The Argun Palm, *Medemia argun*, in the Eastern Nubian Desert of Sudan

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The Argun palm, *Medemia argun* (Mart.) Wurtt. ex H. Wendl., is a dramatic single-stemmed tree palm, growing 30–50 feet (10–16 m) tall (Fig. 1) with fan-shaped leaves that are glaucous and have bright yellow petioles armed with spines (Fig. 2).

First discovered in the Nubian Desert in northern Sudan in 1837, it was initially named as a species of *Hyphaene*, then moved to its own genus. Then, in 1859, living specimens of *Medemia argun* were linked to fruits in Egyptian tombs of the Fifth Dynasty (ca. 2500 BC) including the celebrated tomb of Tutankhamun (Ibrahim & Baker 2009). Although *Medemia* is now regarded as a monotypic genus, a second species, *M. abiadensis* was described by Wendland and included by Andrews (1956) in the flora of Sudan in the White Nile, but it remains somewhat controversial whether this is actually a separate species or a synonym of *M. argun*. Very recently, Darbyshire et al. (2015) in their annotated list of the plants of Sudan and South Sudan listed *M. abiadensis* as a synonym of *M. argun*.

Medemia argun is endemic to the upper valley of the River Nile in Egypt and Sudan. The palm was once more widespread but is now restricted in Sudan to the Nubian Desert east of the River Nile. This region is so arid that consecutive years pass without any rain. Though the terrain is harsh with many rocky features, the Nubian Desert is characterized by a network of seasonal water courses that drain into and form the large Wadi Gabgaba (Fig. 3). These wadis can run with flash-floods coming from seasonal rainfall in the Red Sea Hills. El Amin (1990) reported that *Medemia argun* extends to North Kurdufan in Sudan, a claim that is yet to be confirmed. Within this context the author has made several environmental impact assessment field trips to various parts of North Kordofan but has not come across the Argun Palm.

1. Single-stemmed Argun palm, *Medemia argun*, with fan-shaped leaves.

2. Bright yellow petioles armed with spines and dead male inflorescences.

The palm was considered extinct in the wild until its rediscovery in Sudan in 1995 (Gibbons & Spanner 1996) in small fragmented populations. According to the International Union for the Conservation of Nature (IUCN) Red list Category and Criteria, the Argun Palm is Critically Endangered B1+2c ver. 2.3 (2010).

Medemia argun is characterized by a skirt of dry leaves that persist below the crown (Fig. 4). The palm is dioecious, and the female tree bears numerous plum-shaped fruits that are purple-black when ripe (Figs. 5 & 6). The fruit flesh is very thin and surrounds a large seed enclosed in a pyrene (stone). Once the fruit has dropped to the ground, the hot soil and weather cause the pericarp to dry and wrinkle (Fig. 7).

During fieldwork in 2015, the author came across some trees with two stems arising from the ground. It is not certain whether these are branches of one tree or two separate trees growing from two adjacent seeds (Fig. 8).

Assessment of the Argun palm in the light of recent visits

The author visited the Eastern Nubian Desert twice, once in 2011 and again in November 2015, as part of environmental impact assessment studies for gold mining activities in Block 16, which is one of the concessions of

3. A dry seasonal water course in the Eastern Nubian Desert.

4. A skirt of dry leaves persists below the crown.

5. Clusters of plum-shaped fruits.

gold-mining companies. In both years he came across populations of the Argun palm. The site is in the Red Sea State about 180 km NE of Abu Hamad (34°00′–34°30′E, 20°00′–21°00′N). Block 16 is characterized by Precambrian Basement Complex rocks and sandy deposits and alluvial soils in the wadis (seasonal water courses).

During the second visit, more sites were visited and measurements were made of tree girth, height, density, association and growth status. Height of the mature trees is about 7–9 m, and the girth at breast height is 90–110 cm. There are large variations in the population density with a range of about 4–10/100 m^2 with large empty spaces.

The Argun palm has been found in association with other woody and herbaceous species. Woody trees include *Capparis decidua, Maerua crassifolia*, *Balanites aegyptiaca, Acacia seyal*, *A. ehrenbergiana, A. tortilis* and *Calotropis procera*. The understory vegetation is more dense within and along the small seasonal water courses and includes *Panicum turgidum, Aerva javanica, Tribulus terrestris, Farsetia* spp, *Aristida mutabilis*, *Morettia canescens, Cleome scaposa, Citrullus colosynthis, Cassia sena, Fagonia cretica* and *Euphorbia forsskalii*.

In trying to assess the current status of the Argun palm in the Sudanese Nubian Desert, the author made the following observations: the tree is widely distributed and not restricted to one site (Fig. 9). Although the survey was confined to Block 16, there were reports from artisanal miners that the tree also inhabits other wadis. The sites inhabited by Argun consist of a system of small wadis and smaller water courses that converge to form a larger wadi that eventually contributes to the large Wadi Gabgaba. Although dead trees are present, there are numerous young trees forming a spectrum of growth ages from seedlings to saplings and plantlets to young and old trees (Fig. 10). Many fruiting trees bear dense clusters of ripe fruits, and newly fallen mature fruits are frequently encountered among the dried up old fruits from previous seasons.

In some upstream sites, the water-flow seems to have come in such strong flashfloods that large dead trunks and leaves have been washed

6. Ripe fruits.

7. Newly fallen mature fruits among dried up, old fruits from previous seasons (inset).

away downstream and stopped only by the stems of live trees. Although some old trees have been burnt there are no signs of systematic burning or cutting. There are no villages or residents within the Argun sites.

All the above observations indicate that the Argun population is intact, stable and at the moment sustainable.

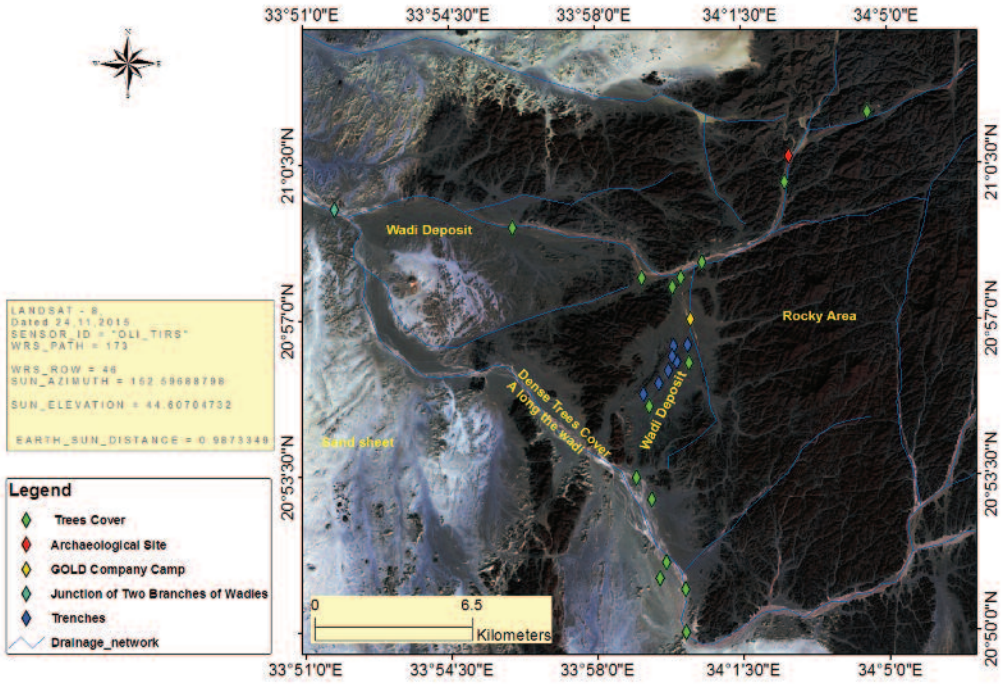
About 30 km south of Abu Hamad, the author came across a solitary Argun tree growing on the edge of a dry water course towards the River Nile. This tree has many apparently basal shoots. These have probably grown from seeds brought by flash floods from the upper wadis. This could be the most southern sighting of Argun in Sudan.

Potential threats to the Argun population

Despite the above observations, there are some factors that could pose threats to the survival of the Argun population:

At one site, sand had been blown and deposited around the trees (Fig. 11). If the

8. Branched Argun trees or separate trees growing from adjacent seeds.



9. Map showing seasonal drainage system, gold-mining activity and archaeological sites in Block 16.

process continues the palms will be threatened by being buried, or the wadi could change its course and deprive the Argun palms of water.

Gold-mining is the current most important activity in this once pristine area. This was started by artisanal miners, but later the government began to control exploitation and almost all the Eastern Nubian Desert in Sudan (between the River Nile and the Red Sea) has now been demarcated and leased as concessions for national and foreign gold companies. It is unfortunate that the only region in the world where *Medemia argun* grows naturally in the wild is now a theater of gold mining activities. The region, once protected by inaccessibility and harsh con-

10. Individuals of *Medemia* of various ages in a wadi.

11. Sand blown and deposited around Argun trees.

ditions, is now open to human beings unaware of a unique and endangered tree. The artisanal miners use Argun wood for cooking and for making shelters. However, this is a short-term activity, and most of the wood used is from dead trees. Tailings from artisanal mining could obstruct natural draining systems and modify the original landscape. Gold-mining companies in the area seek water by drilling boreholes. One of the exploration wells is within a site where there are a few Argun trees. The expected impact on the Argun will be minimal and localized. However, with several proposed boreholes, the impact could be significant if the location of the well is within a denser population. Another activity carried out by the company is the digging of exploration trenches. Luckily, all visited trenches are in higher, rocky ground away from the nearest Argun site. The mining companies, and in particular through their young, enthusiastic geologists and engineers, could play a role in preserving and protecting the Argun community. This could be through certain initiatives and activities such as:

The company's presence may eventually drive off the artisanal miners. Their staff could make Argun enclosures within their concession. The author has already discussed the idea with them and received a positive response. Ground water could be used to irrigate trees around the site, for germinating seeds and for the establishment of Argun nurseries. One geologist is willing to start collecting fruits and send them to the author in Khartoum University to conduct germination experiments. The mining companies have produced the most recent geological and topographical maps of the area, which could be used to delineate the Argun population and its extent. There is an urgent need to organize awareness campaigns among the artisanal miners as well as the mining companies of the importance of the Nubian Argun palm and the need to protect it.

Mining companies could be contacted to host future scientific expeditions. The two obstacles that have hindered any proposals to study the Argun community in the eastern Nubian Desert of Sudan are inaccessibility to the site and where to stay. With the mining companies, at least those for which the IES has conducted environmental impact studies, access has become easy, and accommodation could be made available, or at least the scientific expedition could set camp nearby. One particular company is enthusiastic to collaborate now that it has grasped the idea that their concession has more than gold in it. They believe the prospect of being linked with such a globally interesting conservation endeavor is exciting.

The area is also rich in remains of what seems to be an extensive Neolithic human occupation represented by tombs, settlements, graves and rock inscriptions (Castiglioni & Castiglioni 1998). The area is also significant as a wintering ground for the Sociable Lapwing *Vanellus gregarius*, a migratory bird that breeds

in northern and central Kazakhstan and south-central Russia. This bird species is rated as Critically Endangered within the IUCN Red List of Threatened Species (IUCN 2010, del Hoyo et al. 1996). It was, in fact, during a Sociable Lapwing survey conducted by the Sudanese Wildlife Society in April 2011 that *Medemia* was encountered in the Nubian Desert west of Wadi Gabgaba, east of Station 5 of the Abu Hamad Wadi Halfa Railway (21º00'507"N, 33º01'215"E) (pers. comm.).

The way forward

The once remote, harsh and inaccessible habitat of *Medemia* has become more easily reached due to the presence of the mining companies. One can drive from Khartoum to Block 16, for example, a distance of over 800 km, in one day. The opportunity to go and do real field work for the study and documentation of Argun has never been better than today.

The Eastern Nubian Desert could afford a unique platform where archaeologists, wildlife experts and botanists could join effort. The conservation effort will be welcomed and supported by regional bodies such as the Egyptian Environmental Affairs Agency and the Horn of Africa in Ethiopia as well as the international bodies such as the IUCN and Royal Botanic Gardens Kew in the United Kingdom.

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