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# The French Use of Esparto Grass as Fuel for the Algiers Power Station during World War II (1939–1943)

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**Abstract**

*Between 1939 and 1943, during the Second World War, colonial authorities in Algeria intensified the exploitation of the region's natural resources as part of the broader mobilization for the French war effort. French concessionary companies were compelled to declare the materials they extracted so that their allocation and usage could be directed in service of wartime industry. Among the most exploited resources was alfa grass (Stipa tenacissima), a plant that grew abundantly in the hilly and forested regions of Algeria. With the expansion of the railway network, the exploitation of alfa grass increased significantly, particularly by companies involved in paper manufacturing, textiles, and export industries. These firms utilized the plant both as a raw material for the French paper industry and as a substitute fuel for fixed engines at the Algiers power station, especially amid shortages of coal. This intensive exploitation, driven by the needs of the colonial economy, marked the beginning of an environmental and economic depletion that served French industrial interests at the expense of local resources.*

**Keywords:** *Alfa grass, natural resource exploitation, Algiers power station, colonial economy, Second World War.*

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## Introduction

### Esparto Grass in Algeria: Distribution, Characteristics, and Exploitation Mechanisms during the Colonial Era

The steppe region of Algeria constitutes the primary geographical habitat of esparto grass (*Stipatenacissima*), stretching northward to the boundaries of the Tell Atlas, an area known for its wide distribution of saline lakes or *chotts*, such as Chott El Hodna and Chott El Gherbi, and extending southward to the Saharan Atlas, characterized by its sandy terrain.[i]

This area lies longitudinally between 4°W and 9°E, and latitudinally between 32° and 36°N. It includes the steppes south of Algiers, the Oranian steppes, and stretches eastward to Chott El Hodna.[ii]

Esparto grass also appears in forested areas, particularly along the Tell Atlas range and coastal regions, where relative humidity supports its emergence and growth, albeit within limited ecological zones.

### Climate of the Steppe Regions

These regions experience a harsh continental climate marked by irregular precipitation and wide temperature fluctuations. Annual rainfall ranges between 200 and 400 mm, decreasing gradually towards the south. Summer temperatures exceed 30°C, while winter temperatures can drop below 10°C.

Esparto grass demonstrates notable resistance to cold, surviving temperatures as low as -16°C. Its vegetative activity commences at temperatures between 3°C and 5°C, with optimal growth occurring between 16°C and 25°C.[iii]

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## Ecological and Biological Characteristics of Esparto Grass

Esparto grass is well-adapted to harsh climatic conditions; however, its adaptability diminishes under prolonged exposure to cold or humidity, as it thrives best in dry and warm environments. Its growth is adversely affected by extended droughts and unregulated grazing. Fires, often set by shepherds, can weaken its root systems. Nevertheless, the plant plays a vital ecological role, particularly in combating soil erosion.[iv]

## Classification of Esparto Fields in Algeria

Esparto **fields** in Algeria can be categorized into three main types:

1. **Humid Fields**: The least common, found in northern forested areas, on the edges of the High Plateaus, and in hills and slopes with dense vegetation.

**Semi-arid Fields**: Located in challenging climatic conditions with poor soils, these constitute the majority of Algeria's esparto fields.[v] **Arid Fields**: Predominantly found in dry steppe areas, and are the most widespread.[vi]**Esparto Harvesting Periods**

On April 15, 1921,[vii] the colonial administration issued a decree prohibiting the harvesting of esparto grass in southern regions between March 1 and June 30 each year—coinciding with the plant's growth and budding phase. This measure was due to the absence of agricultural care or fertilizer usage, making prohibition the sole method of conserving this natural resource amid overexploitation by private French concession companies.[viii]

However, the decree included provisions for extending the harvesting period by 15 days or up to a full month upon written requests submitted by local residents to the Governor General. These requests needed to be justified by weather conditions such as rain or snow. Military officers in the south had the authority to approve such extensions in coordination with forest services.[ix]

## Esparto Harvesting Techniques

**A. Manual Harvesting**: This was the most common and traditional method. Workers would wrap the esparto stalks around a wooden stick, then pull them quickly and gather them into loosely tied bundles weighing between 100 and 150 kg. These bundles were stacked within the field and later transported by animals to weighing centers, usually located within the packing facility. After drying, the bundles were mechanically pressed and transported by train to the Port of Algiers.[x]

**B. Mechanical Harvesting**: Concession companies employed mechanical equipment for harvesting, including:

- **The Moroccan Machine**: Designed to mimic hand movements but proved to be limited in effectiveness.

**The Spanish Machine**: More advanced, similar to lawn mowers, capable of harvesting 5 tons per day in a 10-hour shift, equivalent to the output of ten workers.[xi]**Economic Importance of Esparto Grass**

The economic value of esparto grass is the central focus of this study. The colonial administration devoted significant attention to this resource, directing its use towards two main sectors:

1. **Paper Manufacturing**: Esparto was utilized in the production of cellulose pulp due to its excellent natural properties. Initially exported to Britain and later to other European countries, it eventually supported the development of France's domestic paper industry.

2. **Alternative Fuel**: Esparto was used as a substitute for coal to power stationary engines, particularly in power plants such as the one in Algiers, thereby accelerating its exploitation.

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The presence of an extensive railway network linking production areas to ports facilitated the export of large quantities of esparto.[xii]

Although the first official survey of esparto fields did not occur until 1921, considerable environmental degradation had already taken place due to excessive exploitation by French companies. Productive esparto areas were classified according to the administrative divisions of the Tell region, as indicated in official French statistical records, presented in the following table:

**Table 1**: Areas of Esparto Production in the Tell Region of Algeria, According to the French Colonial Administrative Division.[xiii]

(*Unit: Hectares*)

**Department of Algiers**

| Municipality | Esparto outside forested areas | Esparto in forested areas | Total |
|---|---|---|---|
| AïnBessem | - | 25 | 25 |
| AïnBoucif | - | 5.500 | 5.500 |
| Sour El Ghozlane | 1.535 | 405 | 1.940 |
| Beni Mansour | - | 2.255 | 2.255 |
| BouSaâda | 146.100 | 2.188 | 148.288 |
| KsarChellala | 133.855 | - | 133.855 |
| SidiAïssa | 25.000 | - | 25.000 |
| Total | 306.490 | 10.373 | 316.863 |

**Department of Oran**

| Municipality | Esparto outside forested areas | Esparto in forested areas | Total |
|---|---|---|---|
| AïnFezza | - | 24,288 | 24,288 |
| AïnTémouchent | 600 | - | 600 |
| Hassi Ben Okba | - | 250 | 250 |
| BouHenni | - | 273 | 273 |
| Secherou | - | 11,964 | 11,964 |
| Sidi Ali Benyoub | - | 3,318 | 3,318 |
| Djendour | 421,000 | 8,647 | 429,647 |
| Frenda | 12,500 | 32,216 | 44,716 |
| Mekerra | 1,500 | 26,466 | 27,966 |
| Télagh | 61,064 | 18,982 | 230,046 |
| Mascara | - | 8,496 | 8,496 |
| Remchi | 7 | 1,882 | 1,889 |
| Saïda | 2,300 | 108,800 | 111,100 |
| Sebdou | 9,800 | - | 9,800 |
| Gdyel | - | 763 | 763 |
| Zahana | 6,700 | 7,594 | 14,354 |
| Ténira | - | 3,346 | 3,346 |
| Tlemcen | - | 144 | 144 |
| Aflou | 45,429 | 146,000 | 191,429 |
| El Aricha | 160,000 | - | 160,000 |
| Maghnia | 4,790 | 14,992 | 19,782 |
| **Total** | **826,321** | **467,820** | **1,294,141** |

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**Department of Constantine**

| Municipality | Esparto outside forested areas | Esparto in forested areas | Total |
|---|---|---|---|
| Aïn El Ksar | 2,490 | 29,703 | 32,193 |
| AïnM'lila | - | 4,586 | 4,586 |
| AïnTouta | 5,000 | 76,992 | 81,992 |
| Akbou | - | 2,685,52 | 2,685,52 |
| Aurès | 64,361 | 49,736 | 114,097 |
| Barika | 7,800 | 1,533 | 9,333 |
| Batna | - | 11,988 | 11,988 |
| Belezma | - | 7,323 | 7,323 |
| Bibans | 150 | 17,838,54 | 17,84,004 |
| Khenchela | 34,500 | - | 34,500 |
| Meskiana | 18,000 | 1,733 | 19,733 |
| Maadid | 1,500 | 2,950 | 4,450 |
| Morsott | 12,600 | 13,757 | 26,357 |
| M'Sila | 23,330 | 15874, 30 | 33,204,30 |
| Oum El Bouaghi | 1,767 | 3,045 | 4,812 |
| Sedrata | 3,084 | 783 | 3,867 |
| Souk Ahras | 5,333 | 750 | 6,083 |
| Tébessa (Full Powers municipality) | - | 1,690 | 1,690 |
| Tébessa (Mixed municipality) | 112,771 | 44,546 | 157,317 |
| **Total** | **292,686** | **297,430.36** | **590,116.36** |

**Southern Territories under Military Rule**

| Municipality | Esparto outside forested areas | Esparto in forested areas | Total |
|---|---|---|---|
| Djelfa | 349,500 | 2,147 | 351,647 |
| El Bayadh | 971,000 | - | 971,000 |
| Laghouat | 46,000 | - | 46,000 |
| Mécheria | 406,500 | - | 406,500 |
| **Total** | **1,773,000** | **2,147** | **1,775,147** |

**Table 2: Esparto Grass Harvests by Some Esparto Exploitation Companies in Algeria (Stock Declaration) Years 1939-1943.**

(Unit: Tons)

| **Legal Name of the Company** | **1939-1940** | **1940-1941** | **1941-1942** | **1942-1943** |
|---|---|---|---|---|
| SociétéGénérale des Alfas | 14,827 | - | 437 | 1,870 |
| Textiles, Filatures et Tissages | 10,753 | - | 3,845 | 1,330 |
| Société Franco-Marocaine | - | - | - | - |
| Société Commerciale des Alfas | 15,136 | - | - | 3,295 |
| Société d'Exportation des Produits Algériens | 10,419 | 5,946 | 8,360 | 210 |
| Société d'Exploitation des Alfas Nord Afrique | 7,150 | - | 1,094 | 135 |
| Union des Papeteries Navarre | - | - | - | 215 |
| Société Nord-Africaine Commerciale | 1,780 | - | 992 | 320 |
| Société Algéro-Tunisienne des Alfas | 2,094 | 586 | 675 | - |
| Société GhesLuget et Cie | 6,140 | - | 1,596 | 2,315 |
| SociétéMarocaine des Alfas | 6,163 | 200 | - | 227 |
| Sociétéd'Alfa | 17,346 | 14,995 | 19,745 | 4,945 |

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| | | | | |
|---|---|---|---|---|
| Azencot | 4,411 | - | - | 760 |
| Ben Nichou | - | - | 287 | 2,190 |
| Berros | 4,264 | - | - | - |
| Canat | 493 | - | - | - |
| Coupur-Aléiart | - | - | - | 490 |
| Filsd'AntoineCombe | - | 278 | 380 | 232 |
| Dominguez | 1,040 | - | - | 75 |
| Chichi | - | - | - | - |
| Gouttières (Mzarib) | 1,370 | - | - | 91 |
| Lévy | - | - | - | - |
| Martinez Eugène | 748 | - | - | 26 |
| Martinez José Maria | - | 626 | - | 222 |
| Boutard | 189 | - | - | 250 |
| Rovira | 760 | 400 | 310 | 365 |
| Santana | 1,088 | - | - | 200 |
| Span | - | - | - | - |
| Toupilème | 680 | - | - | 225 |
| Ben Dimrad | - | - | - | 102 |
| SociétéLéo | - | - | 400 | 72 |
| Dupuy Robert | - | - | 78 | - |
| Raynaud | - | - | 27 | 123 |
| SidiLarbi | - | - | - | 14 |
| Rodriguez | - | - | - | 1,100 |
| **Total** | **105,851** | **23,031** | **39,326** | **20,407** |

**A Quantitative Analysis of Esparto Grass Exploitation in Algeria during World War II**

**Analysis of Esparto Cultivation Areas**

Table 1 presents precise quantitative data on the cultivation of esparto grass, distributed according to the colonial administrative division that segmented Algeria into four main regions. The data cover three key variables at the municipal level: the total area cultivated with esparto, areas located within forests, and those outside forest zones. The table includes information for approximately 60 municipalities.

Descriptive analysis reveals that the highest average cultivated areas were recorded in the southern territories, where the average exceeded 400,000 hectares per municipality. Significant disparities are noted within the Constantine division, where certain municipalities—such as M'Sila and Aqbou—exceeded two million hectares, a figure that calls for further verification and scrutiny. In contrast, many municipalities recorded extremely limited cultivation, not exceeding 10,000 hectares, indicating a negatively skewed distribution and lack of symmetry, with the potential presence of a high standard deviation caused by extreme values.

Among the top-producing municipalities, Aqbou and M'Sila (in Constantine), El Bayadh and Mecheria (in the South), Djendour and Aflou (in Oran), and SidiAïssa (in Algiers) were leading.

Regarding the spatial distribution of esparto cultivation within and outside forests, the data show that production in the South and Algiers occurs almost entirely outside forest zones. Oran shows a relative balance, while Constantine presents a clearer equilibrium between the two environments, reflecting ecological diversity in exploitation patterns.

**Analysis of Annual Production Data of Concessionary Companies (1939–1943)**

Table 2 provides longitudinal data on the quantities of esparto harvested over four consecutive agricultural years (1939–1943) by a large number of concessionary companies. The figures indicate that the average annual production per company was relatively low, generally not exceeding 5,000 quintals per year. The

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modal value suggests that a significant number of companies reported no effective production during this period (zero or negative values).

The data also reveal considerable disparities in output between companies, with a number of non-declared values, reflecting a lack of transparency or irregular reporting. It is worth noting that the table does not encompass all concessionary companies operating in Algeria at the time, limiting the comprehensiveness of the findings.

### Economic and Environmental Impacts of Esparto Exploitation during World War II

Administrative documents indicate that many concessionary companies failed to comply with esparto harvesting bans and requested extensions due to climate conditions such as rainfall, snowfall, or military operations—factors that directly harmed the plant's natural regenerative capacity. In this context, general authorities delegated discretionary powers to military officers in the South to determine the harvesting dates (ranging from two weeks to one month), which facilitated the overexploitation of the plant.[xiv]

Repeated crises, including labor shortages, typhus outbreaks, and population displacement, led to the suspension of harvesting activities in some areas. Additionally, many Algerians abandoned this occupation due to its meager financial return.[xv]

French press coverage at the time, particularly headlines describing concessionary companies as "sharks in the sea of esparto," reflected the magnitude of the resource's depletion. These companies treated esparto as an exhaustible mineral resource rather than a renewable natural one, despite the existence of regulatory laws governing harvesting periods.[xvi]

From an economic perspective, the following estimated calculations illustrate the revenues earned by French companies from esparto exploitation during the war years: the harvesting cost stood at 15 francs per 100 kilograms, while the selling price to electricity stations reached 50 francs per ton. The railway transport cost per ton was 4 francs, excluding rental costs for esparto fields. Multiplying these values by the harvested quantities between 1939 and 1943 reveals the significant profits achieved at the expense of Algeria's natural resources.

## Conclusion

The French colonial administration exploited the abundance of esparto grass in Algeria—an endemic plant that covered vast stretches of the country—by transporting it through the railway network to northern ports for export to Europe, where it was primarily used in the paper industry. However, with the outbreak of World War II, the colonial authorities implemented general mobilization laws for economic resources, including esparto. French concessionary companies were compelled to declare their stockpiles of the plant, and an inventory was conducted for all quantities harvested between 1939 and 1943. Part of this stock was redirected to the Algiers power station for use as fuel, following tests confirming its effectiveness as an alternative energy source to coal.

The colonial administration mobilized all esparto concessionary companies, transport firms, supervisory services, forestry departments, and the offices of the General Government to ensure the supply of esparto as part of its wartime energy mobilization efforts.

This study reveals the extent of the interconnection between economic imperatives and colonial policies in the exploitation of Algeria's natural resources during World War II. Esparto grass serves as a stark example of the depletion of botanical wealth under a colonial framework driven by administrative and economic domination. The plant was intensively harvested by French concessionary companies, and the quantitative data demonstrate significant regional disparities in the cultivated areas and production volumes, reflecting differences in geographic exploitation patterns and local economic structures.

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The findings highlight a clear failure in environmental protection policies at the time, as French economic interests overwhelmingly prevailed over sustainability considerations. This led to a rapid degradation of the regenerative capacity of this vital resource. The regional and intra-regional comparisons point to the absence of a balanced agricultural strategy and the reliance on short-term approaches that neither respected environmental conditions nor safeguarded the rights of local populations.

These results align with previous scholarly findings on the destructive environmental impact of colonial policies in North African territories. However, this study contributes uniquely by incorporating precise quantitative data and rigorous statistical analysis—dimensions that have been insufficiently explored, particularly in relation to spatial distribution and the economic processing of such data.

Accordingly, this research recommends conducting comparative studies with other French colonies that experienced similar patterns of environmental exploitation. It also suggests investigating the links between the depletion of botanical resources and French industrial policies during the war period. Furthermore, the study proposes expanding the scope of inquiry to assess the socio-economic impacts of such exploitation on Algerian local communities and to explore the integration of this environmental memory into current conservation and ecological rehabilitation policies.

## Références

1. POUGET (M.), 1980.- Les relations sol-végétation dans les steppes sud-algéroises. Trav. et Doc. O.R.S.T.O.M., n° 116, pp. 15-17.
2. Ibid.
3. B. Kadik, Berbar Benahmed, et M. Goussame, « Rapport sur l'Alfa en Algérie », Secrétariat d'État des Eaux et Forêts et du Reboisement (CNREF), p. 12.
4. Ibid., p. 13.
5. Document Algérien, « Synthèse de l'activité algérienne », n° 24, série économique, 1er mai 1947, rubrique : forêt, p. 90.
6. Pouget, op.cit., p. 17.
7. Document algérien, op.cit., p. 95.
8. Archives nationales algériennes (ANA), Fonds Eaux et Forêts, boîte 790, dossier : Ventes et demandes de concessions alfatières, 1923–1929, correspondance du directeur des territoires du Sud au G.G.A., 31 janvier 1929.
9. Kadik, op.cit., pp.21-22.
10. Ibid.
11. Roger Léonard et Maurice Cuttoli, « Alfa », dans Les territoires du Sud de l'Algérie, Alger : Imprimerie Officielle, 1953, p. 269.
12. ANA, Fonds Eaux et Forêts, correspondance G.G.A., direction du territoire de sud, 31 janvier 1929, boîte 790, dossier : Territoires du Sud – Ventes et demandes de concessions alfatières, 1923–1932.
13. ANA, Fonds Eaux et Forêts, boite 790, dossier : Territoires du Sud – Ventes et demandes de concessions alfatières, 1923–1932,Secrétaire général, service de presse, article de presse : « Les Requins de la mer d'alfa », 26 avril 1923.
14. Ibi

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