa. In Kano, Nigeria subsp. adstringens is

reported to be the preferred subspecies for tanning goat skins for the Moroccan leather trade, the pod residues are afterwards fed to cattle (W.J. Howard, O.D.A., verbal information 1994). In Kenya the bark of the Australian Acacia meansii is processed for tannin at Thika.

2.2.4 Fibre

The Acacia species used for root and stem bark fibre are shown in Table 2.2.4. The fibres are used in the domestic economy and there appears to be no commercial potential. The general impression obtained is that such usages could also be carried out by other genera and that Acacia species are not an important fibre source.

2.2.5 Local medicine

The local medicinal uses of Acacia species are shown in Table 2.2.5. Their uses are not supported by any clinical studies and while the successful treatment of verereal diseases, diabetes or use as an aphrodisiac, etc. is problematic, there are active ingredients present which may be efficacious. Gum, for example, has an emollient activity, resulting in a softening soothing action on the skin or irritated internal surfaces. The astringent activity of tannins causes a contraction of mucous surfaces, coagulates proteins and is useful in stopping bleeding of small wounds and other discharges (Brown, 1977). Hagos et al. (1987) have demonstrated that the stem bark of A. tortilis subsp. raddiana, which is used in Somalia against asthma, contains pharmaceutically active compounds that inhibit muscular contractions of the lower small intestine of the guinea pig. Further research will doubtless reveal the presence of other pharmaceutically active compounds within the genus.

Acetic acid, alcohol and water extracts of the fruits of A. dudgeoni, A. nilotica subsp. adstringens and subsp. nilotica have been shown to have molluscocidal activity. The planting of the latter subsp. along waterways could prove beneficial in the control of schistosomiasis (Ayoub, 1982, 1985; Kloos and McCullough, 1987).

2.2.6 Food

The seeds of several African species are known to be eaten, either cooked or raw (Table 2.2.6.1), but very little is known about their nutritional value (Table 2.2.6.2). What little evidence is available suggests that Acacia seeds could be a very valuable and underexploited food resource. Certainly the Australian species have been found to be generally high in protein (17-25%), fat (416%) and carbohydrate (30-40%), i.e. comparing very favourably with such cereals as wheat and rice and even higher than some meats (Brand and Cherikoff, 1985; Thomson 1992). See also section 3.7 for discussion on the edible seeds from introduced species.

2.2.7 Handicrafts

The uses of Acacia species for handicrafts are shown in Table 2.2.7. These are mainly domestic although there is a small commercial potential for sales to the tourist industry. The general impression is that such usages could be carried out equally well by other genera and that Acacia species are not essential sources of handicraft materials.

2.2.8 Miscellaneous domestic uses

The domestic uses of Acacia species in the rural economy are shown in Table 2.2.8. Again the general impression is that such usages could be carried out by other genera and that Acacia is not a vital species.

2.3 Services

2.3.1 Environmental protection

The Acacia species recorded as being used for environmental protection are shown in Table 2.3.1; there are doubtless others that could be similarly used.

Although often phreatophytes, many species, especially in the drier regions, have extensive, subsurface lateral roots to take advantage of any light rainfall that might occur. Such subsurface root systems help to stabilize the soil. The aerial system too has a role in reducing wind erosion and ameliorating the microclimate although information on changes in humidity and temperature is generally lacking. Such species as A. nilotica subsp. indica, A. senegal, A. tortiliis and F. albida have been widely planted to fix and stabilize sand dunes and combat wind erosion.

The shade effect by reducing air temperatures also reduces soil evaporation and lowers soil surface temperatures; factual information on shade and soil temperatures is poorly documented. Working in Kenya, Amundson et al. (1994) report that midafternoon soil temperatures beneath the canopy of A. tortilis subsp. spirocarpa were reduced by 3-12°C. The depths at which these temperatures were measured is not records but measurements of soil surface and subsurface temperatures with or without a grass cover at El Obeid, Sudan and illustrated in Fig. 2.3.1 (Hunting Technical Services, 1964), suggest soil depth may not be important. However, in the absence of shade the high surface temperatures attained by bare soils must have an adverse and possibly lethal effect on any dormant or germinating seed lying on the soil surface, discouraging revegetation and encouraging desertification.

The lower shade temperatures also encourage a more mesophytic and generally more nutritious ground cover, which is further encouraged by the higher soil moisture in the vicinity of the trunk as a result of stem flow. The rainfall collected as a result of stem flow is not immediately available to the lateral roots, whose root hairs are more able to take advantage of leaf drip around the periphery of the canopy. So far unpublished work in USA suggests that stem flow infiltrates through the soil immediately surrounding the lateral roots to where it can eventually be utilized by the trees.

Measurements of total soil water content under F. albida taken just before the start of the rainy season gave a value of 8% beneath the canopy and 4% outside (Radwanski and Wickens, 1967). The authors hypothesize that the improved physical conditions beneath the canopy could be a contributing factor; lower shade temperatures could a be an additional factor.

2.3.2 Soil Fertility

The direct contribution of Acacia species to soil fertility is two-fold. Firstly, there is the contribution through nitrogen fixation (Table 2.3.2) and, secondly, that due to litter fall. The

contribution of the latter is from the recycling of the minerals extracted from the soil by the root system (Radwanski and Wickens, 1967). The contribution in terms of nitrogen is probably minimal since the foliage on the ground probably undergoes two periods of rapid degeneration. The first is the rapid dehydration of the litter and loss of any volatile compounds, so that by the end of the long dry season the second decomposition will be of the remaining fibrous mass and minerals.

The exception is that of Faidherbida albida, where leaf fall occurs at the start of the rainy season and the litter is consequently readily decomposed and the nutrients incorporated into the soil. It has been demonstrated by Giffard, 1964) that the leaf litter from an average stand of 50 trees of A. albida per hectare returns to the soil an annual equivalent of 75 kg N. 12 kg P. 13 kg K, 20 kg S. 25 kg Mg and 120 kg Ca per hectare (Giffard, 1964). The growing of millet (Pennisetum glaucum) beneath the tree canopy can result in a 2.5- to 3-fold increase in yield without additional fertilizers.

There is also an indirect contribution from livestock browsing on the fallen litter, the decomposition of the dung following similar cycles to that of the litter. The quantitave effect of this contribution does not appear to have been evaluated.

2.3.3 Hedges, Shade and Shelter

The species of Acacia reported to be used for live and brushwood hedges, shade and shelter are recorded in Table 2.3.3. Doubtless other species can also fulfill these functions equally well. The shade value of these trees is evident from the large number of livestock crowding beneath a tree canopy during the midday heat.

Gillet (1983) comments adversely on the practice by the pastoralists of cutting large branches of such thorny species as A. nilotica, A. tortilis subsp. raddiana and A. seyal to construct zeribas (overnight brushwood enclosures for livestock); the practice is even more extensively used by agriculturalists to keep livestock off of their cultivated land. These zeribas last about two years before being destroyed by termites or even earlier by bush fires. The brushwood is either obtained by drastic mutilation of the trees or, as is often the case with the agriculturalists, from trees felled during land clearance. In many areas of the Sahel, where large areas have been cleared in an attempt to counteract the low crop yields due to desertification and low rainfall, there are no longer any trees remaining to provide the brushwood hedges. Live fences using A. mellifera and A. tortilis would be a solution, although the eratic rainfall, often compounded by problems of land ownership and protection during early establishment, do not encourage planting.

2.3.4 Wildlife Resource

The Acacia species recorded as attractive to mammals, birds, edible insects are shown in Table 2.3.4; trees browsed by wild herbivores are recorded in Table 2.2.1.1 and a source of bee food in Table 2.2.1.2; those species listed as being browsed by only livestock are doubtlessly browsed by wild herbivores but their use by them has not been recorded in the literature studied.

Management for game refuge requires a high standard of management, not only to ensure against over-grazing but also to ensure that a proper balance is maintained between the different species, especially predators and prey, as well as between the browsing animal and

the vegetation strata utilized. Giraffe, for example, usually browse trees higher than 2 m (Pellew, 1983b; Prins and Jeugd, 1993).

There is a significant difference between the grazing of domestic livestock and that of indigenous game animals, the former being more selective in their grazing habits as well as being less well adapted to coping with the range of vegetation available. For these reasons, Erkkilä and Siiskonem (1992), working in Namibia where bush encroachment by Acacia mellifera subsp. detiens and Dichrostachys cinerea can become a serious problem, recommend encouraging browsing by indigenous game, especially giraffe. However, it should be pointed out that bush encroachment is mainly a problem in southern Africa and is either absent or only a relatively minor problem in much of semi-arid northern Africa.

2.3.5 Amenity and ornamental value

Species reported to be planted as street trees or garden ornamentals are shown in Table 2.3.5. They appear to have rather limited popularity and their wider use is probably hampered by their relative slow growth; the often faster growing exotic species are generally preferred, especially in the Middle East.

2.3.6 Agroforestry

Agroforestry is defined as "a collective word for all land-use systems and practices in which woody perennials are deliberately planted on the same land management unit as crops and/or animals. This can be either in some form of spatial arrangement or in a time sequence. To qualify as agroforestry, a given land-use system or practice must permit significant economic and ecological interactions between the woody and non-woody components." (ICRAF, 1983).

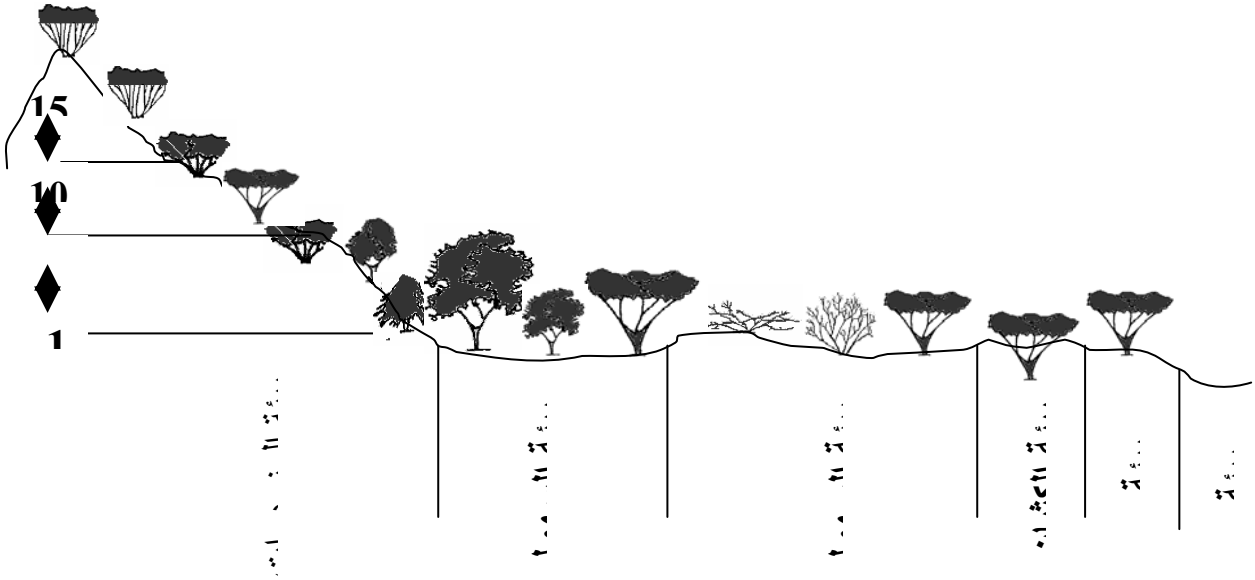
The traditional agricultural system of rotating cultivated land with a period under bush fallow until such time as the soil has recovered its fertility is effective but slow, and is largely dependent for its speed of recovery on the natural regeneration of indigenous woody species.

In elba region acacia it is used in agroforestry in a narrow range , only in a individual garden beside houses and it is restricted for one species "acacia readdian "

But in the last three year there and under the high population growth and food demanding in the same time under the drought effect , ARL with cooperation with WFP start to used a nother introduced acacia species in area which is acacia saligna in agreoforestery and agriculture activities in the north part of elba region , the target is to used this species in forage .

Agroforestry systems would appear to ensure a more rapid recovery and longer maintenance of soil fertility than under traditional fallow; with proper planning it should also offer greater protection against erosion in addition to providing a source of fuel, pole timber, wild food, browse, herbal medicines, etc. But is this necessary true for the drier regions?

Ecology of acacia in Elba region
Habitat and environmental gradient and distribution of acacia
Effect of topographic on acacia distribution



Regeneration of acacia in Elba region

Threats

Under increasing in population growth and demanding acacia species now subject to many threats and risks , which there is a high demanding for the acacia products in the same time there is a fast development line in area that have a side effect on acacia habitat and in the acacia species with direct risk

Threats on acacia in elba region can classify as direct and indirect threats as a type of effect which acacia subject to about twenty one threats in elba region . The source of this threat in most ifrom human activities and other from a natural disasters and circumstances - see annex 1

Socio-economic assessment

Table 1 highlights the main socio-economic roles that Acacia play to different stakeholder groups in Elba P.A . Through a variety of direct, indirect and non-use values

Table 1 Socio-economic roles of Egypt's mangroves

نوع الفائدة	المخرجات	البدو			المجتمع المحلى بالمدن			البحث والتعليم			الحكومة			التجار			المصريين عموما			الاجمالى		
		د	ت	ف	د	ت	ف	د	ت	ف	د	ت	ف	د	ت	ف	د	ت	ف	د	ت	ف
فائدة مباشرة	وقود	0	0	3	1	1	2	0	0	0	0	0	0	1	1	1	0	0	0	2	2	6
	اخشاب بناء	0	0	2	0	0	1	0	0	0	0	0	0		0	0	0	0	0	0	0	3
	تفحيم	3	2	3	1	1	2	0	0	0	0	0	0	2	1	3	0	0	1	6	4	9
	فائدة طبية	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	السياحة	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	7	7	8
	مناظر طبيعية	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5
	بحث وتعليم	0	0	1	0	0	1	1	1	2	0	0	1	0	0	1	0	0	1	1	1	8
	رعى	2	2	3	1	1	3	0	0	0	0	0	2	1	1	2	0	0	1	4	4	11
	انتاج وتربية عسل النحل	1	1	3	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	1	1	6
غائدة غير مباشرة	تدعيم الحياة البرية	0	0	2	0	0	1	0	0	2	0	0	1	0	0	0	0	0	1	1	1	9
	تدعيم البيئات والانواع	1	1	2	0	0	1	0	0	1	0	0	1	1	1	1	0	0	1	2	2	8
	حماية تربة الاودية من النحر	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	تغذية التربة وظائف اخرى	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
فائدة غير مستخدمة	فوائد اخرى غير مستخدمة	0	0	3	0	0	3	0	0	2	0	0	1	0	0	2	0	0	1	0	0	15
	الاجمالى	8	7	29	4	4	20	1	1	7	1	1	6	5	1	12	1	1	8	24	22	94

نوعية التهديد	التهديد		مصدر بالتهديد
التهديدات المباشرة	فقد البيئات	- الزراعة	المشروعات الزراعية
		الرعى	المجتمع المحلى –البدو
		زراعة المحاصيل	المجتمع المحلى – المشروعت الزراعية
		زراعة أشجار الأخشاب	المشروعات الزراعية
	النزع	التحجير	مشروعات التحجير
		التحطيب	المجتمع المحلى –البدو
		التفحيم و الوقود	المجتمع المحلى –البدو
التهديدات الغير مباشرة			
	التنمية	المستوطنات البشرية	الجهات الحكومية
		بنية أساسية (طرق – سدود)	الجهات الحكومية – المشروعات الزراعية
	حالات غير مقننة	العزل – مناطق معزولة	طبيعية
		فقد ونحر التربة	طبيعية
	تراكم القمامة والمخلفات		المجتمع المحلى
	التجارة	تجارة الأخشاب والفحم	المجتمع المحلى
	الأبحاث		الجهات البحثية
	الأنواع الغازية		المتمع المحلى –طبيعية
	اختلال التوازن البيئى (تغييرا ديناميكية الأنواع الأصيلة المحلية)		طبيعية

	كـــــــوارث وتـــــاثيرات طبيعية	الجفاف	طبيعية
		السيول	طبيعية
	عوامـــــــــل جوهريـــــــة للكائنـــــات / طبيعية	ضعف انتشار البذور / الكائن	طبيعية
		فقر الأجيال التالية المعوضة / التكاثر / تبادل الأجيال	طبيعية
		ارتفاع نسبة موت المواليد	طبيعية

أشجار الاساك Acacia asak

الاسم العلمى : Acacia asak
الاسم الشائع : الاساك
النوع : شجرة تصل طولها الى 6م .

المواصفات العامة

الســـــــــــاق

الساق : الساق الصغير اسطوانى محمر الى بنى ارجوانى .
الساق الكبير رمادى مشقوق .
الاذينات : اذينات غير شوكية متساقطة
الاشواك : زوجية او ثلاثية الاشواك الوسطى خطافية وفى بعض

ا الأوراق

التركيب: ورقة ريشية ملساء او لها شعيرات حلزونية .
ريشة ورقية من3-6 أزواج من الوريقات .

الوريقة عبارة عن 8-18 زوج من الوريقات
الوريقات صغيرة اهليجيـــة الشكـــــــل .
السويقة : سويقة الورقة لها غدة بجوار قاعدتها

تركيب الزهرة

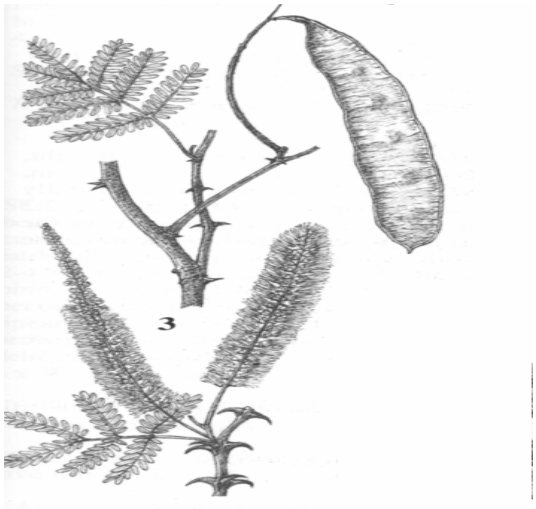
النورة : عنقودية الشكل من 4- 10 سم ذات زهور كمثرية الشكل .
الكأس : 1.5- 2 سم . والتويج : 2.5 سم ابيض الى كريمى .
المتك :خيطى 4-5 مم

الثمار و البذور

الثمرة : قرنية 7-12x 1-1.3 سم ذات لون بنى محمر لى ارجوانى - ملساء - متفتحة - مضغوطة الى شبه شريطية الحواف ليست محززة او محفورة مستقيمة او لها انحناءة بسيطة تشبه حدوة الحصان
البذور :9 مم ضعيفة شبه بيضاوية – بنية مخضرة

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق وبيئات المنحدرات الجبلية لجبل علبة فى وديان عيديب - يهميب فى المناطق المرتفعة من تلك المنحدرات – الكثافة قليلة .



أشجار السلو Acacia nubica

الاسم العلمى : Acacia nubica (Acacia oerfota -oerfota)
الاسم الشائع : الاورفت
النوع : شجيرة متوسطة تصل طولها من 1.5-4 م - متفرعة من القاعدة .

المواصفات العامة

الســـــــــــاق

الساق : الساق الصغير اخضر مصفر مزغب .
الساق الكبير ابيض الى رمادى بنى املس .
الاذينات : اذينات شوكية توجد فى أزواج 1.5سم م

ا الأوراق

التركيب: ورقة ريشية مزغبة تتحول الى ملساء بع
ريشة ورقية من3-6 أزواج من الوريقات .

الوريقة عبارة عن6-16 زوج من الوريقات
طولها من 3 – 6 x 1 – 1.5 مم .

تركيب الزهرة

النورة : ذات زهور بيضاء فى قمة النورة .

الثمار و البذور

الثمرة : قرنية 4-10 x 1-1.5 سم مضغوطة جدا – شريطية اسطوانية – مستقيمة الى ملتوية قليلا – لا يوجد حزوز بها بين البذور – ذات لون بنى مصفر الى صفراء بنية – مزغبة – متفتحة - جانبى القرن مسطح ضيق على الحافة .
البذور : 5-6 x4-5 مم ضعيفة شبه بيضاوية – الى اهليجية مضغوطة قليلا .

التوزيع الجغرافى

نوع مختص لجبل علبة متوطن به دون اى مكان اخر فى مصر
تنمو فى مناطق المنحدرات الصخرية لجبل علبة فى وديان عيديب – يهميب فى low slop– middle slope بكثافة متوسطة بطول المنحدرات .والمناطق الوديان فى السهل الصحراوى بالمنطقة .

أشجار التيكر Acacia mellifera

الاسم العلمى : Acacia mellifera
الاسم الشائع : التيكر
النوع : شجيرة الى شجرة تصل طولها الى 6م ذات جذع بنى مخضر إلى أرجواني قاتم .

المواصفات العامة

الســـــــــاق

الساق : الساق الصغير اسطوانى بنى محمر.
الساق بنى مخضر الى ارجوانى قاتم .
الاذينات : اذينات غير شوكية متساقطة .
الاشواك : زوجية اسفل العقد على الساق - خطافية بنية ارجوانية .

ا الأوراق

التركيب: ورقة ريشية ملساء.
ريشة ورقية : لها زوجين من الوريقات الصغيرة .

الوريقة عبارة عن 1-2 زوج من الوريقات المتقابلة 0.5- 1.8 x1.2-0.2 سم .
الوريقات صغيرة مائلة منحرفة بيضاوية الشكل .

تركيب الزهرة

النورة : ذات عنق طويل من 1.2 – 4 سم .
الكأس : 1مم ذات لون احمر .
التويج : 3 مم ابيض كريمى .

الثمار و البذور

الثمرة : قرنية 2.5-6 x1.2-1.8 سم مسطحة – مستطيلة ذات لن بنى شاحب الى لون القش المصفر – ملساء – متفتحة – لها انحناءة فى نهايتيها مثل حدوة الحصان .
البذور :9الثمرة بها 1-3 بذور – طول البذرة حوالى 1 سم ضعيفة شبه كروية

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق وبيئات المنحدرات الجبلية لجبل علبة فى low slopeالمستوى المنخفض للمنحدرات فى وديان كرم علبة بوادى سرمتاى بكثافة قليلة .

أشجار الخشاب Acacia laeta

الاسم العلمى : Acacia laeta
الاسم الشائع : الخشاب (الهشاب)
النوع : شجيرة متوسطة إلى شجرة تصل طولها إلى 5 م

المواصفات العامة

الســـــــــاق

الساق : ساق بنى محمر غير مقشر القلف
الاذينات : اذينات غير شوكية متساقطة لها أشواك توج

ا الأوراق

التركيب: ورقة ريشية ملساء أو لها شعيرات صغيرة أ
ريشة ورقية من2-3 أزواج من الوريقات المتقابلة .

الوريقة عبارة عن 3-5 (7) وريقات قصيرة لها سو
مختلفة الشكل والحجم 0.3 – 0.2 x 1.5 – 0.4 (0.7)
الوريقات صغيرة مائلـــة اهليجيـــة إلى شريطيـــة ا
سويقة الورقة : من 0.5 – 1.8 سم ذات غدة قرب قاعد

تركيب الزهرة

النورة : عنقودية الشكل من 4- 7 سم– لها سويقة 1- 1.5 سم
الكأس : 1.5- 2 سم ذو لون احمـــر وردى .
التويج : 3-3.5 سم كريمى أو ابيض مصفر .

الثمار و البذور

الثمرة : قرنية 4-7 x 1.5-2.8 سم مسطحة مستطيلة
على الثمرة – ملساء متفتحة - بداية الثمرة تشبه حدو
البذور : عدد 1-2 بذرة لكل ثمرة قرنية 8-9 مم ضعيفة

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق المرتفعات والمنحدرات الـ
فى middle slope–low slop بكثافة متوسطة بطو

أشجار السلم Acacia ehrenbergiana

الاسم العلمى : Acacia ehrenbergiana
الاسم الشائع : السلم
النوع : شجيرة متوسطة تصل طولها من 1.5 إلى 5 م

المواصفات العامة

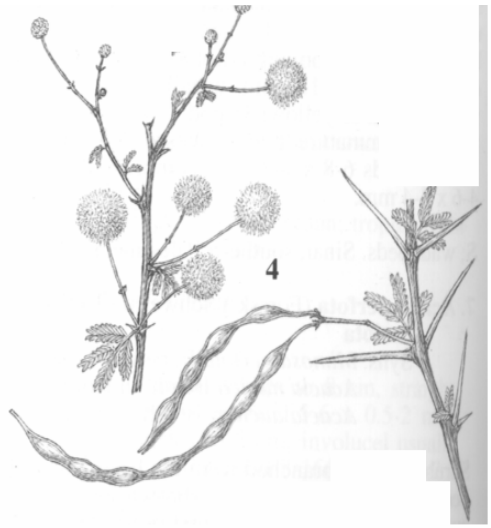
الســـــــــاق

الساق : ساق بنى محمر او بنى رمادى املس او ذو زغب ، يتقشر فى اجزاء صغيرة التفرعات من قاعدة الساق
الاذينات : اذينات شوكية فى أزواج 0.5-5سم مستقيمة

الأوراق

التركيب: ورقة ريشية مزغبة
ريشة ورقية من 1-2 (3) أزواج من الوريقات .

الوريقة عبارة عن 5 –10 (21) وريقات قصيرة لها سويقة واضحة مختلفة الشكل والحجم 0.3 – 0.2 x 1.5 – 0.4 (0.7) سـم
الوريقات صغيرة مستطيلة شريطية الى بيضاوية الشكـــــل
سويقة الورقة : من 0.2-1 سم ذات غدة قرب قاعدة الأذينـــة .



تركيب الزهرة

لها رائحة حلوة مميزة
النورة : سويقة زهرية من 1-3 سم ذات زهور فى القمة بتوزيع
الكأس : 1.5مم .
التويج : 2.5 مم اصفر براق .
المتك : خيطية 4-5مم

الثمار و البذور

الثمرة : قرنية 5-12 x 0.3-0.5 سم مضغوطة شريطية مسننة كلتا طرفيها ، محززة عند كل بذرة منها – ذات لون بنى محمر ه
البذور : عدد 10 بذور لكل ثمرة قرنية 3.5-6.5x2-3 مم مط

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق السهول الصحراوية فى المناطق قليلة جدا .

أشجار السمر Acacia tortilis

الاسم العلمى : Acacia tortilis
الاسم الشائع : السمر
النوع : شجرة تصل طولها من 5 – 12 م متفرعة من قرب القاعدة فى الغالب لها قمة شجرية مسطحة تاجية الشكل

المواصفات العامة

الســـــــــاق

الساق : املس بنى الى بنى محمر .
الاذينات : اذينات شوكية فى ازواج 2-5 مم خطافية ممتزجة بازواج مستقيمة 10 سم

ا الأوراق

التركيب: ورقة ريشية ملساء أو لها شعيرات صغيرة أحيانـــــــا .
ريشة ورقية من3-10 أزواج من الوريقات .

الوريقة عبارة عن 6-20 زوج من الوريقات
الوريقات صغيرة مائلـــة اهليجيـــة الشكـــــل .

تركيب الزهرة

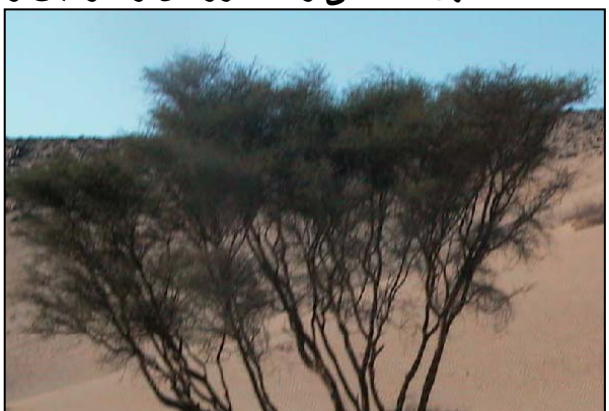
النورة : عنقودية الشكل من 4- 7 سم– لها سويقة 1- 1.5 سم .
الكأس : 1- 2 سم . والتويج : 1.5-2.5 سم ابيض مصفر .
ساق الزهرة : 0.5 – 3.5 سم ذات قنب محورى .

الثمار و البذور

الثمرة : قرنية 3-8 x 0.6-1.2 سمملتوية او ملتفة حلزونيا ضيقة حول
البذور لها عروق طولية ملساء او اهعداب صغيرة
البذور :4-7 x 4-6 مم مضغوطة بنية اللون ملساء

التوزيع الجغرافى

تنمو تلك الانواع فى جميع المناطق والبيئات بمحمية علبة الطبيعية – بكثافة كبيرة جدا فى مناطق السهل الساحلى والصحرواةى والدوديان وفى منطقة المرتفعات السفلية بجبل علبة



أشجار السيال Acacia raddiana

الاسم العلمى : Acacia radiana
الاسم الشائع : السيال
النوع : شجرة تصل طولها من 5 – 20 م متفرعة من اعلى الساق – ذات جذع عريض و قمة شجرية غير منتظمة الشكل الى شبه كروية

المواصفات العامة

الســـــــــــاق

الساق : املس بنى الى بنى محمر .
الاذينات : اذينات شوكية فى ازواج 2-5 مم خطافية ممتزجة بازواج مستقيمة 10 سم

ا الأوراق

التركيب: ورقة ريشية ملساء.
ريشة ورقية من3-10 أزواج من الوريقات .

الوريقة عبارة عن 6-20 زوج من الوريقات
الوريقات صغيرة مائلـــة اهليجيـــة الشكـــــل .

تركيب الزهرة

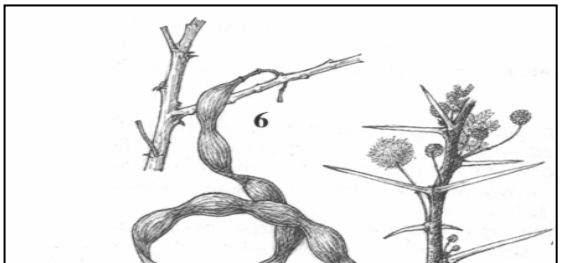
النورة : عنقودية الشكل من 4- 7 سم– لها سويقة 1- 1.5 سم .
الكأس : 1- 2 سم . والتويج : 1.5-2.5 سم ابيض مصفر .
ساق الزهرة : 0.5 – 3.5 سم ذات قنب محورى .

الثمار و البذور

الثمرة : قرنية 3-8 x 0.6-1.2 سم ملتوية او ملتفة حلزونيا ضيقة حول البذور لها عروق طولية ملساء
البذور :4-7 x 4-6 مم مضغوطة بنية اللون ملساء

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق بيئة السهول الصحراوية بوديان محمية علبة الطبيعية (ابرق – ابو سعفة – الحوضين – الاسيلة – بعنيت – ايلاكت- سرارة – عيديب)- توجد بكثافة متوسطة الى - كبيرة - خصوصا فى المناطق ذات المخزون الكبير من المياه الجوفية العذبة – حيث تعتبر كدليل على كمية المياه العذبة فى طبقات الارض .



أشجار القرض Acacia etbaica

الاسم العلمى : Acacia etbaica
الاسم الشائع : القرض
النوع : شجيرة متوسطة إلى شجرة تصل طولها إلى 6 م

المواصفات العامة

الســـــــــاق

الساق : ساق بنى رمادى الى بنى ارجوانى - املس الى مزغب خشن غير متشقق القلف
الاذينات : اذينات شوكية خطافية الى مستقيمة 3-7مم .
الاشواك : الساق عليه اشواك مستقيمة تصل الى 5سم .

الأوراق

التركيب: ورقة ريشية ملساء أو لها زغب .
ورقية ريشية من3-10 أزواج من الوريقات .

الوريقة عبارة عن 6-30 زوج من الوريقات القصيرة .
مختلفة الشكل والحجم 0.5 – 4 x 0.5 – 1.2 مـــم .
الوريقات صغيرة مائلـــة شبه اهليجيـــة صغيرة .

تركيب الزهرة

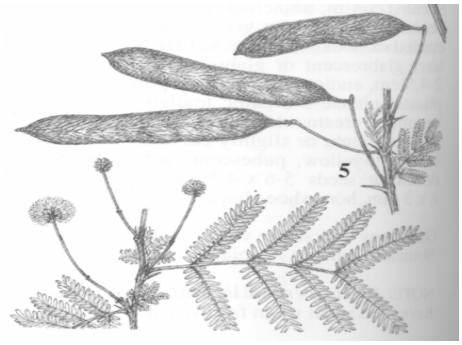
النورة : لها سويقة طويلة 1-3سم توجد على قمتها الزهور .
الزهرة لها قنب صغير حول الوسط .
الكأس : 1مم .
التويج : 3 مم ابيض كريمى .

الثمار و البذور

الثمرة : قرنية 4-10 x 0.8 -1.5 سم مستطيلة مستقيمة – قليلة السمك - ذات عروق طولية– ملساء متفتحة
البذور : 6-8 مم شبه بيضاوية .

التوزيع الجغرافى

تنمو تلك الانواع فى مناطق المرتفعات والمنحدرات الصخرية لجبل علبة فى وديان عيديب – يهميب فى middle slope–low slop بكثافة متوسطة بطول المنحدرات .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